



The Economy's Influence on Environmental Sustainability and Energy

Including the Top Ten Facilities Issues

APPA THOUGHT LEADERS SERIES 2009

Part 1

Published by:



APPA is the association of choice serving educational facilities professionals and their institutions. APPA's mission is to support educational excellence with quality leadership and professional management through education, research, and recognition. APPA's **Center for Facilities Research** engages in a deliberate search for knowledge critical to policy making in education. CFaR encourages the study of the learning environment, appropriate management strategies, and their impact on education. CFaR is sponsored in part by Applied Management Engineering and Sodexo.

APPA
1643 Prince Street
Alexandria, Virginia 22314-2818
www.appa.org
www.appa.org/tools/measures/tls.cfm

With sponsorship assistance from:



Based in Boston, Massachusetts, Haley & Aldrich, Inc. helps its clients meet an array of strategic environmental, engineering, and management challenges from a tradition of specialized services in the geosciences—integrating technology and human potential to achieve desired outcomes.

And additional support from:



For more than 25 years Delta Controls, based in Surrey, British Columbia, has offered dependable and user-friendly building control solutions to educational, commercial, government, and retail buildings. Its BACnet building solution encompasses HVAC, lighting, and access products.

Primary author Elizabeth Lunday is a business writer based in Fort Worth, Texas.

Copyright © 2010 by APPA. All rights reserved.

International Standard Book Number: 1-890956-56-2
Produced in the United States of America

The Economy's Influence on Environmental Sustainability and Energy

Including the Top Ten Facilities Issues

SECTION I: Executive Summary

Since 2006, the APPA Thought Leaders Series has brought together experts in higher education for two days of discussion about the challenges facing colleges and universities in North America. The major difference between the 2009 event and those of years past was a sense of urgency. Discussions had an added level of intensity, particularly over the implications of the economic recession and the growing demand for **environmental sustainability and energy efficiency** on campus.

Energy and the environment were the focal points for the 2009 Thought Leaders Symposium, and the result is this whitepaper, which considers the major challenges posed by environmental sustainability to higher education institutions. Like all sectors of the economy, higher education is affected by issues such as fluctuating energy prices. However, many in higher education believe colleges and universities have a unique obligation to leadership in environmental action. Thought Leaders symposium participants believe that higher education can play a major role in making the entire economy more sustainable by pioneering critical research, testing new technologies and strategies on campuses, and educating the next generation of scientists, businesspeople, politicians, and citizens.

During the symposium, participants heard from experts on different aspects of energy use and environmental sustainability. They also broke into working groups to identify specific challenges to implementing sustainability and energy management

strategies on campus. The economic situation was never forgotten—for each major issue, teams evaluated the implications of the global recession. In the end, the following major points were established—points that became the outline of Section II of this paper:

Environmental Sustainability

- Challenges to sustainability at colleges and universities:
 - Short-term decisions that are made without considering **long-term goals**.
 - The lack of a **business case for sustainability**.
 - A **budget model** at colleges and universities that hampers comprehensive thinking.
 - A **culture** that hasn't embraced sustainability.
- Impact of the global recession on sustainability efforts:
 - **Short-term thinking** that hampers long-term investment.
 - Using the economic situation as **an excuse not to act**.
- Strategies higher education can use to respond:
 - Rely on leaders to **drive change** on their campuses.
 - Increase **communication** among all stakeholders.
 - **Demonstrate success** with high-visibility projects.

- The role of higher education:
 - Draw on the **intellectual capital** on their campuses.
 - Educate the **next generation** of environmental leaders.

Energy Issues

- Challenges to energy action at colleges and universities:
 - Energy will become a **concern for all departments**, not just facilities.
 - **Uncertainty and volatility** in energy markets pose significant risk.
- Impact of the global recession:
 - Demand is increasing to **reduce energy costs**.
 - New energy concerns are **institution-wide**.
- Strategies higher education can use to respond:
 - Take short-term actions with **long-term vision**.
 - Develop **incentives** for increasing conservation.
 - Develop approaches that **reduce risk**.
 - **Diversify and leverage** funding sources.
- The role of higher education:
 - Conduct vital **energy research**.
 - Provide a forum for **experimenting with different energy strategies** and conservation programs.
 - Create and leverage **partnerships** with alumni, civic leaders, utility companies, and other institutions.

Section III of this report shifts the focus to a discussion of the response of facilities leaders to higher education's challenges. Thought Leaders symposium participants believe strongly that facilities departments must play a central role in green projects since the campus's built environment generates a significant percentage of an institution's carbon footprint. Furthermore, facilities leaders bring in-depth understanding of energy and building issues to the table; they can provide information, insight, and perspective to other campus leaders. Finally, facilities leaders have a unique perspective of the campus as a whole, a perspective that is invaluable in developing sustainability strategies.

Section IV focuses on the top critical issues confronting facilities leaders in 2010. While rooted in the discussion of environmental sustainability and energy issues, Thought Leaders symposium participants expanded their focus to address the top ten critical facilities issues:

1. Adjusting to the new sustainability reality.
2. Developing an institutional vision of sustainability.
3. Creating a leadership role for facilities managers in addressing sustainability.
4. Confronting economic challenges.
5. Fixing broken budget models.
6. Managing rising energy costs and energy volatility.
7. Engaging the campus to address energy challenges.
8. Managing space.
9. Prioritizing renewal needs.
10. Meeting the challenges of workforce development.

As well as discussing each of these critical facilities issues, the paper delves further by proposing several questions that facilities departments use to help understand how their organization is positioned for the future and to develop strategies for improvement.

As the Thought Leaders Series completes its fourth year, it remains clear that the need expressed at the first symposium for dialogue between educational facilities professionals and the rest of the academic community has not gone away. If anything, its importance has grown. The challenges facing educational institutions are many, and the solutions will be as varied as the institutions themselves.

And so both APPA and the participants at the Thought Leaders symposium urge you to consider the specific challenges facing your institution in light of these trends and issues. How is your campus responding to environmental challenges? Have campus leaders committed to sustainability, or do environmental efforts remain scattershot? How have recent fluctuations in energy prices affected your campus? Are you making efforts to increase energy efficiency or investing in green energy sources? How has the economic recession affected your thinking about sustainability and energy?

We look forward to your feedback as the dialogue continues.

SECTION II: Critical Concerns Facing Higher Education

Two of the most important issues facing higher education in the next decade are environmental sustainability and energy challenges. In fact, these two issues are closely related, and energy challenges are often considered a subset of sustainability. However, Thought Leaders symposium participants consider energy challenges so critical to college and university campuses that the topic is addressed separately in this report.

Participants considered these issues and asked questions about specific challenges, best strategies to prepare for the future, and how the recession is affecting higher education's approach. A final consideration was the role of higher education in setting an example for environmental awareness and energy efficiency and demonstrating the effectiveness of new approaches.

Environmental Sustainability Initiatives on College and University Campuses

Background and context of environmental sustainability initiatives. While green initiatives are underway in all sectors of the economy, higher education has become particularly focused on environmental sustainability. Efforts ranging from bike rental programs to recycling campaigns, from ecology courses to organic farms, are underway at campuses across the U.S. and Canada. Sustainability is a wide field, including efforts at reducing environmental impacts, cutting carbon dioxide emissions, promoting green jobs and technologies, reducing waste, eliminating toxins, and generally encouraging awareness of the human impact on natural systems.

Campuses have been a hub of environmental activism since the birth of the movement. Earth Day 1970 marked the start of intense interest in ecology. Environmental efforts for the next 30+ years were widespread but sporadic, but starting in the early 2000s the calls for meaningful, substantial sustainability became impossible to ignore, particularly from student and faculty activists. Higher education institutions also came to realize that sustainability mattered to potential

Data Point: Defining "sustainability" *Higher education has a special call to be green*

Higher education is beginning to recognize the need to reflect the reality that humanity is affecting the environment in ways that are historically unprecedented and that are potentially devastating for both natural ecosystems and ourselves. Since colleges and universities are an integral part of the global economy and since they prepare most of the professionals who develop, manage, and teach in society's public, private, and non-governmental institutions, they are uniquely positioned to influence the direction we choose to take as a society. As major contributors to the values, health, and well-being of society, higher education has a fundamental responsibility to teach, train, and do research for sustainability...

'Sustainability' implies that the critical activities of a higher education institution are ecologically sound, socially just, and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curriculum and research, preparing students to contribute as working citizens to an environmentally healthy and equitable society. The institution would function as a sustainable community, embodying responsible consumption of energy, water, and food, and supporting sustainable development in its local community and region.

— *From the Association of University Leaders for a Sustainable Future*

students and donors. The American College & University Presidents Climate Commitment, launched in December 2006, became a tipping point for many institutions, and momentum has steadily grown for campus leaders to sign the pledge to make their institutions carbon neutral. By 2008, campus-wide

environmental sustainability initiatives had become practically mandatory for higher education. For example, as of this writing, 680 campus leaders have signed the Presidents Climate Commitment, representing one-third of the student population in the U.S. Even institutions that chose not to sign the pledge have created sustainability programs.

All this momentum hit a speed bump in late 2008 when the recession hit college and university campuses. The effect was immediate. College endowments lost an

average estimated 22.5 percent of their value in the first five months of 2009, according to the *Chronicle of Higher Education*. Declining tax revenues resulted in state budget shortfalls and corresponding cuts in funding to public institutions. Reductions in state support reported around the country ranged from 5 percent to more than 15 percent, with universities in California, Hawaii, and Washington suffering cuts of at least 20 percent in 2009, according to the *Chronicle*. State and local funding of community colleges also dropped, even as enrollment at

Data Point: Making a business case for sustainability

Why uncertainty shouldn't get in the way of action

Many business leaders on college and university campuses hesitate to take decisive action on environmental and energy issues since so much is still unclear about both the problems at hand and their solutions. Part of making a business case for sustainability must involve addressing these concerns head-on and insisting that action shouldn't wait for certainty.

1. **We don't know how long it may take.** This is not a short-term problem with a near-term solution. It goes beyond the tenure of many who will be charged today with beginning the process to reduce the campus carbon footprint. However, clear progress can be made in the short-term, and even if the end-game is many years ahead, action needs to begin now.
2. **We don't know the perfect way to proceed.** There is neither a straight path to carbon neutrality nor a one-size-fits-all-institutions solution. Specific approaches will vary based on an institution's size and mission, its geographic location, and numerous other factors. What is known is that the best strategies will employ multiple long-term and short-term tactics simultaneously to bring about as dramatic a reduction in greenhouse gas emissions as possible.
3. **We don't know what new solutions will emerge.** As one example, while the idea of carbon capture and
4. **We don't know how much it will cost.** Most likely, it will cost a lot, but inaction could prove far more expensive. By all indications, climate protection legislative and regulatory requirements for reducing carbon emissions are forthcoming and are certain to factor into the cost of future business operations. Some states already have legislation on the books aimed at compliance with carbon limits, or are introducing their own forms of cap-and-trade systems or carbon taxes that provide incentives to reduce greenhouse gas emissions. Similar actions are expected to follow at the national level. Fines for emissions and the cost of purchasing offsets are expected to rise precipitously as a shared standard emerges for how to value carbon. Institutions that show leadership in getting ahead of the climate change issue now will be well positioned to pay far less in the future.

— Excerpted from *The Educational Facilities Professional's Practical Guide to Reducing the Campus Carbon Footprint*, published by APPA, written by Karla Hignite, 2009.

these institutions soared. While economists say the recession is coming to an end, its effects continue on campuses, with no end in sight. Both public and private institutions face budget shortfalls going into 2010, and many have resorted to hiring freezes, eliminating staff and adjunct positions, collapsing course offerings, deferring maintenance, halting new construction programs, and raising tuition and fees.

Challenges to sustainability. Participants at the Thought Leaders symposium agree that higher education faces an unprecedented challenge of implementing major sustainability efforts during a time of economic hardship. While deeply concerned about the impact of the recession, they nevertheless express a sense of urgency regarding environmental issues, an imperative to make major strides in sustainability. A consensus arose that sustainability must remain a priority no matter how difficult it will be to achieve. As a society—and as the education institutions of that society—we cannot wait to make meaningful changes to save our environment.

However, substantial roadblocks stand in the way. One of the major issues relating to sustainability for higher education is a **disconnect between short-term decisions and long-term goals**. Particularly in this time of budget belt-tightening, Thought Leaders participants believe college and university leaders can make logical decisions for the immediate situation but in the long run discourage sustainability. For example, while deep into a building project, institutions are faced with choices about materials and systems that have lasting impacts on energy costs and efficiency; a short-term decision to save money on an air-conditioning or heating system can have significant long-term costs in terms of energy expenses. Short-term decisions to eliminate staff and cut pilot programs can also reverberate for many years into the future; it can take years to regain expertise lost when employees leave or regain the momentum lost when sustainability programs are shuttered.

A second challenge identified by Thought Leaders participants is that **a business case hasn't been made for sustainability**. Higher education institutions may claim a commitment to environmental action, but when boards and presidents start poring over their budgets looking for places to cut, that commitment comes under fire. If the institution is basing its environmental decisions on a general social sense that sustainability is “the right thing

to do,” it’s going to be easy to back away from action. Hard choices have to be made in hard times, and financial managers need to be engaged in developing the institution’s business case for long-term sustainability programs.

The key to making the business case is to research and quantify the financial implications of institutional actions and compare them with various alternatives, including the choice of doing nothing at all. This means digging into the financial implications of options such as creating a smart grid for your campus or installing solar panels to produce energy. A comprehensive proposal to business leaders for such projects would include details of both upfront and annual costs along with tangible and intangible benefits and detriments. Fortunately, resources are available to make this process easier; for example, APPA, NACUBO, and SCUP published *The Business Case for Renewable Energy: A Guide for Colleges and Universities*, which walks institutions through the process of gathering the information needed for a detailed proposal about renewable energy projects. The book provides guidance on various technologies, ownership options, relationships with utilities, and financing strategies—everything you need to make a bullet-proof case for a sustainability project.

A final challenge is posed by the **broken budget model** of colleges and universities. Higher education institutions rely on a bewildering array of funds, each with its own strings attached. Annual operating funds, capital funds, recapitalization funds, revolving funds, federal grants and contracts, state bond proceeds, foundation grants—each is a separate pot of money that operates independently from the rest. This disparate system has a significant impact on university sustainability, as it interferes with the comprehensive, long-term view that is necessary for campus-wide environmental action.

The consequences are particularly severe in the context of higher education facilities, since the total cost of ownership of any building isn’t realized on one budget. In other words, the funds to construct a building come from different sources than the funds to operate and maintain the building, leading to a mistaken notion that the “cost” of a building is only its upfront construction. In fact, the *total cost* of building ownership includes lifetime costs of a structure, from design through maintenance through renovations through

Data Point: The greening of college sports

Athletics remain largely untouched by sustainability projects

While sustainability efforts seem to be reaching every corner of most college and university campuses, certain areas still are off-limits: football stadiums, swimming pools, tennis courts, and basketball arenas. Higher education sports programs have largely remained unaffected by sustainability efforts and seem likely to remain that way into the near future.

A survey of 97 NCAA Division I-A athletics programs found that only 10 percent have developed a strategic plan for sustainability, according to the 2009 Collegiate Athletic Department Sustainability Survey, conducted by AASHE. While nearly three-quarters of respondents said the emphasis on environmental programs was growing, athletic program leaders were more worried about the bottom line—many said they were concerned about the return on investment of sustainability programs.

This is despite the fact that athletic programs are some of the biggest energy users on campus. In a study of energy use at different buildings on the Pomona College campus, three of the top four energy users per square foot were sports facilities, two swimming pools, and a tennis complex. The environmental impact of other athletics activities such as team and fan travel wasn't even measured.

Shifting the mindset of teams of coaches to make sustainability a priority will likely be one of the biggest hurdles in greening the college campus, but student and fan efforts may lead the way. At the University of Florida, for example, the TailGator Green Team made up of student volunteers spread out across the campus on football game days collecting recyclable trash. In 2008, more than 25,700 pounds of cans and bottles were diverted from landfills.

demolition. When buildings are designed with total cost of ownership in mind, they are constructed to be more energy efficient, easily maintainable, and generally sustainable. Higher education needs to develop budget approaches that are less fragmented and more comprehensive—approaches that actually encourage a big-picture view of the campus, its facilities, and their life cycle.

Finally, a fundamental challenge for institutions regarding sustainability is the culture of higher education. **The entire culture needs to change to incorporate sustainability.** As long as sustainability is marginal—a pilot program, a student-run initiative, a niche academic field—it will be subject to cuts. For sustainability to really have an effect, it must shape institution-wide thinking. Sustainability needs to be framework for evaluating processes, crafting policies, and making decisions. Only then will the hard decisions get made, decisions that will change the institution, overturn long-held conventions, and reshape higher education. Further, only with widespread cultural change will sustainability gain the momentum it needs to succeed. Sustainability isn't something that can be “fixed”—these issues won't be resolved in three or four years. It will take decades of sustained effort to make college and university campuses carbon neutral.

Impact of the global recession. The other significant challenge to sustainability in higher education is, of course, the economic recession. With their endowments shrinking before their eyes and state legislatures axing their support, colleges and universities have had to cut everything in sight—including campus sustainability programs. A May 2009 survey by the Campus Consortium for Environmental Excellence (C2E2) found that 80 percent of college and university environmental, health, and safety departments faced budget cuts for the next fiscal year.

Short-term thinking is hampering long-term investment. Institutions can't hire new staff with new skills; they can't invest in training or educational programs; they can't undertake long-term projects with uncertain outcomes. Furthermore, when every budget is at risk, the instinct is to protect your turf. This forces silo thinking, in which every department and division turns inward and jealously guards its ground. This attitude is antithetical to sustainability, which requires a big-picture

understanding of issues across the campus, the region, and the world. Sustainability programs only work with the traditional walls are broken down and groups work together toward a common goal. In this fraught recessionary environment, that sort of cooperation becomes increasingly hard to achieve.

Further, Thought Leaders participants fear that the **economy can become an excuse not to act**. Institutions fall back on what they know during tough times—they resist the unknown. It would be all too easy for a cash-strapped campus to wash its hands of sustainability, perhaps promising to revisit the problem when times get better. Symposium participants agree that maintaining momentum on sustainability will be one of the greatest challenges of this recession.

Impact on different types of institutions. Clearly, different types of higher education institutions will face a variety of sustainability challenges. Large research universities face the greatest obstacles to sustainability as a result of their large campuses and resource-intensive research programs—the environmental impact of a history or modern languages program is a fraction of that of an electrical engineering or biochemistry program. Most also face the challenge of reduced state funding. On the other hand, large campuses can have greater economies of scale, which can produce greater payoffs for sustainability investments. Most have centralized systems for air and water, so improvements can be made in one place to impact the entire campus. Research institutions can also bring their expertise to bear on the problem and the institution can become a proving ground for new technologies and approaches.

At the other end of the spectrum, community colleges also confront significant challenges to sustainability because they run such a tight ship and have little wiggle room to implement new initiatives. There is some indication that two-year colleges are overrepresented among signatories of the Presidents Climate Commitment, and many have failed to meet the schedule for fulfilling certain obligations of the pledge, according to an analysis by *The Chronicle of Higher Education*. “Most [delinquent institutions] are small colleges or two-year institutions, both with presumably fewer resources to throw at sustainability efforts. Colleges that may have had ambitions for sustainability programs a year or two ago might now be reorienting

Data Point: The recession and community colleges

Associate-granting institutions burn the midnight oil

U.S. community colleges got a one-two punch from the recession: slashed budgets and booming enrollment. Directors of community colleges in half of U.S. states reported in the fall of 2009 that they expected midyear reductions in state appropriations, according to the National Council of State Directors of Community Colleges. At the same time, enrollment is off the charts—between 2007 and 2008, community college enrollment jumped from 3.1 million to 3.4 million, and the record-setting enrollments on many campuses in the fall of 2009 point to even greater growth in the 2009-10 academic year. Some colleges in California, for example, have reported increases of 35 percent.

Community colleges have had to scramble to meet the surge in demand. They’ve put makeshift parking lots in tennis courts, rented office space for classes, and generally crammed the schedule as full as it can go. In fact, so high was demand at Boston-area Bunker Hill Community College that it took night class to a whole new level—two courses were added that run from 11:45 p.m. to 2:30 a.m. Students study introductory psychology and essay writing in the dead of night fueled by coffee and cookies; Wick Sloane, the instructor for the writing course, pumps himself up with pushups before class starts.

Other colleges are also embracing the trend, saying not only do the late-night classes relieve the burden on overcrowded classrooms, they also appeal to shift workers. Illinois Central College, for example, offers Night Owl classes including Introduction to Jazz and Medical Ethics, and Clackamas Community College in Oregon provides graveyard welding classes that run between 10:00 p.m. to 2:00 a.m.

their priorities in the economic downturn,” noted the *Chronicle*.

Further, these campuses are currently so overwhelmed with students that it’s hard for sustainability to get priority on their agenda—they’re too busy trying to fit

students into classes. Fortunately, the environmental footprint of these institutions is generally smaller than that of residential and research campuses, so they don't have as far to go. The only area in which community colleges generally have a disadvantage is in transportation, since their students commute. Data collected by the ACUPCC shows that 50 percent of community college gross greenhouse gas emissions comes from commuting, compared to 11 percent for baccalaureate colleges and universities.

Private colleges and universities have the most flexibility to implement sustainability programs, although lately budget shortfalls have limited their options. Since operating budgets are driven by enrollment, if enrollment is down, it will be hard for the institution to move ahead with sustainability programs. Nevertheless, a smaller organization makes it easier to assemble teams across disciplines to achieve consensus about sustainability priorities.

Strategies higher education can use to respond.

Thought Leaders participants set out several strategies that colleges and universities can use to respond to the challenges of sustainability.

First, **leaders need to drive change.** Without engaged, committed leadership, sustainability efforts will falter. That leadership shouldn't be limited to a campus sustainability officer but should come out of different divisions and departments. Dynamic leaders can come from almost any discipline—what matters is that they can move the campus toward its goals. In addition, this

Data Point: Conservation communication

Oberlin College shows students how much energy they're using

In a recent experiment at Oberlin College, round, glowing lights were installed on the walls of a residence hall. The orbs were tied to the energy metering system for the building and changed colors in real-time based on energy use in the building. Bright red meant high consumption, yellow meant average, and green indicated below-average usage. Just being aware of the energy output of the dorm motivated residents to cut back on power—energy consumption dropped by more than 50 percent.

TLS
8

Data Point: Developing new sustainability metrics for higher education

Allowing campuses to measure what they want to manage

Researchers at Yale University looked at the challenge of measuring sustainability on college and university campuses, focusing their attention on the challenge of coming up with metrics that were realistic, useful, and effective in guiding decision making. They noted that many sustainability goals outline by institutions are either arbitrary or are "long-term ideals that offer no information on the path to achieve them."

The team proposed a process that would break goals into short, medium, and long terms to accommodate the timeframes required to achieve significant change. They also proposed methods to set goals based on multiple sources of information:

Timeframe	Process by which metric target is established
Institutional (up to 12-20 years)	Multiple stakeholder consensus given present-day circumstances
Generational (mid-term, up to 50 years)	Scientifically based "green" scenarios, if available, and in-house projections of historical trends into future
Visionary (up to 100 years)	Theoretically ideal target

Efforts such as these will help institutions develop the tools they need to evaluate and manage sustainability.

leadership needs to be long-term, able to sustain momentum over the long haul. Too often, Thought Leaders participants believe, campus leadership is short-term, driven by immediate goals. A new chancellor or president wants to make his or her mark on the campus, achieve a few limited, high-profile goals, and move on to the next campus. Sustainability requires a greater commitment over a longer time.

Second, sustainability requires **communication among all stakeholders**, particularly as sustainability choices become more difficult and the cost and effort required become greater. Communication is critical to break down barriers between departments and discipline, between town and gown, even between competing institutions. Successful institutions reach out to anyone and everyone who can help the campus achieve its goals. That might mean coordinating space requirements between different departments, partnering with local utilities, or creating research programs with a competing university. In addition, communication is essential to changing the culture of the institution so that the entire campus is focused on the same goals. It is not enough to communicate happy goals about saving the planet, nor is overwhelming stakeholders with data and statistics a useful approach. The most effective communications is straightforward and action-based. For example, a program could inform individuals about how much water they are using (or waste they are generating, or energy they are consuming) and then provide concrete steps on how to reduce that figure.

Finally, higher education institutions need to **demonstrate success**. Making the business case for sustainability comes down to having figures that prove that sustainability is not only for the greater good but also a smart economic decision for the institution. Campuses need to engage in constant measurement and assessment of their progress. Rigorously documented pilot programs give the institution the data it needs to convince skeptics that sustainability gains can be made without breaking the bank. To get the right data, institutions may need to develop new metrics that better illustrate the problem and point toward a solution. Thought Leaders participants argue that current metrics fail to meet the needs of the new sustainability challenge. By carefully evaluating the institution's goals, campuses can determine what they need to measure and put the right metrics in place.

The role of higher education. Despite the challenges inherent in the greening of the university, higher education has a unique role to play in sustainability. Even with all its limitations, higher education can do things no other sector of our economy can do. Colleges and universities have an **unmatched resource in the intellectual capital on their campuses**. Across the U.S. and Canada, students and faculty members are turning their minds to the myriad problems besetting our environment. Every day, they make steps toward a more sustainable future. Certainly the private sector conducts research, as does the government, but their efforts pale in comparison to the fundamental investigations underway at colleges and universities. In fact, if higher education didn't do this research, no one else would. Without higher education's contribution, our society will lack the crucial information it needs to solve global problems.

Higher education shapes the next generation of environmental leaders. The problems of the environment won't be solved in the next five or ten years—it will take future generations to undo the harm of previous generations. Those future generations will be trained and educated in today's colleges and universities. Higher education is taking on the challenge of training a new generation of students who have the skills to confront issues of water, air, and energy.

A 2008 survey by the Council of Environmental Deans and Directors, operating under the University Affiliate Program of the National Council for Science and the Environment, identified 1,182 environmental degrees available from 652 U.S. colleges and universities; on average, 33,000 undergraduate and 9,000 graduate students every year are enrolled in these programs. In addition, higher education is also promoting environmental awareness among the general student population, so even students in fields other than environmental studies leave the university with a basic understanding of conservation and sustainability. All signatories of the ACUPCC are required to “make climate neutrality and sustainability a part of the curriculum and other educational experience for all students,” and colleges and universities are increasingly making sustainability courses part of their core curriculum for all students. The end result will be a generation of citizens with an in-depth understanding of sustainability issues and the skills to create a green future.

Data Point: Renewable energy credits and carbon offsets

Critics charge greenwashing; advocates argue for green investing

One option for colleges and universities seeking to reduce their carbon footprint is to buy renewable-energy credits, or RECs. Institutions pay a premium to buy green energy from sources such as wind or solar power; the credits are intended to cover the additional cost of green-energy production and encourage providers to invest in renewable projects. These credits were invented because it's impossible to direct energy from any particular source—such as a wind farm—to any particular user; once it hits the grid, energy is energy. RECs allow institutions to claim they are using energy from renewable sources without actually building those sources themselves.

However, RECs remain controversial, with many critics claiming they don't actually reduce greenhouse gas emissions. It's often unclear, for example, if the RECs actually pay for a renewable energy project that wouldn't have been built anyway. Further, critics claim campuses would be better off reducing consumption than buying more energy.

Even more controversial than RECs, however, are offsets. Offsets involve sequestering or conserving

carbon dioxide in an amount equal to that emitted by the campus. For example, a campus might invest in a tree-planting project or invest in program to replace incandescent lightbulbs with compact fluorescent bulbs in the community. Many critics have mocked offsets as simply a way to spend yourself green and perpetuate complacency. Others have claimed that offset credits are difficult to calculate, since projects such as tree farms take decades to capture carbon, and can be counted multiple times in multiple ways.

Nevertheless, many campuses have made both RECs and offsets critical parts of their energy plans. Experts recommend, however, that institutions make careful study of any REC or offset proposal before investing. As interest has grown in these approaches, information has become available to help institutions make smart decisions, such as the ACUPCC's Voluntary Carbon Offset Protocol, which offers guidelines on selecting carbon offsets that will actually help the environment, not just relieve some guilt or enhance an institution's image.

Campus Energy Issues

Background and context of energy challenges. For the history of most colleges and universities, energy was cheap and plentiful—barely a consideration for higher education. All that changed in the 1970s, when the OPEC oil embargo resulted in skyrocketing petroleum prices. Suddenly, lines formed at gas stations across North America, energy conservation was all over the news, and Congress poured funding into research and development on alternative fuels. But then gas prices went down and all the fears went away. The difference can clearly be seen just in terms of energy research funding—after a peak in the late 1970s, energy industry spending on research and development fell by almost three-quarters, while Department of Energy funding dropped from an average \$7 billion annually (adjusted for inflation to 2008 dollars) to \$3 billion annually during the next 30 years, according to the Congressional

Research Service. Meanwhile, higher education institutions invested in buildings built on the assumption that energy costs would remain low.

The picture started to change in the late 1990s and early 2000s as global warming became a major concern. With the news full of images of melting glaciers and average world temperatures on the rise, attention focused on the impact of carbon dioxide emissions on the climate. Investment in alternative energy sources such as wind, solar, and geothermal power became seen as a means for reducing reliance on burning fossil fuels and adding carbon dioxide to the environment. The ACUPCC draws on this train of thought by asking campuses to pledge to become “carbon-neutral,” with no net contribution of carbon to the environment.

However, in the business offices and facilities departments of colleges and universities, attention shifted back to energy costs when oil prices shot up again. From 1985 to September 2003, the inflation-

adjusted price of a barrel of crude oil generally remained under \$25/barrel. In 2003, the price rose above \$30; it reached \$60 by August 2005 and peaked at nearly \$150 in July 2008. Energy was no longer cheap nor plentiful. Green energy sources became appealing in an entirely different way because they provided an alternative to oil and natural gas. Conservation became a high priority when energy bills reached unexpected heights. The recession both helped and hurt the energy situation. On the one hand, the recession actually marked the end of the energy cost spikes. When consumers cut back on travel and demand for products dropped, reducing global shipping, worldwide oil demand fell and triggered price reductions. On the other hand, the recession coming hard on the heels of the energy crisis brought home the message that energy uncertainty was not a temporary blip but a new normal.

Data Point: Submetering for labs and research facilities

Calculating the energy load of the most demanding buildings

College and university laboratories generate a constant stream of energy, energy that lab users are rarely aware of. Submetering for labs could help the students, faculty, and staff working in labs better understand their energy use so they could manage it better.

The International Institute for Sustainable Laboratories, with support from the U.S. Department of Energy and the Environmental Protection Agency, recently worked with industry professionals, technology providers, lab managers, and organizations including the International Society for Pharmaceutical Engineering and Lawrence Berkeley National Laboratory, to explore technologies and best practices for lab submetering. The team developed strategies for capturing data, organizing and presenting that information, automating processes, and promoting changes in operations and maintenance. Projects such as this should help institutions find better way to assess and manage energy even in the most challenging of environments.

Challenges to energy action. Thought Leaders participants agree that energy issues will remain a priority for colleges and universities for many years to come. One resulting challenge is that **energy will become a concern for all departments, not just facilities.** In an era of cheap energy, most university programs didn't worry about their energy use. That hands-off attitude won't be possible in this new era. Individual programs and departments will need to be aware of their energy consumption and made to take an active part in improving efficiency. Already, some campuses have begun metering individual buildings and even individual floors and labs. This is going to be a major adjustment for faculty and staff who could always ignore energy use in the past.

Another concern will be energy price fluctuations. **Energy uncertainty and volatility pose significant risk to institutions.** For most of the 20th century, higher education institutions could predict with relative certainty from year to year how much they would have to pay for energy. That certainty has faded in the 21st century—and uncertainty creates risk. As a result, higher education institutions will start looking for any way possible to manage that risk. Campus leaders will need to aggressively pursue energy conservation, as a way to reduce energy demand. They need to broaden their energy portfolio to include green energy sources so that instead of relying on one method of energy production they can spread the risk across a variety of sources.

Some institutions choose to contract with utility providers for green energy, committing to buy power from wind farms, for example; others are investing in renewable energy power production themselves. For example, Vermont's Middlebury College invested in a wood-chip and oil-fired cogeneration plant that should allow the institution to cut its fuel oil use in half while reducing carbon emissions by 12,500 tons annually. Other colleges and universities are installing solar panel arrays and wind farms; Colorado State University, for example, is working on a project to create a massive wind farm that would provide more energy than the campus itself needs. Finally, institutions need to think creatively about strategies to hedge against spikes in energy costs when they come.

Data Point: Locking in energy prices
Are fixed energy contracts the solution to energy cost volatility?

Several colleges and universities have tried to reduce their exposure to energy volatility by locking in energy rates with utility companies. For example, Loyola University of Maryland contracts to purchase between 70 and 80 percent of its energy at a fixed rate to eliminate uncertainty, buying the rest on a floating basis. Concordia University in Austin, Texas made a ten-year commitment with Austin Energy’s GreenChoice Program, locking in rates of 2.85 cents per kilowatt hour.

For Concordia, it was a great deal—the institution can make plans for the immediate future knowing exactly what it will pay for energy. While the university paid more at the beginning for its power, over time the cost of conventional energy such as natural gas has risen above what it is paying for primarily wind power.

However, the strategy has risks. Loyola, for example, purchased about a quarter of its energy in July 2008, when the price of oil reached its peak. Now the institution is stuck with that price even though rates have gone down. At the end of the day, fixed energy contracts are a gamble, and even experts find it extremely difficult to predict movements in the market. Nevertheless, some campus leaders look to long-term predictions that energy prices will only go up in the future and make the commitment to fixed-price contracts. Ultimately, institutions will have to weigh the risk of misreading the market against the risk of energy volatility.

Impact of the global recession. As the recession continues to affect college and university budgets, and any line item that can be cut, is cut, **pressure is increasing to reduce energy costs.** Conservation is a challenge on both the micro and macro level. First, many small, individual decisions add to up to create a university’s total energy output. Leaving a light on, keeping a fan going, adjusting the thermostat by a few degrees: by themselves, they require little electricity, but altogether they pack a big punch. Measuring that output

on a more discrete level becomes critical—people need to know how much energy they are using. Equally critical is the process of communicating how energy use can be reduced so that individuals feel they are having an impact. At the same time, major conservation achievements can be made through major facilities projects. The impact of efforts such as converting lights to energy-efficient fixtures, installing new insulation in old buildings, or upgrading to efficient HVAC equipment can be significant—and often have an excellent return on investment—but nevertheless require major upfront investment. Finding room in the budget for those kinds of investments in the midst of a recession is a challenge.

A second major challenge of the recession in terms of energy is that it puts pressure on **a wide range of institutional processes and operations.** Athletics, housing, food service—all need to be reassessed to determine how much energy they are using and new strategies need to be put in place to cut that energy use. Processes such as budgeting and space management also need to be analyzed so that the institution understands their energy effects. Fundamentally, the need is for the same kind of shift in culture as discussed in the sustainability section—for an overall change in attitude that looks at every aspect of the campus for opportunities to reduce energy use. Colleges and

Data Point: Higher education and energy
By the numbers

- 240,000 buildings
- 5 billion square feet of floor space
- \$15 billion to \$18 billion in new construction and renovation each year
- \$20 billion annually for facilities maintenance, operations, and utilities
- On a typical campus, 70 to 90 percent of direct greenhouse gas emissions are due to buildings.
- Higher education accounts for about 5 percent of U.S. commercial building sector greenhouse gas emissions.

universities that have adopted this attitude have identified significant opportunities for improvement; for example, in a study of one building on the Penn State campus, the Mueller Lab Building, researchers found ways to reduce emissions by one-third, cut 1.8 million kilowatts per hour of energy consumption, and save more than \$45,000 a year.

Impact on different types of institutions. Energy issues pose the greatest challenge for large research and comprehensive institutions. These campuses have a wide variety of buildings on large campuses; they operate 24 hours a day, seven days a week. Both laboratories and athletic facilities place huge demands on the electrical grid, as do dormitories. Dorms have recently become the focus of energy conservation efforts on many campuses; programs are underway to install energy-efficient lighting, create recycling programs, and use submetering to give feedback to students. Research institutions also have the largest electrical, water, and HVAC systems, many decades old, and renovations to those systems require significant investment. On the other hand, improvements to these centralized systems can have a major impact across the entire campus.

Private and liberal arts institutions generally consume less energy than research institutions, although they still face the challenge of controlling energy costs in residence halls. One advantage for these colleges and universities is that they have a relatively uniform energy profile. That is, their programs change little from year to year, so their energy uses don't fluctuate significantly. This helps reduce risk from energy volatility.

According to self-reporting through the ACUPCC, community colleges have the largest average gross carbon dioxide emissions per 1,000 square feet: 29.02 metric tons in comparison to the 15.16 metric tons from baccalaureate colleges and 21.3 from doctorate-granting institutions. However, nearly 50 percent of these emissions come from commuting, compared to 11 percent from baccalaureate colleges and 13 percent from doctorate-granting institutions. A major challenge, then, for community colleges will be helping students and faculty find more energy-efficient ways to get to and from campus. It's extremely difficult, however, for commuting to become a major priority for these institutions in the face of swelling student demand and rising costs.

Strategies higher education can use to respond. Despite all of these challenges, participants at the Thought Leaders symposium identify several strategies that higher education leaders can employ.

First, institutions need to **take short-term actions with long-term vision.** In this time of recession, it's not possible to undertake every large-scale efficiency program the institution has in mind. In fact, even in good times, colleges and universities found it hard to budget for projects such as new cogeneration facilities or complete energy retrofits of aging buildings. (Thought Leaders participants note that if deferred maintenance was a problem when the economy was thriving, how would institutions find the means to fix it now?) The solution is to take the small steps that are possible in today's budget while keeping an eye on the big picture. That means the institution needs to develop long-term plans and come up with major goals, but it doesn't have to undertake all those goals at once. Simple strategies can have measurable gains that give the institution a sense of accomplishment and pave the way toward larger projects down the line.

Second, **higher education needs to develop incentives for increasing conservation.** Generally people want to be more energy efficient, and if they are given the right information and tools they will move toward conservation on their own. However, at some point all of the low-hanging fruit—all of the easy, painless steps—will have been taken, and it will get much harder to make further progress in conservation. This process is already playing out at some institutions; in the first year of Yale University's new conservation program, students cut energy use in residence halls by 10 percent, a significant achievement. The next year, however, energy consumption stayed about the same—students had done all the easy things to become more efficient, and the next steps, that would cut energy use by another 5 or 10 percent, would require uncomfortable sacrifices such as using fewer electronic devices or lowering the heat in their dorm rooms.

Certainly one response to this situation is enforcement; institutions can put energy policies into place that mandate lower energy use and crack down on violators. This has its place, but it can backfire and often ends up annoying and alienating those who would otherwise be supporters. Making conservation decisions for people also has its place; for example, a college or

Data Point: Top five steps to shrink the campus carbon footprint

Tips on achieving the most significant results from the NWF

The National Wildlife Federation has been working with students and faculty on greening the campus for decades. Based on their experience, they propose the following five steps to success:

1. **Convert to zero-carbon or lower-carbon energy sources** (2 to 70 percent savings). Switching to wind, solar, or geothermal energy can result in the greatest cuts to carbon dioxide emissions.
2. **Update efficiency of HVAC** (2 to 30 percent savings). Target the biggest users of energy first, like labs, swimming pools, and older dorms.
3. **Scale back heating, cooling, and lighting demand** (2 to 20 percent savings). Changing thermostat settings requires no upfront investment and can have a major payoff.
4. **Reduce plug loads** (2 to 20 percent). Electronics steadily drain energy from the grid. The best strategy combines behavioral and technological changes.
5. **Make wise campus planning decisions.** Comprehensive, campus-wide planning leads directly to improved stewardship of resources.

university might install low-flow shower heads and toilets in residence halls—although even this strategy can have unintended negative consequences, as when dorm residents in Yale protested loud and long when they disliked their new water-efficient showers, eventually forcing the university to raise the water pressure. However, Thought Leaders participants agree that the most successful energy conservation programs will provide incentives to improve efficiency. These incentives could operate on many levels, from entire divisions and departments down to individual students and faculty members.

Next, **institutions need to develop approaches that reduce risk.** Energy risk is a complex topic, and so are some of the strategies to manage it. Institutions can

enter into agreements designed to hedge against risk such as swaps, caps, option pricing, and collars. Universities would be wise to seek out skilled, experienced experts to explore these financial mechanisms. However, these are not the only steps colleges and universities can take to limit their risk. Investment in alternative energy provides a hedge against fossil fuel prices, while actually generating power gives institutions control over their energy production.

Finally, **colleges and universities should diversify and leverage funding sources.** Creative thinking has led institutions to develop a wide range of funding mechanisms for energy management programs. Some create revolving loan funds for efficiency projects, others borrow against their endowments, and still others seek out grants from private, state, and federal sources. Student fees are becoming an increasingly powerful way of funding energy improvements; at several institutions,

Data Point: Achieving net-zero buildings on campus

Higher education association partners with the DOE

The U.S. Department of Energy (DOE) launched a major initiative in 2008 to advance the development and adoption of net-zero energy commercial buildings—buildings that would have a net-zero effect on the power grid by generating as much energy as they consume. Significant research will be required to meet the goal of marketable net-zero buildings by 2025, including research on challenges and solutions appropriate for different market sectors. DOE is therefore partnering with industry groups to develop sector-specific strategies.

The newly formed Higher Education Energy Alliance (HEEA) is DOE’s partner for higher education and will lead the effort to develop net-zero buildings for colleges and universities. Along with other higher education associations, APPA will work to harness advanced technologies emerging from DOE and its national laboratories, create an information-sharing network to promote effective strategies, help shape future energy research, and serve as a unified industry voice on energy issues in higher education.

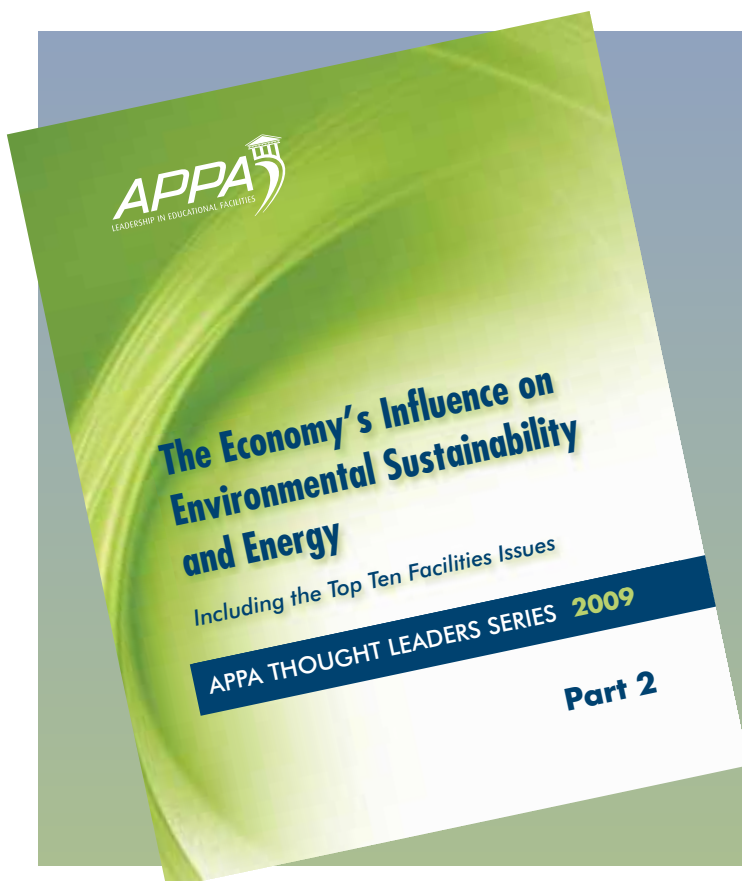
students have voted to increase fees to fund projects ranging from LEED-certified buildings to investment in wind farms.

The role of higher education. No matter how great the energy challenges confronting them, colleges and universities have a unique obligation to respond. Higher education plays numerous important roles in our society: educator, leader, innovator, creator. All of these roles will need to be applied to the challenges of global warming and energy uncertainty.

One specific area in which colleges and universities can play a part is in **energy research**. Fortunately, funding for such research seems to be on the rise; more than \$327 million of the Obama administration stimulus funding went into research on projects including smart grid technology and integrated climate research. However, funding would have to jump even more to come close to the equivalent of late 1970s levels, a tough proposition for a down economy. More than likely,

colleges and universities will have to continue patching together a wide range of funding sources for their energy research. Experts agree that no matter how it is funded, colleges and universities will be the source of the most innovative new energy technologies.

Colleges and universities can also provide a **forum for experimenting with different energy strategies and conservation programs** as well as for field tests for energy research. Where better to put new ideas into action than in the institutions where those ideas were developed? Higher education needs to embrace experimentation even in the face of risk and try out new ways to generate electricity, manage water, and control air. Colleges and universities also need to reach out into the community and **create and leverage partnerships** with alumni, civic leaders, utility companies, and other institutions. Institutions have enormous storehouses of intellectual capital to draw upon outside of the university's walls; it's time to tap that capital to come up with creative energy solutions.



Look for Part 2
of this series in
the July/August
2010 issue of
Facilities Manager
magazine.



Introducing the APPA

BOK

Body of Knowledge

Your Ultimate Guide to the Educational Facilities Profession

Imagine having the most authoritative and up-to-date information on the practice of educational facilities right at your fingertips.... 24 hours, seven days a week.... and made available online to you and every staff member at your institution!

APPA's online Body of Knowledge provides your entire facilities organization with instant access to practical guidance, best practices and proven solutions from the educational facilities profession's most respected and recognized leaders.

APPA members can enjoy this benefit (a 12-month subscription) at the member price of \$199.00 per institution. This one low subscription price provides online access to your entire staff.

For an online demo of the APPA Body of Knowledge and to subscribe, visit:

www.appa.org/bok

The APPA Body of Knowledge is Made Possible through the Support of:

Benefits:

- Latest practices, recommendations, and professional guidance from over 60 subject matter experts (leading educational facilities professionals).
- Over 50 chapters of online content updated regularly, and offering you only the most up-to-date information and practices.
- Four core areas of content: General Administration and Management; Operations and Maintenance; Energy, Utilities, and Environmental Stewardship; and Planning, Design and Construction.
- Online access to EVERYONE in your facilities department for one low subscription price of \$199.00 for 12 months (for APPA members only).
- Provides a source of education and professional development for your entire facilities team.
- Latest content can be read online, or saved and printed from your computer.
- Notification of regular updates to the Body of Knowledge content, via the BOK Newsletter.

