*The Educational Facilities Professional's*

# Practical Guide to Reducing the Campus Carbon Footprint

APPA
LEADERSHIP IN EDUCATIONAL FACILITIES

Published by:

APPA
LEADERSHIP IN EDUCATIONAL FACILITIES

CFaR | Center for Facilities Research

**APPA** is the association of choice serving educational facilities professionals. 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** was established to engage in a deliberate search for knowledge critical to policymaking in education. CFaR encourages the study of the learning environment, appropriate management strategies, and their impact on education.

APPA
1643 Prince Street
Alexandria, VA 22314-2818
***www.appa.org***

**With generous sponsorship from**

AEI Affiliated Engineers

AEI/Affiliated Engineers, Inc. is a mechanical, electrical, and piping consulting firm working nationally and internationally on complex and large-scale projects. For higher education, the firm specializes in high-performance sustainable building design and in energy systems master planning, design, and implementation. Energy-related specializations include: alternative and renewable fuel analysis and implementation; performance modeling; climate action plan development and emissions control planning; chilled water, steam, high- and medium-temperature hot water, and distribution systems; thermal storage; and combined heat and power.
***www.aeieng.com***

*Primary author Karla Hignite is a freelance writer based in Kaiserslautern, Germany.*



International Standard Book Number: 1-890956-48-1
Produced in the United States of America

# Contents

# Contents cont.



# FOREWORD
# What We Don't Know Shouldn't Stop Us

The phrase *cone of uncertainty* is one you might hear weather forecasters use when describing a gathering storm. Early on, as a storm is taking shape, it's difficult to know how fast it will pick up speed, how forceful it may be, where it will hit with greatest impact, and the extent of the damage it may leave behind.

This term is also used by project engineers whose modeling techniques attempt to predict outcomes before they have full knowledge of what will happen or when. At the outset, the project may be fraught with uncertainty about the best course of action, or how long it will take to deliver the desired results, or what it will end up costing. At the beginning, the cone is wide, but through a series of adjustments, the cone eventually narrows to zero percent.

Tackling climate change can be viewed in both these contexts. As in the case of the storm, we may feel like spectators, with circumstances seemingly outside our control. In reality, this isn't a localized storm. The entire planet is in peril, and we need to do much more than wait and watch. We can and must act to influence the outcomes, despite the things we don't yet know.

Recent energy and economic pressures in the United States are in some ways reminiscent of the 1970s, when concerns about the availability of fuel sparked an "energy crisis" leading to wide-scale interest in energy conservation and alternative energy sources like solar power. At that time, many college and university facilities departments launched major efforts to increase energy conservation and efficiency on campus.

Of course, conditions on the ground and in the air have changed dramatically in the past four decades. The Earth has added another 2.5 billion people. And the developing economies of population giants China and India are showing a growing appetite for fossil fuels—not unlike the cravings of the United States, which represents only 5 percent of the world's population yet accounts for nearly 25 percent of total energy consumption. While the supply of energy remains a concern, this time around the energy crisis is primarily about an even larger problem: There's too much carbon in the air, and the atmosphere is warming.

**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.

**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.

**We don't know what new solutions will emerge.** As one example, while the idea of carbon capture and sequestration is being explored for its potential for safely storing emissions rather than releasing them into the atmosphere, those market technologies and processes are only beginning to be understood. Other helpful breakthroughs are likely to occur, but it would be naïve to assume that a magic bullet will emerge to save the day. We must act now on the basis of current knowledge, while remaining ready to shift our approach as opportunities arise.

**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.

## A roadmap for reducing emissions

Excellent instruments and resources have already been developed to support the American College & University Presidents Climate Commitment (*http://www.presidentsclimatecommitment.org/*). Rather than duplicate those efforts, this implementation guide is intended to give educational facilities professionals a practical companion framework for moving forward in their unique role within this process. The intent is to help facilities professionals maximize their specific contributions and share their expertise and knowledge while working in tandem with other campus stakeholders to meet their institutions' goals of carbon neutrality and reduced greenhouse gas emissions.

One key point for moving forward: Begin with the end in mind. Specific approaches and timelines taken by institutions will vary. What is universally true is that institutions must engage in asking the right questions and brainstorming all possible solutions. The process itself is on par with institutional master planning and requires the input and buy-in of all campus stakeholders.

The chapters that follow expand on five key action steps critical for reducing your campus carbon footprint.

1. **Form a stakeholder group.** Identify key roles and responsibilities.
2. **Complete a greenhouse gas emissions inventory.** Develop baseline measures through facilities and energy audits.
3. **Develop a strategic climate action plan.** Outline mission, goals, and timeframes; brainstorm all possible options; and create a roadmap to carbon neutrality.
4. **Identify resource investments.** Allocate financial, intellectual, and personnel resources to reduce emissions.
5. **Implement a tactical plan.** Identify and carry out specific projects and initiatives, and monitor, report, and validate progress.

Following the publication of this implementation guide, APPA will launch a website in 2009 dedicated to expanding on the information presented in this document. This new site will provide links to important resources and offer best practices and case studies of specific actions being taken by colleges and universities throughout North America.

## How to use this guide

One way to view the steps articulated in this guide is in a circular fashion. Once all stakeholders are identified, an initial carbon inventory forms the basis for setting strategic goals, applying resources, and engaging in specific actions to reduce emissions. Improvements achieved allow stakeholders to then reset the bar, reassess strategies, reallocate funding, and recalibrate tactics to address the next round of reductions.

A solid process and structure are imperative for maintaining momentum for the long journey of achieving carbon neutrality. However, ***do not let formal processes impede important near-term progress.***

Some facilities professionals may want to dive into the meat of this guide—developing and implementing a tactical plan (chapter 5)—to identify specific actions they can take immediately to realize important near-term carbon reduction results even as they collaborate to build the kind of formal structures and financing commitments that will maintain ongoing attention and action. In fact, the Presidents Climate Commitment calls for participating institutions to select, within two months of signing the commitment, two or more tangible actions to complete during the two years that the long-term climate action plan is being developed.

Addressing the challenge of climate change and the carbon footprint of your campus is not for the timid. Two key questions at the outset are these:

1. Has your institution formalized its commitment to reducing its carbon footprint?
2. What is your institution's capacity to accept dramatic and swift change?

Your responses to these questions will provide a good gauge of where in this process you may need to begin.



# 1. Form a stakeholder group.



**GUIDING PRINCIPLE**
***Organize for Success***

Before you can develop the necessary strategic, financial, and tactical plans to comprehensively address greenhouse gas emissions on your campus, your institution must organize in a way that builds bridges across your campus and into the community. After you have identified all stakeholders and their roles, and have formally organized as an institutional structure, you can move on to the next steps of gathering relevant data, developing institutional policies and strategies, considering financial impacts, and outlining actions for implementation.

Virtually every activity that takes place on an institution's campus has an impact on its carbon footprint. From vehicular traffic to the food served and the waste generated to where thermostats are set and how laboratory fume hoods are vented—all these activities carry a measure of greenhouse gas emissions.

Because the problem of carbon rests with all campus occupants, tackling emissions-reduction efforts will require a critical mass of constituents across the institution. Only a wide range of expertise and input will yield the brainpower needed to develop a viable plan for pursuing carbon neutrality. The effort must have top-level support, but it also requires buy-in at all levels and from all sectors to ensure that the strategies developed carry forward with the enthusiasm needed to build organizational capacity and sustain participation over the long haul.

In short, a new kind of support structure is required that connects the institution's enterprise to its academic mission of teaching, research, and public service. The first step in organizing to effectively engage the full campus is to identify key stakeholders and their roles and responsibilities.

Ultimately, this core stakeholder group, or subsets of it, will be charged with developing the institution's strategy for pursuing carbon neutrality, gathering and evaluating critical data, identifying the necessary financial and human resources, and carrying out specific priority actions aimed at curtailing greenhouse gas emissions. The kinds of issues discussed in this group will range from energy loads and construction standards to greening campus operations to integrating sustainability into the institution's degree programs and coursework.

## New roles for the facilities professional

For decades, many educational facilities professionals have served on the frontlines and spearheaded efforts to reduce energy consumption and enhance operational efficiency of the physical plant. The urgency of the need to significantly curb greenhouse gas emissions requires a new model of thought and action.

Although educational facilities professionals will be instrumental in meeting the challenge of guiding their institutions through carbon reduction initiatives, the changes needed go beyond enhancing operational efficiency into the roots of rethinking curricula and the entire student experience. While in many respects still leading the charge, today's facilities professional must understand that today's efforts to address climate change require campus-wide collaboration among many stakeholders. In this new environment, facilities professionals must be willing to serve in new capacities.

**Subject expert.** For the most part, the inner workings of a campus's physical facilities go largely unnoticed by the majority of building occupants. Most don't understand where energy is coming from or how it is used (and often wasted) within buildings and around the campus. A sense of the overall capabilities and complexities of current systems and their alternatives will allow all stakeholders to make better informed, strategic decisions about future directions. Faculty, staff, and students will all benefit from having facilities staff share their knowledge about energy sources and systems, construction standards, and the conservation measures already in place. Something as simple as providing hands-on demonstrations and tours of facilities can give students, faculty, and staff greater understanding of the systems of the campus, how they interrelate, and the opportunities for modifying them for low-carbon operation.

**Academic liaison and partner.** Facilities staff must be willing to work closely with faculty and students to fulfill the academic goals related to the institution's climate change initiatives. This may include anything from guest lecturing in classes or partnering with faculty to develop or round out curricula to shepherding students through the process of conducting facility

and energy audits, collecting data, and monitoring resource use and efficiency. Facilities staff can help develop research projects that will enable operations staff to measure and assess impacts and develop strategies for resource reduction.

**Strategic administrative partner.** Facilities professionals must partner with campus administrators to ensure that all the resources—time commitments as well as financial—are seriously considered and become part of the tactical (i.e., action) plan as well as the strategic plan.

**Communicator and motivator.** In embracing these new roles, facilities professionals should not fail to ensure that their own departments are fully on board. In this regard, the facilities professional also assumes responsibility as a communicator—reinforcing the messages and priorities of the institution's climate change initiatives among all units, including utility operations, trades, environmental health and safety, purchasing, parking and transportation, and housing and dining staff.

## Individual roles, team responsibilities

While some institutions have already formed cross-divisional campus sustainability committees or advisory panels, others are in the beginning stages of organizing. In addition to the key role that educational facilities professionals will continue to play, a cross-section of other key administrative and support staff, faculty, and students round out the group.

**Sustainability directors.** In recent years, many institutions have hired sustainability directors or coordinators to provide oversight and leadership for green campus initiatives. Depending on their knowledge and where they report within the institution, these people may or may not be the appropriate leaders of carbon reduction efforts, but they will certainly be key members of the team.

**Top administration leaders and trustees.** Without leadership and support from the top, the chance that an institution will effectively address its climate change commitments is dramatically reduced, if not nil. Yet, top leaders often need help understanding real costs and viable solutions. Very often, it is the facilities professional who has the greatest expertise and experience to share in these areas. This person plays a crucial role in helping to frame the issues, raise key challenges, suggest a full range of possibilities, and provide realistic assessments of the requirements and costs to enact specific energy initiatives and improvements.

**Faculty.** With their direct contact with students, faculty can play a huge role in advancing a culture of sustainability on behalf of the institution and can help drive hands-on involvement in carbon-reduction projects. In addition to informing course content and serving as a resource to faculty instruction, facilities professionals also need to work with faculty to think through their use of classroom, office, and laboratory space, and partner with faculty to develop meaningful learning opportunities for students. This partnership might include, for example, making central plants a part of the research laboratory resources for engineering faculty and students.

**Students.** A primary stakeholder group in campus climate change initiatives is the student population. Interest in environmental concerns is high among this group, and students are increasingly making their voices heard with regard to expectations they have for their institutions to set an example. In addition to groups of students organized around sustainability efforts on individual campuses, more students are joining initiatives launched through professional affiliations such as Engineers for a Sustainable World (*www.eswusa.org*) and through national campaigns such as Campus Climate Challenge (*www.climatechallenge.org)*. On a growing number of campuses, students are voting to impose fees on themselves to purchase green energy or pay for renewable energy projects on campus. While the responsibility for buying green power or building renewable energy systems is institutional, such enthusiasm and commitment from students should be embraced and encouraged. Facilities departments would be wise to consider using resources to hire student interns for a range of special projects, including assistance with conducting energy audits. Students, as well as faculty, can become important additions on the green design teams for new buildings.

**Key professional staff.** A cross-section of staff from important campus functions and departments round out the list of critical stakeholders. For instance, student affairs staff offer expertise in developing student-led initiatives or events such as residence hall energy and recycling competitions. Development and foundation staff provide critical brainstorming of funding possibilities. Because the ongoing tracking and monitoring of a range of data points—from enrollment statistics to parking permits issued—institutional research staff are invaluable in strategic and tactical planning efforts. Procurement staff can help others understand how purchasing decisions impact emissions reduction efforts. Finally, a critical aspect of hammering home the importance of a campus climate change initiative and actually getting the whole campus involved entails changing human behavior with regard to how occupants use their buildings and travel to and from campus. Because communication is an essential element of raising awareness and maintaining interest, don't underestimate the importance of involving communications and marketing staff.

## The whole campus

Recognize upfront that stakeholders will naturally come to this shared challenge with different perspectives, whether driven by policy, finances, or academic or social concerns. A primary charge for your stakeholder group is to remain committed to



## A Separate Role: The Energy Committee

Institutions serious about carbon neutrality should establish a facilities energy committee. This committee is distinct from a climate action stakeholder group or any other sustainability council or campus-wide environmental task force—though is represented on these bodies. The job of the facilities energy committee is to ensure steady progress on energy conservation.

Walter Simpson, retired University at Buffalo energy officer, describes the role and function of such a committee in the following excerpt.

> This committee should be chaired by a conservation advocate with enough rank and resources to get things done.…A facilities energy committee should be comprised of facilities supervisors who are responsible for energy management systems, temperature control, heating and cooling plant and distribution systems, electrical, mechanical, and boiler maintenance, as well as planning and design. The energy committee should meet frequently, e.g., every other week when starting up and monthly or every other month when established.…All mid- to large-size campuses should have a full-time energy officer in addition to energy managers who supervise utilities operations and energy purchasing. The energy officer should be a free agent who develops large and small energy conservation projects, spearheads awareness efforts, and provides overall leadership to the energy program. Needless to say, it is essential that the energy officer report to the top of the organizational ladder and have the full cooperation of facilities directors and staff.
>
> Of course, saving energy is not just up to the energy officer. It is a team effort. All facilities staff members that are in a position to spot energy waste or implement energy conservation should be doing so. This expectation can be formalized by supervisors who "get it" and carry the torch and by rewriting job descriptions so facilities staff are evaluated on the basis of their energy performance.

—Walter Simpson, "Organizing an Effective Campus Energy Program: Lessons from the University at Buffalo," *The Green Campus*, page 69.

building bridges across departments and disciplines, and to foster a mindset of collaboration for looking broadly at campus environmental challenges in general and greenhouse gas reduction solutions in particular. Ultimately, something as huge as carbon neutrality requires that the entire campus community be engaged. This is not a project, but a shared journey that in many aspects will redefine your institution and its relationship to the broader community.

### CONSIDER THIS

In determining key stakeholders, don't forget about *external* partners who might provide valuable perspectives.

- **Consultants.** A good deal of the work ahead to reduce greenhouse gas emissions is complicated and will likely require the knowledge of key business partners, including architects, engineers, and other experts.
- **Service providers.** More opportunities will emerge to collaborate with local utilities and other providers on specific energy projects.
- **Community leaders.** In the long term, as more institutions become more efficient in their energy use and even become energy producers, communities can benefit. Many communities may be interested in collaborating on local solutions and transportation challenges. Enlisting the participation of community partners in specific projects further strengthens town-gown relationships.

### *On the unique role of facilities staff…*

> *"While all members of the campus community have a part to play in greening their campuses, facilities managers and their staff are in a unique position to make a difference because they are ultimately running the physical plant of the campus. They have their hands on the levers, switches, and controls of the largest pieces of equipment on campus that use the energy. They can run this equipment efficiently or wastefully; they can choose to retrofit it so that it is more efficient. They manage the solid waste stream and can implement or improve campus-wide recycling efforts. Facilities managers and their staff manage the campus grounds and can do so sustainably or not. They manage the design and construction of new campus buildings, which if not done right will be environmental liabilities for 50 or 100 years to come. They are responsible for water and sewer and so much more that defines the campus environmental footprint. None of this is to say that facilities units can do it all without the support and active involvement of students, faculty, administrators, and staff, but it is clear that facilities units are well positioned to provide critical green campus leadership."*
>
> —Walter Simpson, "A Reflection on Green Campuses," *The Green Campus*, page 8.

# 2. Complete a greenhouse gas emissions inventory.

1. Form a stakeholder group.
2. **Complete a greenhouse gas emissions inventory.**
3. Develop a strategic climate action plan.
4. Identify resource investments.
5. Implement a tactical plan.

**GUIDING PRINCIPLE**

***Build Baseline Measures***

Engaging in a greenhouse gas assessment provides a starting point for measuring progress and allows institutional leaders to identify specific areas where dramatic reductions can likely be made in the short term, even as they work toward longer term adjustments, which could prove more difficult. The baseline inventory also provides a common data set for establishing benchmarks and priorities during the strategic planning stage and a means for estimating associated resource costs and benefits.

Reducing greenhouse gas emissions requires preliminary data gathering to establish baseline measures as a cornerstone for setting climate neutrality goals and targets during the strategic planning process and for measuring progress toward those goals. Conducting the assessment and explaining the data are areas in which stakeholders will likely look to campus facilities professionals to provide leadership. The inventory also serves as a baseline educational tool that will help all stakeholders gain a sense of the scope of the problem, the opportunities, and the constraints for their institution in moving toward carbon neutrality.

## Why measure your emissions?

ACUPCC signatories are expected to track six greenhouse gasses that are recognized in the Kyoto Protocol, but the main focus by far is on the most significant greenhouse gas: carbon dioxide. A key reason for performing an inventory at the start of the strategic planning process is to ensure that decision making about specific goals and resource investments will be data driven. Conducting an inventory also allows stakeholders to gain a solid understanding of the types and sources of greenhouse gas emissions on campus and how each of these affects climate.

Conducting a carbon inventory carries multiple benefits:

- Provides baseline measures for monitoring ongoing progress.
- Reveals main sources and causes of emissions, which assists in identifying emission reduction strategies and tactics.
- Identifies areas of potential risk that an institution may need to address from a legal or regulatory standpoint.
- Points to specific opportunities for purchasing renewable energy or investing in renewable energy projects, engaging in performance contracting, or purchasing carbon offsets.
- Informs the strategic and financial planning stages by highlighting the need for specific institutional policies.
- Underlines the importance of dealing with the carbon impacts of commuting to and from campus by students, faculty, and staff.

## Before you measure

Before engaging in a greenhouse gas inventory, leaders will need to make some decisions about process and about the definitions and measures that will be used to monitor progress over time.

**1. Choose your methodology.** Should you conduct the assessment in-house or contract those services?

**2. Select a reference year.** In addition to identifying what to measure, the ACUPCC specifies that signatories determine an appropriate baseline year for evaluating emissions on an annual basis. Whether you choose a fiscal, academic, or calendar year, select a reference year for which you can provide an accurate snapshot of facilities (age and types of buildings, types of equipment and technologies, and types of building occupants), campus populations, and seasonal data (e.g., building use and occupancy at various times of the year). Decide what measures you want your baseline inventory to incorporate for comparison with future inventories.

**3. Determine your emissions scope.** There are a variety of scope issues to consider including organizational boundaries. Which departments, schools, joint ventures, and so forth will you include? Obviously, it is desirable to be as inclusive as possible, but there may be special reasons for excluding some functions. Then there is the important question of emissions types. Which types of greenhouse gas generation will your institution include in its climate inventory initiative?



- **Scope 1:** ***Direct emissions*** include all physical plant fossil fuel combustion emissions, as well as those from fossil fuel-consuming boilers, fleet vehicles, and "fugitive" emissions—for example, agricultural/livestock (methane) emissions. Direct emissions result from sources owned or controlled by the institution.
- **Scope 2:** ***Indirect emissions*** include emissions generated from purchased electricity used by equipment that an institution owns or operates.
- **Scope 3:** ***Other indirect emissions*** include air and vehicular travel, solid waste, procurement-related emissions and other emissions that occur consequentially from an institution's activities.

When considering Scope 3 emissions, will you factor in student and employee commuting traffic or on-campus travel only? Will you account for transport-related emissions associated with all products delivered to your campus? ACUPCC signatories agree to report on Scope 1 and 2 emissions and two of the Scope 3 emissions: student and employee commuting, and those resulting from air travel for which the institution pays.

**4. Select a calculation approach and tool.** Which specific evaluative tools make the most sense for quantifying your greenhouse gas emissions? Which tool will best serve the purpose and needs of your campus? There is more than one way to present and examine your campus carbon footprint. For instance, measurements might be expressed as metric tons of $CO_2$ per student or per square foot as well as overall greenhouse gas emissions in metric tons $CO_2e$. ($CO_2e$, or $CO_2$ *equivalency*, is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential in comparison to the primary greenhouse gas, carbon dioxide.)

At the same time, be wary of creative indices. Relying too heavily on them may offer an appearance of success in reducing carbon intensity even as overall emissions levels may be on the rise. For instance, measurements might be expressed as metric tons of carbon dioxide ($CO_2$) per student or per square foot. These approximations will be beneficial when determining the cost benefits and return on investment of specific carbon reduction strategies. At the same time, be wary of considering these as absolute measurements. Relying too heavily on indices may give the appearance of success in reducing carbon intensity even as overall emissions levels are on the rise.

Likewise, your choice of a calculator tool may vary depending on factors such as the size and type of your institution. A small, single-campus institution, for which data will be mostly straightforward, might use a different tool than a large multi-campus research institution uses. As a rule of thumb, choose a tool that is simple to use but provides enough flexibility and captures enough data to assess and address future regulatory or compliance standards that might emerge. A common tool that many institutions are using to audit their greenhouse gas emissions is the Clean Air–Cool Planet Campus Carbon Calculator, recommended by the ACUPCC (see Calculator Tools sidebar).

## Calculator Tools

A variety of calculator tools are available and already being used by colleges and universities, including tools developed by the Chicago Climate Exchange (*www.chicagoclimatex.com*) and the California Climate Action Registry (*www.climateregistry.org*). However, the ACUPCC recommends that signatories that are not already using these or other inventory tools use the Clean Air– Cool Planet Campus Carbon Calculator (*www.cleanair-coolplanet.org/toolkit/content/view/43/124*) to conduct their emissions inventory, and the vast majority of campuses currently use this calculator. This tool, designed specifically for campuses, provides procedural protocols and a framework for investigation. It is also consistent with the standards of the Greenhouse Gas Protocol of the World Business Council for Sustainable Development and the World Resources Institute. Its spreadsheets are based on workbooks by the Intergovernmental Panel on Climate Change for national inventories, which have been adapted for institutional use. (Version 6 of the calculator was released in October 2008 and includes new projection and analysis tools that will be incredibly useful for campus planning.)

ACUPCC signatory campuses agree to inventory their emissions produced through on-site combustion of fossil fuels; electricity consumption; student, faculty, and staff commuting; and institution-funded air travel. To the extent possible, and as the inventory methodology develops, institutions should also attempt to evaluate embodied emissions in purchased goods and services, including food.

As for carbon offsetting resources, in addition to the Chicago Climate Exchange and the California Climate Action Registry, see the Consumer's Guide to Retail Carbon Offset Providers (*www.cleanair-coolplanet.org/ConsumersGuidetoCarbonOffsets.pdf*) and the Voluntary Offsets For Air-Travel Carbon Emissions Report (*www.tufts.edu/tie/tci/pdf/TCI_Carbon_Offsets_Paper_April-2-07.pdf*).

**5. Collect annual activity data.** Where should you focus your research for gathering information about energy sources and costs? Start big and find the right people on your campus who routinely collect and manage the data you will need. Review all utilities bills, fuel usage of combustion units, vehicle fleets, and all mobile emissions sources. Once you perform these initial steps, you are ready to apply your selected calculation tool. Here are some of the data inputs you may need to conduct your inventory:

- Institutional data (population, research dollars, etc.)
- Electricity
- Stationary energy sources (e.g., on-campus natural gas use)
- Transportation (e.g., university fleet)
- Commuter travel
- Agriculture/livestock
- Solid waste/recycling
- Refrigerant gas
- Renewable energy credits/offsets

Additional questions to address related to conducting an inventory include how you plan to verify and validate your data (e.g., through third-party verification) and what process you will use to periodically update your inventory.

## Tips for getting started

As with documenting most baseline measures, it can take time to establish parameters. Subsequent measuring activities will improve and expand on initial calculations. For starters:

**1. Include as many emissions sources as you can.** This will help you address and lower emissions, even if you can't measure everything as well as you might like to the first time around.

**2. Bear in mind that the bulk of activities you will need to measure center on consumption of fossil fuels related to facilities and commuter travel.** These activities, including purchased electricity (typically mostly fossil fuel generated), will contribute the lion's share of your campus carbon footprint. If your campus is burning coal or if purchased electricity comes primarily from coal burning, these sources of emissions will be a disproportionate share of the whole.

**3. Understand that regional differences may affect how your institution initially responds to its inventory outcomes.** For instance, the carbon intensity of various forms of electricity—whether carbon-intensive coal or carbon-free hydro—will vary by state, as will energy costs. (Note: the Clean Air–Cool Planet Carbon Calculator provides regional emissions factors that take these variances into account.) Regions with higher prices for fuel and electricity may benefit from quicker payback periods for energy conservation. They may also find that renewable energy alternatives are more cost-competitive with conventional sources than in areas where conventional energy prices are low. Likewise, the availability of incentives to finance conservation and energy efficiency or renewable energy will vary by municipality and by state or region. Additionally, energy needs vary by region. Educational institutions in the South might do well to focus initially on cooling and air-conditioning efficiency, while those in the North might focus on heating impacts. Institutions in dry regions of the country might want to factor in the embodied energy and carbon intensity related to water use.

## The emerging carbon marketplace

An institution's efforts to reduce its greenhouse gas emissions should include a multipronged approach, since no single activity will bring a campus carbon footprint to zero. Moreover, on most campuses efforts to reduce greenhouse gas emissions will only take your program so far. If your goal is climate neutrality, then at some point you will need to resort to carbon offsets to address those emissions that could not be reduced to zero.

*Offsetting* refers to the practice of compensating for greenhouse gas emissions that an institution can't presently avoid. Offsets are essentially credits purchased to support projects that reduce or sequester emissions somewhere else. Common examples include renewable energy projects and tree planting—whether in your local community or somewhere halfway around the world. A key requirement of a carbon offset is "additionality"—that is, the carbon reduction claimed in the offset must be in addition to what was required or would have occurred anyway and must be the result of the purchase of the offset.

Currently, no well-established certification system exists that provides widely accepted standards or norms for offsetting. Among existing standards are those used in the Chicago Climate Exchange (*www.chicagoclimatex.com*) and the California Climate Action Registry (*www.climateregistry.org*). In addition, the ACUPCC recently launched its voluntary offsets protocol (*www.presidentsclimatecommitment.org*).

Progress at both the national and state levels can be expected in the near future with regard to climate protection legislation, as well as some kind of carbon "cap and trade" or carbon tax system that will create financial incentives for carbon reduction. Thus, the very real possibility that institutions will need to respond to state and/or federal legislation requires campus stakeholders to understand the implications of a future carbon marketplace.



For institutions that have signed on to the ACUPCC, the rigor of adhering to the commitment will likely result in carbon reduction results that go beyond the requirements of any state or federal legislative proposals on the table. Possible federal legislation includes the Lieberman–Warner Bill (Climate Security Act). State and regional programs include the Regional Greenhouse Gas Initiative (*www.rggi.org*), a cooperative effort by ten Northeast and Mid-Atlantic states to reduce $CO_2$ emissions; and the Western Climate Initiative (*www.westernclimateinitiative.org*), which unites several Western states and Canadian provinces in the development of strategies to reduce greenhouse gas emissions.

## The pros and cons of offsets

Among the key questions not yet resolved is how to value carbon. This will have a huge bearing on return-on-investment calculations of future costs associated with emissions. Other key considerations for developing common standards include process flows, life-cycle analysis, emissions factors, and verification protocols. The potential market size for offsets is also of concern. Will enough offsets exist in the future to honor all commitments?

While relying to some extent on carbon offsets is more or less unavoidable for educational institutions seeking climate neutrality, some see a downside to strategies that rely too heavily on paying for offsets. Beyond the cost—which could become prohibitive—a mindset that your institution can buy its way out of its greenhouse gas reduction commitments does not address the fundamental expectations of campus constituents who want to see their institution set an example.

### Reality Check for Compiling a Viable Inventory

When compiling a greenhouse gas emissions inventory, it's not enough to simply arrive at an overall estimate of your total campus footprint. To be actionable as information, data must be available at the individual building scale and tracked over time. Every institution serious about achieving carbon neutrality needs to invest heavily in a meter system at both the campus and individual building scale so it can track progress over time both at the building scale and at the campus level. Keep in mind these four guiding principles when compiling your institution's inventory.

**1. Know your buildings by type.** It is important to understand what a "high performance building" actually means in your climate and at your institution. This will provide a reasonable place to start for knowing how much opportunity is available through either energy conservation efforts or through green design efforts as well as how much capacity in the central system is being used to support inefficiency writ large on the institution. These numbers should be compiled on a building by building basis by type: academic, residence halls, wet labs, dry labs, hospital function, office space, and so forth. The metric here should be Energy Use Intensity (KBTU/GSF/YR).

**2. Know how you stack up in your peer group.** There may exist very good comparison information from institution to institution that could be educational for making decisions and understanding exactly how well the institution performs in its peer group. However, be forewarned that it may be difficult to make true comparisons from institution to institution since climate, institutional focus, population density, and so forth are all factors that influence whether a comparison is valid.

**3. Scrutinize your numbers.** Are all BTUs created equal? This is not only a question of technically creating the greenhouse gas inventory but also tactically driving down carbon use through energy use reduction and whether central plant chilled water production equates to chilled water production from building-based chiller equipment. For instance, do you calculate off of BTUs or kWhs to the chiller equipment?

**4. Measure water consumption.** While monitoring carbon emissions and energy use is important, do not ignore water use. Energy and water are increasingly intertwined, regardless of what region of the country in which an institution is located. Consider the water required to generate one megawatt hour of electricity: gas/steam combined cycle—7,400-20,000 gallons; coal and oil—21,000-50,000 gallons; and nuclear—25,000-60,000 gallons (for cooling systems that draw and dump water, not cooling tower systems). Or, consider the water used by alternative fuel vehicles per 100 miles traveled: ethanol vehicles—130-6,200 gallons; hydrogen fuel-cell vehicles—42 gallons; plug-in hybrid electric vehicles—24 gallons; and gasoline vehicle—7-14 gallons.

*—Mike Walters, Sustainable Practice Leader, Affiliated Engineers, Inc.*

On a positive note, development of local carbon offsets to achieve regional greenhouse gas emissions reduction goals can strengthen relationships between institutions and their communities, as colleges and universities work with their communities to reshape and rethink regional economies. For instance, institutions can use their energy expertise and capital to help local municipalities, businesses, schools, and families implement programs and practices aimed at conservation and transition to clean and renewable energy alternatives. Ideally, your campus will achieve most of its greenhouse gas emissions reductions through on-site energy conservation and other measures and relegate carbon offsets to the role of last resort.

## Document your progress

Tracking progress and recording results provides invaluable data for future activities. Keep a log of all projects completed and quantify the greenhouse gas emissions reduction and energy saved in appropriate units (MT $CO_2e$, gallons, kWh, BTUs, etc.) *and* in energy dollars. The latter offers convincing proof of program effectiveness in conventional terms. Capture data on how much fossil fuel energy you have replaced with green and carbon-neutral power. Quantify other related environmental benefits of cutting greenhouse gas emissions such as reduced air pollution. Documenting energy savings and emissions reductions over time not only provides great public relations fodder and undergirds ongoing administrative support, but also boosts the morale of employees and students directly involved in these efforts, encouraging their continued interest and action.

### CONSIDER THIS

- Share your greenhouse gas inventory with your business partners and ask them to conduct an inventory of their organizations. When an institution commits to reducing its carbon footprint, it can be in its best interest to partner with providers who share this commitment.
- Consider the educational opportunities that conducting a greenhouse inventory presents beyond informing the decision making of your stakeholder group. Students and faculty can be involved in conducting the inventory. The results of the inventory can be used by faculty to engage students in a variety of learning opportunities. Likewise, the institution can share the results with the public to increase transparency

### *On what causes global warming …*

*"Sunlight enters the atmosphere and warms the Earth, and then is sent back into space as heat radiation. Greenhouse gases trap this heat in the atmosphere and thereby warm the Earth's surface as we are warmed when blankets are piled on our bed. Carbon dioxide (CO2), produced mainly by burning fossil fuels (coal, oil, and gas), is the most important greenhouse gas made by human beings. Methane (CH4), which is 'natural gas' that escapes to the atmosphere from coal mines, oil wells, rice paddies, landfills, and animal feedlots, is also an important greenhouse gas. Other significant warming agents are ground-level ozone and black soot, which arise mainly from incomplete combustion of fossil fuels and biofuels.*

*"In order to arrive at an effective policy, we can project two different scenarios concerning climate change. In the business-as-usual scenario, annual emissions of CO2 continue to increase at the current rate for at least fifty years, as do non-CO2 warming agents including methane, ozone, and black soot. In the alternative scenario, CO2 emissions level off this decade, slowly decline for a few decades, and by mid-century decrease rapidly, aided by new technologies."*

—Jim Hansen, "The 800-Pound Gorilla: The Threat and Taming of Global Climate Change," *The Green Campus*, pages 40-41.



# 3. Develop a strategic climate action plan.

1. Form a stakeholder group.
2. Complete a greenhouse gas emissions inventory.
3. **Develop a strategic climate action plan.**
4. Identify resource investments.
5. Implement a tactical plan.

**GUIDING PRINCIPLE**

***Start with the End in Mind***

Thinking strategically about how to reduce your campus carbon footprint requires an approach similar to institution master planning: aligning key greenhouse gas reduction goals with the institution's mission, vision, and finances. Begin your strategic planning process by identifying end goals that are clear and interim action steps that chart your course.

An important mindset to adopt at the initial planning stage is to understand that pursuing carbon neutrality will be a long-term journey that must be continued beyond the tenure of most of the people who make up your current stakeholder group. Thus, plans must be aggressive, yet flexible enough to allow for the new technologies, energy developments, and world realities that will emerge. What might seem like a sound strategy today could turn out to have value as a transitional strategy only, as more dramatic opportunities emerge or legislative requirements force changes.

While your institution's ultimate carbon reduction goals may be restorative—that is, actually surpassing climate neutrality by making your institution a carbon sink rather than a carbon source—it is important to set a series of realistic goals and stretch goals so that early successes fuel continued motivation. Available financial and human resources will certainly influence the tactics employed in pursuit of an institution's carbon reduction goals, but the initial strategic planning stage is a time to envision all possibilities, not to rule out options. For this reason, initial strategic planning should precede financial planning.

## Charting a course, setting a timeline

What is a realistic timeline for a campus to achieve carbon neutrality? Obviously, the sooner the better as far as Planet Earth is concerned. While the Intergovernmental Panel on Climate Change (*www.ipcc.ch*) is calling for significant greenhouse gas emissions reductions over the next few decades, colleges and universities committed to playing a leadership role must do much better than this during a much shorter timeframe. Initial planning efforts should consider whether achieving climate neutrality over a ten-year period might be possible.

The ACUPCC calls for initiating development of a comprehensive plan for achieving carbon neutrality as soon as possible after signing the commitment—completing a greenhouse gas emissions inventory within the first year and an institutional climate action plan within two years. The latter should include a target date for achieving neutrality and should identify interim targets and specific actions leading to that goal as soon as possible. The commitment reinforces a message of setting both immediate and future targets by requiring that institutions identify at least two tangible actions to pursue within the first two months of signing the commitment and simultaneously with the more time-consuming work of developing a comprehensive climate action plan.

The following are among the suggested actions:

- Establish a policy for all new campus construction to be built to U.S. Green Building Council's (*www.usgbc.org*) LEED Silver standard or equivalent *at a bare minimum*, while aiming for targets that significantly surpass current LEED requirements.
- Adopt an energy-efficient appliance purchasing policy that requires buying ENERGY STAR-certified products wherever these ratings exist (*www.energystar.gov/index.cfm?c=higher_ed.bus_highereducation*).
- Develop a policy of offsetting all emissions related to institution-funded air travel.
- Provide faculty, staff, students, and visitors with access to public transportation.
- Purchase or produce at least 15 percent of the institution's electricity consumption from renewable sources within one year through onsite projects or off-campus electric purchase or purchase of renewable energy certificates.
- Establish a policy or a committee in support of climate and sustainability shareholder proposals in connection with endowment investments.
- Participate in waste minimization through the RecycleMania (*www.recyclemania.org*) competition or adopt at least three specific measures to reduce the institution's waste.
- Establish a committee to enhance scheduling of facilities to ensure that construction of new facilities is a last resort.

- Focus on enhancing performance of existing facilities by providing funding for deferred maintenance and retro-commissioning activities.

The urgency and immediacy of the global climate challenge can help engage and galvanize the interest of an institution's current generation of students, faculty, and staff even as the institution sets a clear agenda for the future.

## The best ways to lose big

A robust strategic plan clearly identifies all options and alternatives, balances short- and long-term goals, and includes both hard (i.e., capital) and soft (i.e., behavioral) measures—what you can see (e.g., window replacements) and what you can sense (e.g., a culture of sustainable values). Goal-setting at the strategic planning stage should be comprehensive yet also as specific as possible (see sidebar on Climate Plan Goal Setting). Also important to bear in mind is to push forward in your pursuit of carbon reduction in "wedges"—that is, in manageable pieces. For instance, you may want to focus first on energy conservation in existing buildings, energy efficiency in new buildings, fuel mix (including new renewable fuels), transportation, or offsets.

While goals will be specific to individual institutions, most will realize the biggest carbon reduction gains from focusing on broad commitments in these critical areas:

**Energy conservation and efficiency.** No matter an institution's other energy goals, a clear priority for all institutions should be to make conservation a core, immediate strategy. Reducing overall energy consumption directly reduces greenhouse gas emissions in kind. A focus on super-efficient buildings and systems through readily available products, technologies, and operating procedures will have a significant impact on reducing greenhouse gas emissions by reducing energy loads. More efficient use of energy will also maximize the benefits of clean energy sources including solar, wind, biomass, and geothermal.

**Clean energy.** Switching from carbon-intensive energy sources to clean and carbon-free energy sources is another clear priority, since reducing dependence on carbon-intensive sources yields an immediate reduction in emissions levels. The focus may encompass green energy procurement and onsite renewable and cogeneration projects.

**Efficient facilities use.** A strong focus on emissions directly related to facilities must be foremost, since most campus energy consumption is in some way connected to building occupancy. In addition to energy retrofits and employing green standards for new construction and renovation, better space utilization should become a priority, especially for energy-intensive buildings such as laboratories. Ensuring that existing buildings are used to full capacity eliminates wasteful use of energy, and thus, reduces emissions. Efficient space utilization may also make new construction unnecessary—again saving energy and reducing greenhouse gas emissions.

**Green building design.** Unless a new building uses no fossil fuels, even a very green, energy efficient new building will add to your campuses carbon footprint—perhaps at precisely the time you are striving to reduce your net carbon emissions to zero. Thus, avoiding new construction is desirable and, barring that, designing and constructing only the most energy efficient new buildings possible is critically important. Designing new buildings to run on renewable energy sources—including daylighting, photovoltaics, and passive and active solar—will also reduce additions to your carbon footprint.

**Transportation.** Much can and should be done to minimize transportation impacts through fleet conversions, commuter transportation and parking alternatives, and travel offsets, including air travel for faculty and staff.

### Sample Climate Action Plans

The ACUPCC website (*www.presidentsclimatecommitment.org*) provides examples of climate action plans, reports, and studies from a variety of institutions.

The Association for the Advancement of Sustainability in Higher Education (AASHE) has also posted sample campus climate commitments and greenhouse gas inventories on its website (*www.aashe.org*). Additionally, AASHE provides a wealth of resources on a full range of campus sustainability issues, including institution strategic and master plans that incorporate sustainability; dorm sustainability competition best practices; outreach materials for campus sustainability; and resources on green building, energy conservation policies, and solar electric and wind turbine installations.

## Policies checklist

A core part of the planning process for outlining strategies and goals should involve developing institutional policies that provide clear directions with regard to climate neutrality initiatives. Like strategic planning goals, policies should be as specific as possible. They can produce both financial savings and reduced emissions. For instance, a 1-degree difference in the campus-wide policy for temperature control can mean a huge difference in emissions and millions of dollars saved over time.



Any specific strategies and policies identified should be embedded in all relevant planning documents of the institution, such as the campus master plan and the energy management strategic plan. This will ensure that the climate neutrality effort is effectively institutionalized. In addition to developing policies related to the key areas above (energy conservation and efficiency, clean energy, efficient facilities use, green building design, and transportation), other key policy areas include:

***Food services:*** purchase and promotion of local and low carbon-footprint foods and food waste reduction.

***Waste management:*** comprehensive campuswide waste reduction, reuse, and recycling efforts including composting of food waste.

***Procurement:*** low-emissions purchasing, green purchasing policies, and bulk purchasing through consortia.

***Education and research:*** eco-literacy for all graduates, greening the existing curricula and strengthening environmental studies programs, and fostering clean energy research and innovation.

***Investment:*** allocation of institution investments, especially endowment assets, toward green market sectors.

***Communication:*** promotion of energy conservation awareness and outreach programs.

Each of these policy areas is discussed in greater detail in Chapter 5, Implement a Tactical Plan.

## Other key discussion points

In addition to area-specific goals and policies, strategic conversations about climate neutrality must also address broad institutional concerns that play an important role in supporting a comprehensive climate action plan.

***Technology.*** One challenge some institutions will immediately encounter in conducting their greenhouse gas inventory is the difficulty of arriving at accurate measures of emissions, especially for older facilities that may not be equipped with energy metering technologies. Implementing these technologies may be a first step toward getting an accurate picture of the full campus carbon footprint.

***Staffing.*** Any strategic planning effort must consider staffing as well as financial needs. Depending on the size of an institution and its current internal capabilities, some of the priorities established for carbon reduction efforts may require a substantial investment in personnel. One realization that should quickly emerge during the strategic planning process is that this effort is not the part-time responsibility of a single person, nor does it end with an initial emissions inventory. Success and dramatic results will require ongoing measurements and sustained efforts by many. Nonetheless, key functions in energy management and green campus leadership need appropriate staff positions.

***Curriculum and research.*** Equipping future graduates to fill a growing marketplace of green collar jobs and to lead future research in clean energy development and technology become an obvious priority strategy for institutions interested in reducing their carbon footprint and ultimately that of the planet. Not as evident, though arguably as critical, is a priority to green the full curriculum, infusing sustainability into all programs—from business to chemistry to music. Fostering a mindset of sustainability among all graduates is one way to ensure that future leaders and citizens are equipped to live low-carbon lifestyles and push for the kinds of broader social policies and change needed. In these efforts, faculty from all subject areas may need incentives or temporary reduced workloads to incorporate sustainability components into their curricula.

## Institution-specific considerations

It is always a good idea to look at what peer and neighboring institutions are doing, but your institution's goals and priorities may vary significantly from those implemented by other colleges and universities, even in your region. Influencing factors include type and size of an institution, multiple-campus institution versus single campus, large research university versus community college, rural versus urban, residential versus commuter, and public versus independent. The goals and tactics of a small residential campus of 3,000 students, the majority of whom live within walking distance, may be far different from the goals and tactics of a large research institution with 25,000 commuter students and buildings spread across three campuses.

In addition to physical boundaries, each institution has a unique culture and leadership style, and these can factor into the level of collegiality and connectedness of stakeholders working together on a plan. It's important at the outset to identify all the various physical, regional, and cultural parameters of your institution and how they may contribute to unique opportunities and critical challenges.

While not all institutions are located in sunny climates or windy areas, all campuses are likely to have some ability to use solar, wind, biomass, or geothermal to a greater or lesser degree. For

## Climate Plan Goal Setting

The strategic goals flowing from an institution's climate action plan will likely include some combination of the following:

**1. Energy efficiency and conservation measures and approaches** that factor in return on investment, payback periods, and incentives to engage consumers. Within this category there might be goals for incorporating new equipment and technologies including metering tools.

**2. Energy supply goals**, including significant movement toward renewably generated alternative energy sources and plans to eliminate reliance on coal and oil.

**3. Plans for carbon offsets.**
Goals developed as part of an institution's strategic climate action plan should be specific. For instance:

- Reduce energy consumption by X percent by year XXXX.
- Achieve X percent green power purchases by XXXX.
- Develop X on-site renewable energy projects by year XXXX.
- Eliminate coal use by XXXX (assuming your campus has a coal-fired power plant).
- Cap growth in greenhouse gas emissions at X levels by year XXXX (assuming your campus is in a build-out mode).
- Achieve X percent reduction in single occupant car/truck commuting by XXXX.
- Begin exploring carbon offset purchasing or creation by XXXX.
- Achieve X percent reduction in greenhouse gas emissions by XXXX.
- Achieve climate neutrality by XXXX.

Any overarching goals expressed in the strategic plan should specify how greenhouse gas reduction targets tie directly to the institution's overall sustainability efforts to:

- promote education, awareness, and advocacy of social and environmental responsibilities;
- enhance the value of the institution by fostering innovation and research;
- increase the operational efficiency of the institution;
- address all points of service, including transportation, food services, waste, recycling, and procurement programs; and
- mitigate potential risk and compliance concerns.

example, the National Renewable Energy Laboratory provides helpful online tools (*www.nrel.gov/gis/solar.html*) to assess solar radiation opportunities throughout the United States. Ultimately, every campus can encourage the exploration and adoption of renewable energy through investment and purchasing practices.

Perhaps as important as identifying priority goals for moving forward with carbon reduction efforts in the near term is to identify and document why a particular strategy or action would not be appropriate or viable at the present time. This may provide an important historical record for the future, to help people remember or understand why a particular action was not pursued. It may also help with future decision making; for example, if certain conditions change so that an old idea might be a good new strategy. This may be as simple as realizing that a strategy that was once cost-prohibitive is now within the financial reach of the institution.

## Giving structure and substance to your plan

Reducing greenhouse gas emissions and moving toward carbon neutrality should not be viewed as one more thing to add to a long list of institutional priorities. Because an institution's carbon footprint ties directly to so many areas of campus life—utilities purchasing and consumption, construction and renovation, food services, recycling, procurement, transportation—carbon reduction goals stand the best chance of being achieved if they are woven into the fabric of existing sustainability goals. For this reason, it makes sense to many institutions to fold climate-neutrality goals into the institution's existing campus sustainability plan. Structurally, climate action plans should encompass several key components. The ACUPCC calls for action plans that include the following:

***Campus emissions.*** Describes the institution's current emissions trajectory under "business as usual" terms versus following



specified targets to lower emissions leading toward carbon neutrality.

***Mitigation strategies.*** Shows how the institution intends to achieve climate neutrality, describing how it will reduce greenhouse gas emissions and listing potential measures for avoiding or reducing emissions. The ACUPCC suggests that signatories consider these criteria in evaluating emissions mitigation options:

1. Potential to avoid or reduce GHG emissions.
2. Flexibility as a step toward future emissions reduction measures.
3. Return on investment or financial impact.
4. Potential to create positive or negative social and environmental side effects.
5. Relationship to other potential measures and opportunities for synergistic measures.
6. Potential to be scaled upward if successful.
7. Potential to involve students and faculty.

***Educational and research community outreach efforts.*** Describes plans to make climate neutrality and sustainability a part of the curriculum and overall educational experience for all students, along with actions to expand research and community outreach to achieve climate neutrality. Actions to consider include having students or classes perform the campus greenhouse gas inventory; inviting students to serve on building, operations, and facilities committees; incorporating sustainability-themed housing; and conducting sustainability competitions among residence halls. Outreach efforts may include introducing community education initiatives on climate change and sustainability and developing programs to support staff and faculty with efficiency upgrades of their homes through home energy audits.

***Financing.*** Explains how the institution will pay for the various mitigation strategies and related initiatives described in its climate action plan.

***Tracking progress.*** Details how the institution plans to track and monitor progress of its action plan. This may include establishing a centralized reporting system for tracking actions taken by the institution to reduce emissions; using energy management systems to monitor major emissions sources; and conducting periodic literacy surveys of students and faculty to assess the effectiveness of the sustainability-related content of courses.

While the strategic planning process will allow for identifying specific tactical priorities, it is best to view it as an organic process. Stakeholders will continue to measure progress, reassess priorities, and reallocate funding in light of new developments, new technologies, evolving energy sources, and new world realities. Like any strategic or master planning process, it will require course corrections over time.

# 4. Identify resource investments.

1. Form a stakeholder group.
2. Complete a greenhouse gas emissions inventory.
3. Develop a strategic climate action plan.
4. Identify resource investments.
5. Implement a tactical plan.

**GUIDING PRINCIPLE**

***Quantify What You Can Commit***

The financial planning stage is used to determine how to pay for climate action goals through a variety of funding and self-financing options. Like the specific strategies identified, available funding and particular funding sources may vary dramatically among institutions. Certain technologies that institutions will eventually employ don't yet exist, and creative financing approaches are likely to emerge that will make pursuing carbon reduction strategies more viable.

Once strategic greenhouse gas reduction goals are established, key decisions must be made about how the institution plans to capitalize these priorities. Decisions must factor in institutional willingness and capacity to make specific commitments of financial and human resources. Whether it involves new hires or reallocating existing staff time, the human costs should be identified, quantified, and incorporated into the institution's financial plan.

Decisions about where to invest are not always clear. While certain energy hogs can be identified as a priority focus, various stakeholders will also pull for specific investments. For example, a student group that imposes a student sustainability fee might favor a wind or solar energy project on campus, while others in the group might believe that more urgent priorities exist. These decisions require a commitment by all stakeholders to approach conversations in a spirit of negotiation and compromise.

## Think of funding as fluid

Just as the campus carbon inventory must be repeated to mark progress and the strategic plan revisited to adjust priorities, it is helpful to think of resource investments as fluid. Over time, the level of funding for greenhouse gas reduction initiatives will change and where those investments are made will also shift.

While there are ways of implementing energy conservation and efficiency improvements which are self-financing (e.g., performance contracts), it is nonetheless true that retrofits cost money. As campus facilities reach higher levels of efficiency, costs for projects may increase while paybacks stretch out to longer periods of time. Consideration of longer payback projects is essential, but at some point it may seen more economical to reduce your campus carbon footprint by shifting resources and investing heavily in renewable energy—either on site or through a contract with a green power energy producer. Green power purchasing costs can be mitigated by negotiating a long-term contract, which could have the added benefit of guaranteeing flat energy prices over the long haul and thus providing a hedge against energy price volatility.

Unknown factors such as a sharp spike in the price of traditional fuel sources or the emergence of specific regulatory standards may push institutions to make strategic adjustments sooner. For example, a carbon tax could make switching to solar, wind, or geothermal suddenly much more economical compared to the alternative of continuing to rely heavily on fossil fuels. In this regard, investments in carbon reduction are best considered over time, recognizing that the focus of these investments, the levels and types of funding (grants, bonds, gifts, state budgets, etc.), and their financial benefits will shift over time.

Tracking investment allocations over time and comparing the types and levels of funding with actual reductions in emissions may reveal some interesting relationships between resource spending and a reduced carbon footprint. An important point to bear in mind is to use economic models that are consistent with those the institution uses elsewhere so that carbon reduction priorities can be compared with broader institutional funding priorities.

***Hidden costs.*** Hidden costs may lead to inaccurate valuations. For instance, as carbon markets are refined and a standard cap-and-trade system is developed, the actual assigned value of carbon may make a strategy of 100 percent carbon offsetting cost-prohibitive. But once the true costs are known and factored in, certain alternative investments may prove to be cost-efficient.

***Total cost of ownership.*** Both the marketplace and the regulatory environment are focused toward reducing greenhouse gas emissions. Some states have laws that constitute renewable energy portfolio standards and/or standards for compliance with LEED certification for new construction and for renovation of existing buildings. Other calculations to include are investment payback, life-cycle costing, and total cost of ownership.

***Social costs.*** Perhaps less clear but equally important are the social costs associated with not pursuing serious reductions in greenhouse gas emissions. Increasingly, key stakeholders—



including students, parents, employees, and local communities—expect institutions to show leadership and display responsible behavior. However, concerns exist regarding how to finance clean and renewable energy projects and carbon-neutral construction and renovation, especially in the face of public concerns about the rising cost of higher education. This is one more reason why goals to reduce greenhouse gas emissions should be integrated into the broader financial planning of the institution.

Ultimately, more creative thinking must be shown regarding how to structure the financing of a climate neutrality plan so it is least costly and more cost-effective. For example, institutions should factor into the costs savings associated with potential energy conservation projects the avoided costs of carbon offsets that would otherwise have to be purchased to achieve climate neutrality. While factoring in these avoided costs is complicated by the fact that we don't currently know what the costs of those offsets may be, they nonetheless represent real cost and energy savings.

## Applying resources

In moving toward 100 percent green power, institutions in some regions may need to be willing to pay a premium at first. However, as conventional energy resources become more expensive, colleges and universities should look for, and take advantage of, increased incentive funding for energy conservation and efficiency projects and for renewable and clean energy purchasing.

What follows is an overview of some funding options available outside an institution's budget.

***Energy service companies (ESCOs).*** Many institutions are entering into performance contract agreements with energy services providers to get upfront financing for building retrofit projects. ESCOs are businesses that design, install, and, in some cases, finance conservation and energy-efficiency projects. Some large projects can generate positive cash flows to pay for additional projects. A big benefit for institutions is that no upfront investment is required, and the project can be structured to suit the particular needs of a campus with regard to factors such as risk tolerance and degree of involvement. Projects can be "fixed cost" or "cost plus." They can include an energy saving guarantee, or a campus may decide to forego the costs associated with such a guarantee and not require it.

***Incentives and rebates.*** Some utilities or state energy offices provide incentives or rebates to encourage customers to improve efficiencies. The incentives can be applied to the specific projects that earn them or placed in a campus fund to pay for additional energy conservation projects.

***Revolving loan funds.*** Some institutions are borrowing funds from institutional endowments and paying back the loans through the savings realized from energy conservation and carbon reduction projects.

***Joint projects and purchasing.*** While not yet a common practice, many institutions are well positioned to arrange with other institutions to jointly purchase renewable energy or to develop joint home-grown energy projects. For example, a large wind farm supported by multiple partners offers lower costs per kWh, because operations and maintenance costs are spread over more kWhs.

Other financing sources include grants, bond money, donor contributions, legislative general appropriations and earmarks, and student sustainability fees. Institutions might also consider developing innovative ways to charge campus energy users for the energy they consume or otherwise provide incentives for users to save energy.

### CONSIDER THIS

- Maximize conservation and efficiency to minimize the costs of green power, onsite renewables, and carbon offsets.
- Strive for a plan that can be at least partially self-financing.
- Look for early actions and investments that produce savings, and use those to help pay for additional initiatives.
- Identify and prioritize the types of measures that are the most cost-effective in terms of dollars invested per ton of avoided greenhouse gas emissions. However, temper the benefits of quick payback measures by bundling near-term paybacks with longer term initiatives that will show significant results over time.
- Don't simply follow the new money. Refocus on existing funding sources and complementary projects already planned.
- Consider avoiding the need for capital expenditures for renewable energy projects by utilizing third-party purchase agreements, which enable a contractor to use federal tax credits, rapid depreciation, rebates, and incentives to build a renewable energy system for your campus.
- Negotiate with utilities for long-term and fixed-price purchase of green power.
- Explore low-cost, low-carbon initiatives such as space utilization improvements, telecommuting, and satellite locations for back-office employees.
- Research the various financial vehicles that can be used to acquire renewable energy and pay for energy conservation without increasing the institution's capital or operating costs. These include lease/purchase, operating lease, capital lease, and performance contract.
- Get creative. Consider fundraising initiatives through the development office where, for instance, donors are encouraged to buy solar panels instead of bricks.
- Work with other campuses and the wider community to spread costs and benefits.

# 5. Implement a tactical plan.

1. Form a stakeholder group.
2. Complete a greenhouse gas emissions inventory.
3. Develop a strategic climate action plan.
4. Identify resource investments.
5. **Implement a tactical plan.**

### GUIDING PRINCIPLE
***Name the Nitty Gritty***

On one hand, identifying specific tactics to pursue in reducing your campus carbon footprint is the final step in a comprehensive climate action plan. On the other hand, it is an initial launch point for delving into the necessary work of achieving climate neutrality. In the same way that the strategic planning process requires stakeholders to brainstorm all possibilities, honing in on the details of a tactical plan entails thinking creatively about multiple ways to address specific goals.

Whereas an institution's strategic plan formulates broad goals, the tactical plan outlines specific approaches, measures, and actions for bringing these goals to life and identifies funding options. For instance, transitioning to 10 percent solar energy generation to power your campus is a broad strategic goal. What tactics will prove most beneficial and realistic for achieving that goal? What will available funding allow in terms of installing a project on campus versus purchasing solar credits? What creative ways can you find to finance this goal, including partnering with a third party?

The various tactics identified in support of a specific goal must be balanced with approaches identified for all other goals. What should emerge from this tactical planning step is a roadmap of short-term and longer term initiatives. The roadmap should include a range of activities that address both operational and academic strategies leading to the goal of significantly reduced or zero greenhouse gas emissions.

Tactical planning includes the constraints of available resources, so stakeholders must approach this process with their creative thinking caps fully on. A viable tactical plan for addressing an institution's carbon reduction commitments must:

- identify the who, what, and when of your institution's climate action plan;
- adequately fund and staff initiatives;
- establish target timelines for rolling out projects;
- monitor and report progress;
- allow for periodic (e.g., every other year) review and adjustment; and
- continue to involve top leadership and the full campus community, maintaining the interest, high expectations, and high levels of participation necessary for success.

Without these specific elements, your tactical plan is in danger of being relegated to the bookshelf to gather dust.

Before launching into the development and implementation of your institution's tactical plan, recognize and catalog all the things you've already done to offset campus greenhouse gas emissions. From conservation and energy-efficiency initiatives to green energy purchasing and onsite renewable projects to converting acres of your campus to woodlands and wetlands, take stock of and celebrate important achievements in reducing emissions to build a foundation for future success.

What follows are the critical areas of opportunity for reducing campus emissions and examples of specific tactics you can use to address these challenges. Many of these examples have been drawn from "Steps Toward Environmental Sustainability: 125 Ways to Green Your Campus," developed by the UB Green Office of the University at Buffalo and published in *The Green Campus*. All are areas in which educational facilities professionals can and must play a key role.

## Conservation and energy efficiency

While buying **renewable energy certificates** (RECs) or purchasing carbon offsets are viable options to pursue as part of a comprehensive strategy for reducing greenhouse gases, recognize that conservation and increasing efficiency arguably comprise the best initial strategy for reducing carbon emissions. Nothing is cleaner than the kWh or BTU you don't need and don't use. Moreover, every kWh or BTU that is not conserved remains part of your carbon footprint and will need to be replaced by RECs or carbon offsets. These potential additional costs can be avoided by conservation and should be taken into account when calculating paybacks.

Existing strategies, technologies, and products for improving energy efficiency are already making significant contributions to reducing emissions levels for many institutions. Embracing these technologies will help align colleges and universities to



take full advantage of the renewable and clean energy sources they produce or purchase.

Conservation and energy efficiency represent a "first wave" strategy, but they should also remain part of your ongoing efforts. Even if your campus has recently engaged in facilities and system retrofits, it's not too soon to go back and do another round. Consider new tactics, deeper cuts in energy use, and longer paybacks that factor in life-cycle costs.

***Tactics:***

- Create a facilities energy committee to focus on energy conservation measures and priority projects.
- Identify a current staff member for the role or create a new position of campus "energy czar."
- Target your institution's biggest $CO_2$ emitters first, whether they are laboratory buildings, your power plant, or your electric heat.
- Conduct an energy audit of all buildings and implement building energy conservation retrofits of lighting, HVAC, motors, drives, and so forth.
- Minimize run times for HVAC fan systems and equipment.
- Focus on efficiency measures for fume-hood ventilation systems, including variable air volume fan systems and heat recovery.
- Develop policies that set heating and cooling temperatures for each season.
- Incorporate energy-efficiency and conservation goals in campus facilities audits and master planning.
- Institute a green computing policy that requires computers to be turned off overnight, operate with "sleep mode" enabled during the day, and addresses computer equipment purchasing decisions to ensure that high-efficiency models are purchased.
- Conduct consumer awareness programs to save energy.
- Offer rewards and incentives to individual units or departments for reduced energy consumption.
- Use dollar savings from conservation initiatives to pay for RECs or to help finance onsite renewable energy projects.
- Create a revolving fund that allows savings from conservation measures to finance new projects.

## Energy production and procurement

One tactical reality worth bearing in mind is this: As much as 80 percent of an institution's carbon footprint may derive from its purchased utilities. Failing to focus on this area could rob an institution of its greatest potential savings. At the same time that conservation and energy-efficiency initiatives reduce overall electricity load, the purchase and production of green power further reduces an institution's dependence on fossil-fuel-based energy consumption and thus reduces its carbon footprint. In developing green energy options, select approaches that will get you to 100 percent carbon-neutral electricity as soon as possible.

***Tactics:***

- Create campus energy policies and implement efficient operational measures. For example, strictly minimize operation of campus HVAC and other energy-consuming systems consistent with productive operation of the campus.
- In addition to reclaiming all the heat that would otherwise be exhausted, develop options to move your heating load to carbon-neutral sources such as biomass generation, biofuels, wind or solar power, or photovoltaic-produced hydrogen.
- With regard to power plant fossil fuel choice, switch from coal to natural gas or sustainable biomass for your central plant.
- Convert electric heat to natural gas where purchased electricity is mostly fired by fossil fuel.
- Explore cogeneration projects or options for combined heat and power to produce heat and electricity more efficiently.
- To the extent possible, run new buildings on renewable energy and green power.
- Explore possibilities for installing wind, solar electric, solar thermal, biomass, geothermal, and/or hydro energy generation on campus.
- Consider using sustainable biofuels for transportation fleets, heating, and other needs.
- Commit to landscape practices that produce biomass and eliminate the need for grass cutting.
- Purchase renewable energy directly or buy RECs from your utility provider or other suppliers.
- Consider long-term contracts to help renewable energy developers create new renewable energy capacity.
- Don't overlook ways to double dip with conservation and carbon reduction strategies. For instance, appropriate landscaping provides beneficial cooling and reduces water use. Water conservation projects such as faucet and shower aerators reduce water use and thus reduce the energy required to heat and pump water.
- Insist that your electricity provider begin providing electricity with less embodied carbon. Seek statewide and federal policies that mandate this.

## Green construction and renovation

The built environment in the United States accounts for approximately 40 percent of the country's total energy use and about 70 percent of total electricity use. Attempts to dramatically reduce global greenhouse gas emissions must therefore focus concentrated efforts on reducing the impacts of campus facilities.

With regard to new green buildings, institutions should strive to achieve the highest design standards possible. Not only will you achieve national recognition, but you will also net a decreased addition to your climate footprint. While the ACUPCC recommends instituting a policy of mandating LEED Silver or the equivalent as a bare minimum for all new construction, many advocate LEED Gold or Platinum and emphasize that in order to have real and lasting impact institutions should, to the extent possible, commit to building zero emissions energy neutral buildings.

Since even a LEED Platinum building may increase the carbon footprint of a campus through its associated heating, cooling, lighting and equipment loads, maximizing LEED energy points is an essential part of green design.

***Tactics:***

- Design for the highest energy-efficiency standards possible, substantially exceeding energy codes.
- Use the U.S. Green Building Council (*www.usgbc.org*) LEED rating system to help guide design decisions and, wherever possible, pursue LEED Gold or Platinum. Always consider cost and energy consumption consequences.
- When building new, consider actual space requirements; don't overbuild.
- Site new facilities to minimize transportation and other environmental impacts.
- Incorporate daylight and passive solar design elements to reduce energy consumption.
- Require the use of environmentally friendly building materials and products, evaluating equipment and product options based on life-cycle analysis and embodied energy and greenhouse gas emissions.
- Recycle demolition and construction debris.
- Reduce lawn areas and the need for grass cutting, opting instead for native vegetation.
- Control the spread of parking lots and other paved surfaces that encourage more car and truck use and that increase greenhouse gas emissions through the depletion of natural habitat.
- Recommission and retrofit existing buildings to optimize performance.
- Build internal expertise to evaluate solutions proposed by design teams.

## Space utilization

Every new building, no matter how green and energy efficient, adds to the carbon load of a campus. Likewise, every additional carbon footprint increment must be offset, at some price, to achieve carbon neutrality. Therefore, a primary strategy for most institutions should be assessing better ways to use existing space more efficiently and to reduce overall demand for square footage and associated energy loads required to heat, cool, and light additional space.

***Tactics:***

- Seek to maximize the use of campus facilities through seven-day campus programming and full use of facilities in summer months to reduce the need for additional built space.
- Increase distance learning opportunities to free classroom space.

### Create Energy Policies

Campus energy policies play a critical role. They establish and institutionalize energy goals, and they authorize action and programs to achieve compliance. They also enable facilities managers and staff to hold the line against unreasonable demands to turn up the heating or air conditioning. The best time to develop conservation-minded campus energy policies is when your campus energy costs are high and the budget is tight. A genuine institutional commitment to address climate change by reducing greenhouse gas emissions should drive energy policies in a conserving, sustainable direction.

The following are some of the issues that can be addressed in campus energy policies:

- Heating and cooling season temperature settings
- Building HVAC and fan schedules
- Computer operations and "green computing"
- Restrictions on portable space heaters
- Banning halogen torchiere lamps
- Energy purchasing (including buying green power)
- Energy efficiency purchasing standards for various types of equipment
- Green design and energy efficiency standards for new construction
- Energy practices in residence halls and student apartments
- Campus transportation
- Alternative fuels and efficiency for fleet vehicles
- Campus renewable energy development
- Greenhouse gas emissions reductions

—Excerpted from Walter Simpson's "Organizing an Effective Campus Energy Program: Lessons from the University at Buffalo," *The Green Campus*, pages 73 and 75.



- Introduce telecommuting and reduced workweek scheduling to decrease demand for additional office space.
- Develop sophisticated controls to shut down those portions of buildings that are not in use for long periods of time, such as faculty offices in the summer months on campuses where faculty are on a ten-month contract.

## Transportation

Next to the amount of energy consumed by the built environment, transportation energy use is responsible for a significant percentage of greenhouse gas emissions. In the United States, motor vehicles account for about 25 percent of these emissions. Thus, a big challenge for many educational institutions is transportation—namely, how to get students and employees to and from campus efficiently and inexpensively when mass transit options don't offer convenient connections or when service is infrequent.

In addition to working with local and regional transit authorities to enhance service and routes, campus leaders are looking to ramp up distance learning opportunities and offer block scheduling to reduce the number of days that students must travel to campus. Shorter workweeks for faculty and staff are also garnering attention, as are parking policies that would influence how far students and employees drive and how often.

Another option is buying employees and students bus or rail passes. This approach would not only result in significant greenhouse gas emissions reductions but might also eliminate the need for additional parking on campus. Thus, the cost of the passes may actually produce a net financial savings because of the money not spent building a new parking lot or garage.

***Tactics:***

- Purchase an energy efficient vehicle fleet.
- Use alternative fuels for your campus vehicle fleet.
- Create a bike-friendly and walkable campus, and introduce a bike-sharing program.
- Implement a "no idle" policy for fleet vehicles and campus buses.
- Consider a policy of no cars for on-campus freshman and sophomores.
- Increase on-campus housing to eliminate student commutes, and redevelop affordable housing options in surrounding neighborhoods to encourage more students, faculty, and staff to live within walking distance of the campus.
- Provide incentives to students, staff, and faculty to use local transit systems, to drive less, and to use more fuel-efficient vehicles.
- Create ride share and vanpool options for faculty and staff.
- Purchase carbon offsets to negate emissions related to faculty and staff air travel.

## Waste reduction and recycling

An often overlooked component of emissions reduction is the waste stream. How does your institution reduce all forms of waste through better procurement practices and comprehensive recycling programs? Recycling actually reduces greenhouse gases in two important ways. First, reducing what is sent to landfills automatically reduces the levels of methane produced and emitted. And second, because less energy is required to make products from recycled resources versus virgin materials, recycling can also curb emissions by reducing the amount of fossil fuels required to manufacture products.

Good waste reduction and recycling programs tend to be highly visible and participatory and encourage green thinking and behavior on campus. These programs may lead to collectively larger greenhouse gas emissions reductions. Influencing human behavior in greener directions is key to maximizing results.

***Tactics:***

- Recycle at least 50 percent of your institution's solid waste.
- Institute a robust recycling program to which you continue to add new items for collection; for instance, expanding beyond paper, cardboard, plastic, metal, and glass to include batteries, tires, computers, fluorescent lights, and so forth.
- Maximize collection by making recycling easy and convenient, with bins that are co-located with trash cans and placed in all high-traffic, public locations as well as under every desk.
- Reduce all waste, especially paper, disposable items, and packaging materials.
- Establish programs to encourage the use of e-mail and double-sided printing.
- Reduce printed materials by transitioning to online phone directories and campus publications.
- Compost food waste.
- Institute campus recycling competitions. For more information, go to RecycleMania (*www.recyclemania.org*), College and University Recycling Council (*www.nrc-recycle.org/curc.aspx*), and U.S. EPA WasteWise College and University Campaign (*www.epa.gov/wastewise/targeted/colleges/cu_index.htm*).
- In addition to recycling, focus on source reduction and reuse of everything from furniture and electronics to clothing and other items left behind by students.
- Establish swap shops to facilitate refurbishment and exchange of unwanted items.

## Procurement

Efficient procurement policies and practices that factor in life-cycle costs can go a long way toward minimizing waste and curtailing excessive embodied energy and greenhouse gas emissions. Addressing this source of emissions is important even if it will not be captured in your greenhouse gas emissions inventory.

***Tactics:***

- Buy less, and purchase only what you need.
- Instead of purchasing virgin-fiber or partially recycled content paper, buy nonchlorine-bleached office paper that has 100 percent postconsumer recycled content.
- Buy computers, appliances, and other equipment that operate with maximum energy efficiency and are compliant with the U.S. EPA ENERGY STAR program.
- Whenever possible, buy recycled, local, or sustainably produced products. Helpful resources include Green-e (*www.green-e.org*), which includes a list of retailers of certified renewable energy products, and EPA's Green Power Partnership (*www.epa.gov/greenpower*).
- Incorporate green standards in all contracts for services and goods.
- Evaluate products based on the full range of life-cycle factors, including durability, reusability, recycled content, hazardous material content, energy efficiency, packaging, and energy required to ship the product to your campus.

## Food services

Campus food systems are among the daily activities that can have a significant incremental impact on emissions not only because of reduced energy consumption (which will be captured by your inventory) but also indirectly through purchasing decisions and opportunities to educate consumers and raise awareness about food choices.

***Tactics:***

- Whenever possible, buy local, organic, seasonal food.
- Encourage students and other consumers to eat foods that are lower on the food chain and therefore bear a lower carbon footprint (e.g., less meat) by offering education and signage about the carbon impacts of menu items.
- Use dinnerware that is reusable, and institute reusable mug and bottle programs that offer discounts on beverages.
- Institute food donation and kitchen waste composting programs.
- Purchase energy-efficient and water-saving kitchen equipment.
- Require vending machine contractors to use ENERGY STAR machines or to retrofit machines with energy setback controls.
- Mandate recycling standards and requirements for locally produced food in your contracts with food service vendors.

## Education and research

The ACUPCC recommends that signatories take concerted steps to align their teaching and research activities with commitments to reduce greenhouse gas emissions.

***Tactics:***

- Work closely with students and faculty on internships, special projects, and courses that support climate neutrality. Facilities operations should provide many opportunities for internships.
- Teach specific courses on climate science and policy, and incorporate elements of these topics across all curricula.
- Partner with local businesses and the community to share climate expertise and solutions.
- Provide facilities for on-campus research to help address the climate crisis.
- Install innovative energy-conservation or renewable energy systems, and work with students and faculty to assess the effectiveness of these technologies to reduce greenhouse gas emissions.
- Involve students and faculty in researching emissions-reduction solutions for vehicles, buildings, and industrial processes.
- Research solutions for new energy sources and for carbon capture and sequestration.
- Establish dedicated funds for research related to climate neutrality, and use a percentage of the institution's endowment to support climate research initiatives and innovation.

## Outreach and awareness

More stakeholders are starting to realize that it may not be the building itself but rather how occupants use it that results in inefficiencies. One approach that is gaining ground is to develop programs to address human knowledge and behavior. For instance, more institutions are installing metering technologies in office buildings and dormitories to monitor efficiencies and are linking these with display kiosks where the results are interpreted. Making the results of metering public can help educate building occupants about the direct impact of their behaviors on energy consumption, emissions, and costs and can improve the eco-literacy of graduates.

***Tactics:***

- Institute annual or semester-based energy competitions among residence halls and academic buildings to promote efficiency and to encourage students to conserve energy and water.



- Develop campaigns to remind students and employees to power down over breaks.
- Create a campus website to promote energy conservation, recycling, and other environmental initiatives and priorities.
- Incorporate an online energy and emissions tracking system to help students, staff, and faculty visualize savings and the impacts of their actions and to link conservation efforts with reductions in greenhouse gas emissions.
- Develop an information network of students, faculty, and staff from every office and department on campus to help spread the word about programs, policies, and incentives.

### *On the lead role facilities managers must take…*

*"Outreach should be audience-specific, recognizing differences in outlook, opportunity, and motivation to act and participate. Energy awareness raising should be directed first at those who can do the most—namely facilities managers, trades, operations, and design and construction staff. Besides, if there is the impression that facilities is not doing its job, few on campus will take conservation seriously and efforts to raise energy awareness with that larger audience will fail. A successful energy awareness program should create a campus culture where people are upset by energy waste and want to report it and stop it."*

—Walter Simpson, "Organizing an Effective Campus Energy Program: Lessons from the University at Buffalo," *The Green Campus*, pages 72-73.

# Conclusion/Next Steps

## A different way to gauge success

Colleges and universities are often scrutinized by education consumers, the public, and peer institutions on a range of attributes: SAT scores for incoming freshmen, endowment assets, library holdings, student-faculty ratios, federal research grants and tuition assistance, to name a few. David W. Orr, the Paul Sears Distinguished Professor of Environmental Studies and Politics at Oberlin College, suggests a different set of criteria for ranking higher education institutions in his essay "Rating Colleges" in *The Green Campus: Meeting the Challenge of Environmental Sustainability* (Alexandria, Virginia: APPA, 2008). Orr proposes five criteria for evaluating whether an institution and the graduates it produces actually move the world in a sustainable direction.

**1. What and how much does an institution consume and/or discard per student?** "Arguably, the best indicator of institutional impacts on the sustainability of the earth is how much carbon dioxide it releases per student per year from electrical generation, heating, and direct fuel purchases. Other ratios of interest would include amounts of paper, water, materials, and electricity consumed per student. These can only be determined by careful audits of how much of what enters and leaves the campus. On this basis colleges might compete to become increasingly efficient in lowering resource use per student" (page 14).

**2. What kind of institution management policies are in place for energy use, building, landscaping, materials, purchasing, waste, and recycling?** "What priority does the institution give to the use of recycled materials? What percentage of its material flows are recycled? Does it limit the use of toxic chemicals on the grounds and in buildings? Does it emphasize efficiency and solar energy in renovations and new buildings? Does it use nontoxic materials?" (page 15).

**3. What does the curriculum provide in terms of teaching the essential tools of eco-literacy?** "What percentage of its graduates know the rudiments of ecology? Do they understand that no good economy can be built on the ruins of natural systems? Do they have experience in the out-of-doors? Is there opportunity and encouragement to restore some part of the nearby rivers, prairies, worn-out farmland, or strip-mined land? … This presumes, of course, that the faculty itself is ecologically literate and relates environmental themes to course material" (page 15).

**4. How are institution finances used to build sustainable regional economies?** "What percentage of its food purchases come from nearby farmers? … To what extent are their funds invested in enterprises that move the world toward sustainability? All institutions should set long-term goals to harmonize their investments with the goal of sustainability, seeking out companies and investment opportunities, doing things that need to be done to move the world in sustainable directions" (page 15).

**5. What do graduates do in the world?** "On average, what price will future generations pay for the manner in which graduates of particular institutions now live? How much do they consume over a lifetime? How much carbon dioxide do they contribute to the atmosphere? How many trees do they plant? How do they earn their keep? How many work through business, law, social work, education, agriculture, communications, research, and so forth to create the basis for a sustainable society? Are they part of the larger ecological enlightenment that must occur as the basis for any kind of sustainable society, or are they part of the rear guard of a vandal economy? Most colleges make serious efforts to discover who among their alumni have attained wealth. I know of no college that has surveyed its graduates to determine their cumulative environmental impacts" (pages 15-16).

## The social call for a climate solution

Another way to consider the cost of climate change is the social price that institutions could face for failing to show leadership in an area of emerging interest and need. Whether the topic is melting glaciers and rising sea levels or concerns about rising prices of fuel and food, concerns about environmental challenges have entered mainstream conversations. Our global challenges of energy, climate, and biodiversity are all now closer to the collective consciousness of large segments of the population and are forcing debate about how and where we live, how and what we drive, and what we buy from how far away.

This growing societal consciousness about a range of environmental problems and their potential consequences puts increased pressure on colleges and universities to be more transparent about resource use and outputs. On the positive side, this greater awareness offers unprecedented opportunities for colleges and universities to show leadership and partner with communities and municipalities to find real solutions quickly. Educational facilities professionals are key to bringing these important changes to fruition.



## Excess emissions

Scientists point to a rapid accumulation of excess greenhouse gases in recent decades as potentially devastating to the social and economic well-being of human civilization. In particular, the overabundance of carbon dioxide—which accounts for approximately 70 percent of all greenhouse gas emissions—threatens life on the planet as we know it, and as we would wish for our grandchildren to know it.

These dangerously high levels that remain trapped in the Earth's atmosphere are warming the planet's overall temperature at a rate most scientists find alarming. Recently, leading U.S. climatologist Jim Hansen has said we have a small window of only one more degree of warming and just ten years to respond to the problem or it may be impossible to avoid "tipping points" and the worst consequences of climate change.

Global scientific consensus concurs with that assessment. The Intergovernmental Panel on Climate Change (*www.ipcc.ch*) suggests that greenhouse gas emissions globally must be reduced by at least 50 percent below 2000 levels by 2050 and that $CO_2$ emissions must peak before 2015 to head off the probability of catastrophic impacts associated with global mean temperature increases of more than 2 degrees Celsius.

The good news is that a solution is at hand. We know what to do to put the brakes on global warming. The sobering reality is that we must act now to dramatically change our current energy path and immediately begin reducing our annual carbon emissions. Achieving significant reductions in greenhouse gas emissions will require a renewed commitment to energy conservation and efficiency and proactive steps to kick the fossil fuel habit, especially by reducing reliance on the dirtiest, most carbon-intensive of these fuels (coal) and instead switching to clean and renewable carbon-free energy sources. Achieving *carbon neutrality*—that is, no net addition of greenhouse gas emissions—will be difficult. It will mean significant changes in the ways colleges and universities meet their energy needs. But higher education institutions can and must play a pivotal role.

### The ACUPCC: Higher Education Presidents Unite on Climate Change

The American College & University Presidents Climate Commitment is an effort of presidents and chancellors to address climate change by committing their institutions to eventually achieving climate neutrality and to accelerating their research and educational efforts to help society move in this same direction. Three non-profits help coordinate and support the effort: the Association for the Advancement of Sustainability in Higher Education (AASHE), Second Nature, and ecoAmerica.

The ACUPCC calls on institution leaders to pledge to the following:

- Take immediate steps to reduce greenhouse gas emissions.
- Complete an emissions inventory.
- Set a target date and interim milestones for becoming climate neutral.
- Integrate sustainability into the curriculum and make it part of the educational experience.
- Make the campus climate action plan, inventory, and progress reports publicly available.

A wealth of resources is available from the ACUPCC website (*www.presidentsclimatecommitment.org*), including the ACUPCC Implementation Guide, which provides full details on the specific obligations of the commitment and explains technical issues and requirements related to implementation.

The ACUPCC Implementation Guide is a critical handbook for institutions that have signed on to the commitment. It is invaluable for every institution that is pursuing greenhouse emissions reductions because it provides a larger context for the involvement of institution presidents and chancellors. The guide also emphasizes tangible actions in which facilities managers can play a key role. These include green building, green power production, green purchasing, and waste reduction.

## A higher calling

In recent decades, many colleges and universities have engaged in a range of sustainability initiatives aimed at reducing resource use and impacts as part of a broad commitment to a healthier environment. Many of these efforts have been championed by facilities professionals. Operationally, they include:

- spearheading campus energy conservation programs;
- implementing significant energy-efficiency technologies and standards for campus facilities;
- mandating green design standards for new construction and renovation projects;
- instituting campuswide recycling and waste-reduction programs;
- shifting campus food services operations to focus on local and organically grown products;

## Key Resource: *The Green Campus*

Much of the material discussed in this implementation guide is amplified in great detail in the 2008 APPA book *The Green Campus: Meeting the Challenge of Environmental Sustainability*, edited by Walter Simpson, retired energy officer at the University at Buffalo (SUNY Buffalo).

*The Green Campus* offers an extensive collection of articles encompassing key responsibilities of higher education facilities professionals: energy, buildings and maintenance, purchasing, recycling and waste reduction, landscaping and grounds, and transportation, with special emphasis on meeting the challenge of climate change. This invaluable resource serves as a foundational reference for moving your institution forward with its climate neutrality initiatives in a comprehensive manner. Copies are available through the APPA bookstore at *www.appa.org/bookstore*.

- adopting green purchasing policies and practices that consider the life cycle costs of products, their packaging, and how far they must be transported to campus; and
- partnering with communities on better pedestrian and transportation solutions.

The academic mission of higher education institutions also places them in the unique position of equipping future civic and business leaders, engineers, architects, and scientists with the skills, knowledge, and passion to lead a sustainable society. As a microcosm of society at large, college and university campuses can now offer a learning laboratory for how to work together across disciplines to eliminate our nation's reliance on fossil fuels.

Moreover, the higher education sector in the United States represents a $300 billion-plus industry that annually spends billions on energy, fuel, and infrastructure. With this buying power, colleges and universities have the capacity to affect the marketplace and encourage the production of planet-friendly goods and services that are part of the solution to climate change, not part of the problem.

Judy Walton, executive director and director of strategic initiatives for the Association for the Advancement of Sustainability in Higher Education, sums up the role of higher education in this global challenge in this way:

> Leading society to reverse human-induced global warming is a task that fits squarely into the educational, research, and public service missions of higher education. There is no other institution in society that has the influence, the critical mass, and the diversity of skills needed to successfully make this transformation. Tomorrow's architects, engineers, attorneys, business leaders, scientists, urban planners, policy analysts, cultural and spiritual leaders, journalists, advocates, activists, and politicians—more than 17 million of them—are currently attending the 4,200 institutions of higher learning in the United States. This group will play a central role in transforming today's greenhouse-gas-intensive economy into tomorrow's low-carbon economy. Higher education must provide these students with the necessary knowledge, skills, and motivation to do so.
>
> —Judy Walton, "Going Climate Neutral: The American College & University Presidents Climate Commitment," *The Green Campus*, page 61.

The top leaders of more than 600 higher education institutions from all 50 U.S. states have signed on to the American College & University Presidents Climate Commitment (ACUPCC), committing their institutions to neutralizing their greenhouse gas emissions. Their enthusiastic response suggests strong support for the message and the mission of seeking carbon neutrality. To meet this challenge, campus leaders will be relying heavily on facilities professionals to help craft, initiate, and implement effective campus climate action plans.

Where do we go from here?



# APPENDIX A
# Participants in the APPA Thought Leaders Sustainability Symposium

***In May 2008, APPA conducted a Thought Leaders Symposium on the specific topic of sustainability and with the stated goal of developing a practical implementation guide for educational facilities professionals. The symposium, produced under the auspices of APPA's Center for Facilities Research, was graciously sponsored by Affiliated Engineers, Inc. APPA Past President Jack Colby is the chair of the Thought Leaders Series.***

**John F. Bernhards**
Associate Vice President
APPA
Alexandria, Virginia

**Wendell C. Brase**
Vice Chancellor for Administrative and Business Services
University of California, Irvine
Irvine, California

**Douglas K. Christensen, APPA Fellow**
Director of the Office of Facility Solutions
Brigham Young University
Provo, Utah

**Chris Christofferson**
Physical Plant-Campus Services
University of California, Berkeley
Berkeley, California

**Jack K. Colby**
Assistant Vice Chancellor for Facilities Operations
North Carolina State University
Raleigh, North Carolina

**Anthony Cupido, P. Eng.**
Assistant Vice President, Facility Services
McMaster University
Hamilton, Ontario, Canada

**Raymond DuBose**
Director of Energy Services
University of North Carolina at Chapel Hill
Chapel Hill, North Carolina

**Norbert W. Dunkel**
Assistant Vice President and Director of
Housing and Residence Education
University of Florida
Gainesville, Florida

**Georges Dyer**
Senior Fellow
Second Nature
Boston, Massachusetts

**Larry Eisenberg**
Executive Director, Facilities Planning and Development
Los Angeles Community College District
Los Angeles, California

**Steve Glazner**
Director of Knowledge Management
APPA
Alexandria, Virginia

**Suzanne Healy**
Director of Professional Development
APPA
Alexandria, Virginia

**Christina Hills**
Research Specialist
APPA
Alexandria, Virginia

**Dan Johnson**
APPA Consultant and Member Emeritus
Watsonville, California

**Kevin S. Kenyon**
Associate Vice President for Facilities Planning and Management
Ball State University
Muncie, Indiana

**Jeri Ripley King**
Facilities Management Strategic Communications
University of Iowa
Iowa City, Iowa

**Steve Kraal**
Senior Associate Vice President for Campus Planning Facilities Management
University of Texas at Austin
Austin, Texas

**Geoffrey P. McMahon, P.E., LEED-AP**
Principal
Affiliated Engineers, Inc.
Seattle, Washington

**Michele Madia**
Director, Environmental Leadership
National Association of College and University Business Officers
Washington, D.C.

**E. Lander Medlin**
Executive Vice President
APPA
Alexandria, Virginia

**Patrick Sanaghan** ***(Thought Leaders Symposium facilitator)***
President
The Sanaghan Group
Doylestown, Pennsylvania

**Pete Sandberg, LEED-AP**
Assistant Vice President for Facilities
St. Olaf College
Northfield, Minnesota

**Jerry Schuett, P.E.**
Principal
Affiliated Engineers, Inc.
Chapel Hill, North Carolina

**Walter Simpson**
Energy Officer (retired)
College at Buffalo (SUNY Buffalo)
Buffalo, New York

**William G. Suter, LEED-AP**
Director of Facilities
American University
Washington, D.C.

**Faramarz Vakili**
Associate Director, Physical Plant
Facilities Planning and Management
University of Wisconsin/Madison
Madison, Wisconsin

**Mike Walters, P.E., LEED-AP**
Sustainable Systems Leader
Affiliated Engineers, Inc.
Madison, Wisconsin

**Judy Walton, Ph.D.**
Acting Executive Director
Association for the Advancement of Sustainability in Higher Education
Lexington, Kentucky, and Portland, Oregon

**Patti Wilson, LEED-AP**
Director of Business Development
Affiliated Engineers, Inc.
Rockville, Maryland

**William E. Winner**
Professor, Department of Forestry and Environmental Resources Coordinator
Provost's Office
North Carolina State University
Raleigh, North Carolina

**Stan Wrzeski, LEED-AP**
Sustainable Systems Analyst
Affiliated Engineers, Inc.
Madison, Wisconsin



# APPENDIX B
# References and Resources

## Organizations

APPA (Leadership in Educational Facilities)
*www.appa.org*

Association for the Advancement of Sustainability in Higher Education (AASHE)
*www.aashe.org*

Clean Air-Cool Planet
*www.cleanair-coolplanet.org*

Disciplinary Associations Network for Sustainability (DANS)
*www.aashe.org/dans*

Engineers for a Sustainable World
*www.eswusa.org*

Higher Education Associations Sustainability Consortium (HEASC)
*www.heasc.net*

Intergovernmental Panel on Climate Change
*www.ipcc.ch*

National Renewable Energy Laboratory
*www.nrel.gov*

National Wildlife Federation's Campus Ecology Program
*www.nwf.org/campusecology*

Second Nature
*www.secondnature.org*

U.S. Green Building Council
*www.usgbc.org*

## Publications


APPA and the Campus Safety Health and Environmental Management Association. *Environmental Compliance Assistance Guide for Colleges and Universities, second edition*. Alexandria, Virginia: APPA and CSHEMA, 2008.

Barista, David. "Green Building Reaches the Tipping Point in Higher Education." *Facilities Manager*, November/December 2007.

Campbell, J. Kirk. "Custodial Operations: Green & Sustainable." *Facilities Manager*, May/June 2008.

Campbell, Jeffrey L. and Alan S. Bigger. "Cleanliness & Learning in Higher Education." *Facilities Manager*, July/August 2008.

Clean Air-Cool Planet. *Consumer's Guide to Retail Carbon Offset Providers*. *www.cleanair-coolplanet.org/Consumers-GuidetoCarbonOffsets-.pdf*

Dautremont-Smith, Julian, primary author. "American College and University Presidents Climate Commitment Implementation Guide: Information and Resources for Participating Institutions," 2007, *www.presidentsclimatecommitment.org/pdf/ACUPCC_IG_Final.pdf.*

Eagan, David J., Terry Calhoun, Justin Schott, and Praween Dayananda. "Guide to Climate Action Planning: Pathways to a Low Carbon Campus," National Wildlife Federation Campus Ecology, 2008, *www.nwf.org/campusecology/pdfs/climateactionplanning.pdf.*

Eagan, David J., Julian Keniry, and Justin Schott. "Higher Education in a Warming World: The Business Case for Climate Leadership on Campus," National Wildlife Federation Campus Ecology, 2008, *www.nwf.org/campusEcology/BusinessCase/HigherEducationInAWarmingWorld2-21-08.pdf.*

Folsom, Kevin. "sustainable facilities vs. Sustainable Facilities." *Facilities Manager*, May/June 2008.

Johnson, Bill. "Geothermal Energy: Tapping the Potential." *Facilities Manager*, November/December 2008.

Jones, Kenneth B. "What is a Carbon Footprint and How Can You Reduce Yours?" *Facilities Manager*, March/April 2008.

Medlin, E. Lander, with Anthony D. Cortese. "Sustainability and the ACUPCC." *Facilities Manager*. March/April 2008.

Pelletier, Steve. "Sustainability: What is the Trustee's Stake?" *Trusteeship*, September/October 2008.

Putman, Andrea and Peter Bardaglio. *Boldly Sustainable: Hope and Opportunity for Higher Education in the Age of Climate Change*. Washington, D.C.: National Association of College and University Business Officers, 2009.

Putman, Andrea and Michael Philips. *The Business Case for Renewable Energy: A Guide for Colleges and Universities*. Washington, D.C.: APPA, NACUBO, and SCUP, 2006.

Shi, David. "Sustainability 101." *Trusteeship*, March/April 2008.

Simpson, Walter, ed. *The Green Campus: Meeting the Challenge of Environmental Sustainability*. Alexandria, Virginia: APPA, 2008.

## Websites

Affiliated Engineers, Inc.
*www.aeieng.com*

American College & University Presidents Climate Commitment
*www.presidentsclimatecommitment.org*

Association for the Advancement of Sustainability in Higher Education Resource Center
*www.aashe.org/resources/resource_center.php*

California Climate Action Registry
*www.climateregistry.org*

Campus Climate Challenge
*www.climatechallenge.org*

Chicago Climate Exchange
*www.chicagoclimatex.com*

Campus Sustainability Day
*www.scup.org/csd*

Clean Air-Cool Planet Carbon Calculator Toolkit
*www.cleanair-coolplanet.org/toolkit/index.php*

The Climate Registry
*www.theclimateregistry.org*

College and University Recycling Council
*www.nrc-recycle.org*

ENERGY STAR (U.S. Department of Energy)
*www.energystar.gov*

Green Power Partnership (U.S. Environmental Protection Agency)
*www.epa.gov/greenpower*

Green-e
*www.green-e.org*

Higher Education Climate Action Project (HECAP)
*www.heclimateaction.org*

Higher Education Sustainability Fellows Program
*www.aashe.org/heasc/fellowsprogram.php*

National Wildlife Federation's National Report Card on Environmental Performance and Sustainability in Higher Education
*www.nwf.org/campusecology/resources/html/stateofthecampusenvironment.cfm*

Regional Greenhouse Gas Initiative
*www.rggi.org*

Recyclemania
*www.recyclemania.org*

Society for College and University Planning's Carbon Neutral Offset Program
*www.scup.org/resources/carbon-neutral-offset.html*

Sustainability Tracking Assessment and Rating System (STARS)
*www.aashe.org/stars*

Sustainable Endowment Institute's College Sustainability Report Card
*www.greenreportcard.org*

WasteWise Program (U.S. Environmental Protection Agency)
*www.epa.gov/epawaste/partnerships/wastewise/index.htm*

Western Climate Initiative
*www.westernclimateinitiative.org*


ISBN 1-890956-48-1