A comprehensive review of the strategies and steps to reduce greenhouse gas emissions on campus, with best practices from U.S. colleges and universities

GUIDE TO
Climate Action Planning
Pathways to a Low-Carbon Campus

by David J. Eagan, Terry Calhoun, Justin Schott and Praween Dayananda

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COVER IMAGE
Northland College McLean Environmental Living Learning Center student residence, photo by Bryce Henry, Northland College student.
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• The Campus Ecology Climate and Sustainability Series

This Guide to Climate Action Planning is part of a growing number of fact-filled, timely campus resources on climate and sustainability produced by Campus Ecology. More guides will be forthcoming in 2008 – on topics such as Campus Habitats, Student Climate Achievements and Financing Climate Action. Two additional publications available now through the Campus Ecology website are Higher Education in a Warming World: The Business Case for Climate Leadership on Campus (60 pages with more than 100 campuses mentioned from 32 states) and an 8-page Executive Summary of the 60-page report. **To download, visit www.nwf.org/CampusEcology**

OVERVIEW

In the next 20–50 years—within the lifetimes of today's college students—we will have to achieve an impressive feat: cut climate-warming emissions to close to zero. To do so, we will need to rewrite the rules on how to live on a planet with limited resiliency, and conduct our affairs in a manner that safeguards the future prospects for people, wildlife and ecosystems.

Why this guide? Increasing numbers of schools have started—or soon will start—planning to reduce their net emissions. Whether prompted by state law, grassroots demand, administrative mandate, requirements of the American College and University Presidents Climate Commitment or the desire to manage carbon and energy more efficiently, hundreds and eventually thousands of schools will be looking for guidance as they embark on the climate action planning process.

Leading climate scientists say with increasing urgency that we have little time left before global warming pollution pushes the earth's life-support systems past critical tipping points. They warn that a delay of global action by just another 10 years would double or triple the rate of reductions needed to stabilize temperatures 2–3ºC above pre-industrial levels.

With the challenge critical and the stakes mounting, the need for climate leadership has never been greater. The good news is that the higher education sector is responding to global warming, with more than 550 colleges and universities committed to achieving climate neutrality and many others working toward substantial emissions-reduction targets. Despite these commitments, however, *actual greenhouse gas emissions continue to rise on most campuses*. Gains from energy efficiency and conservation have been outpaced by growth in student populations and new construction.

This guide addresses a simple question: How can colleges and universities significantly reduce their net CO_2 and other greenhouse gas emissions over a relatively short time? What sort of roadmap or blueprint will show the way? By drawing upon the experiences and expertise of leading campuses, it outlines some steps for creating effective climate action plans. It also highlights best practices from the handful of schools that are leading the way in campus-wide climate planning.

The planning process will extend beyond campus borders, and the implementation of climate action plans will generate valuable resources and expertise that will help businesses, communities, states and other entities to significantly cut their emissions possibly in partnership with the campus. Higher education's pioneering work on climate action plans will play an important role in achieving a more secure, just and sustainable future.

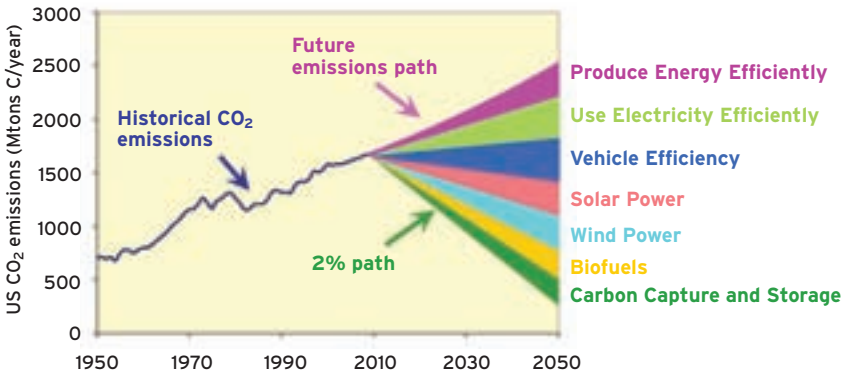
I. THE CASE FOR CLIMATE ACTION PLANNING ON CAMPUS

Reducing emissions on campus to climate-safe levels will not happen by chance, nor will it be accomplished by half-measures. Above all, it will take a deep commitment to act, based on trust in the overwhelming scientific evidence that climate change is already occurring and will steadily worsen if we continue to pour climate-warming gases into the atmosphere.

The most reliable long-term strategy to turn that commitment into effective action is integrated, comprehensive planning for emissions reduction and the alignment of the climate action plan with other campus plans, especially the master plan and strategic plan. This section explores some key reasons for developing and implementing a climate action plan.

• The science imperative

The data amassed by climate scientists not only identify the many signals that prove global warming is underway, but also show the clear correlation between global average temperatures and CO_2 concentrations in the atmosphere. Left unchecked, the upward trajectory of greenhouse gases will likely lead—and sooner than earlier models predicted—to rising oceans, species extinctions, massive droughts and monumental disruptions in human affairs around the planet.



Achieving significant greenhouse gas reductions will take action on many fronts. The "wedge" idea illustrates how a suite of approaches work together to curtail emissions to levels that will minimize climate warming.

(After Pacala and Socolow, *Science*, 2004)

The core objective in emissions-reduction planning is to ratchet down release of CO_2 and other warming gases to levels that will halt the rise in global greenhouse gases and temperatures. To get there, scientists calculate that the U.S. will need to cut its emissions at least 80% by 2050 or earlier to slow and ultimately limit the effects of global warming. A growing number of scientists are arguing for even stricter caps and steeper timetables.

To reach these climate-stabilizing CO_2 levels, the National Wildlife Federation advocates the "2% pathway"—steady, verifiable progress in emissions reduction averaging at least 2% per year below a 2005 baseline level across all sectors of society (see graph). Commitment to this incremental target is needed to bring about a *net reduction* of 30% by 2020 and greater than 80% by mid-century. While it may seem like a daunting challenge, the technology exists today to achieve such steep cuts.

We are already witnessing the effects of global warming—a hint at what the future may hold if we fail to act. This brief mention of the scientific basis for action is just a reminder of the magnitude of the work that lies ahead. There are many excellent sources of information and analysis on global climate change that can provide a wealth of details, with more coming out daily that only strengthen the case for taking action. For a list of recommended reports, articles, books and websites, see Appendix B.

• Climate action and higher education

Campuses have been implementing energy-saving projects for decades, and have been creating and implementing strategic and master plans for even longer. But long-term planning and programs to significantly reduce net energy use and emissions is new territory for higher education. Besides a growing awareness and concern about global warming, there are several factors that have sparked a growing wave of activity at colleges and universities. Together, they add up to a widely acknowledged "sustainability movement" that has taken root in higher education.

Student activism. With global warming constantly in the news and even in the movie theatres, the urgency to take action has united students in common cause at schools everywhere. In the last two years, major, national, campus-focused climate campaigns such as the Campus Climate Challenge, and events such as Step It Up, Power Shift and Focus the Nation[1] have mobilized tens of thousands of students into action. Students have joined these and other efforts to lobby their local campuses, communities and even Congress to set new policies and plans to curb emissions. On dozens of campuses, students have voted to tax themselves a few dollars per semester to fund carbon-cutting projects or purchase wind energy, leveraging action that wouldn't otherwise have occurred

© National Wildlife Federation, Campus Ecology

Students rally at the nation's capital during Power Shift in November 2007.

Sustainability in professional management associations. Since the early part of this decade, a number of the organizations to which campus-based professionals belong purchasing agents, planners, facilities managers, housing officers and more have been working with their members to introduce the long-term benefits of viewing their work through the lens of sustainability. The annual Campus Sustainability Day in October (since 2003), and publications such as *Sustainability: Taking the Long View (SCUP 2003), The Business Case for Renewable Energy: A Guide for Colleges and Universities* (APPA/NACUBO/SCUP 2006), and *The Green Campus: Meeting the Challenge of Environmental Sustainability* (APPA 2008) are just a handful of many such professional development and learning initiatives. In 2005, a number of these organizations created an umbrella group called the Higher Education Associations Sustainability Consortium (HEASC). Recently, academic disciplinary associations have formed the Disciplinary Associations Network for Sustainability (DANS).

"We really care about these issues, and we care about making a positive change in the world. But we're also extremely flexible and fast and realistic when addressing these issues. I think that's something new that our generation is bringing."

–Lucas Brown, Oberlin College student, 2008

Top-level commitment to campus climate action. An important driver for recent campus climate activity has been the *American College & University Presidents Climate Commitment* (ACUPCC).[2] Since its launch in December 2006, more than 550 presidents have pledged to create plans for their institutions with the goal of climate neutrality. Other schools are also setting GHG emission reduction targets and timelines, even if they haven't (or haven't yet) committed to climate neutrality. In all, there are hundreds of campus initiatives that now call for the creation of detailed climate action plans to guide their reduction activities, the vast majority of which have yet to be written. Groups such as NWF's Campus Ecology Program are not only encouraging adoption of the ACUPCC and other commitments, but also are helping a number of partner institutions with climate action planning and implementation.

Government mandates. Reduction goals for state and local energy consumption, including energy-saving building codes, have been established in a number of states and municipalities. Former New York Governor George Pataki led the way in 2001 by issuing Executive Order 111, which requires state agencies (including universities) to reduce energy consumption 35% below 1990 levels by 2010 and purchase 20% renewable energy by the same year.[3] California passed AB 32 in 2006, requiring all public and private companies and agencies/institutions in the state to reduce global warming emissions to 1990 levels by 2020, or 25% from 2006 levels. Beginning in 2007, North Carolina requires all new or renovated state-owned buildings—including higher education institutions—to be 20–30% more energy and water efficient than previous minimum standards. Texas recently passed a state-wide policy requiring strict energy efficiency levels at all public schools. More mandates will be coming and possibly at the national level with cap-and-trade policies for carbon emissions. While there will be resistance, such laws may be needed to speed up the pace of climate action.

"Effective conservation programs can free up funds within the University budget that will in turn be invested in renewable and non-CO_2 emitting forms of energy."

–Richard C. Levin, President, Yale University

Financial incentives. Fortunately, the business case for climate leadership is as strong as any other argument. With rising energy prices and shrinking campus budgets, establishing strong programs for efficiency upgrades, green buildings, renewable energy and other fuel-saving initiatives typically helps "green" the bottom line. Coupled with a wide variety of grants and rebates from government programs and local utilities, cutting carbon emissions has increasingly become synonymous with cutting costs. (NWF's new report *Higher Education in a Warming World* gives specific examples. See link in Appendix B.)

• Advantages of campus climate plans

The need for a "roadmap" to help campuses reach their emissions-reduction targets has never been greater. The experiences of the first wave of schools that implemented carbon-cutting initiatives have shown that good planning is the best way to ensure good results.

A climate plan is many things . . .

- A roadmap for action, showing the best routes that collectively lead to an agreed-upon destination.
- A tool for analyzing and prioritizing projects based on a range of economic, environmental and social criteria.
- A social contract, orchestrating a diverse mix of staff, faculty, students and other stakeholders to work together on solutions to global warming.
- A long-term work-in-progress; the children of today's college students will continue the work that is just now beginning . . .

Not surprisingly, every campus plan and approach to emissions reduction will be different, given the fact that every campus has a unique mix of people, priorities, resources and traditions.

Context affects planning: Complexity, size, control, collective bargaining. From a *Guide to Planning for Change* by Donald M. Norris and Nick L. Poulton, September 2008, Society for College and University Planning (SCUP).

The "Context" image (see box) displays a matrix of just a few of the differences among institutions and institutional types which ensure that no two plans will be identical, though there are elements each will share —some of which are detailed in the next section.

• Why plan?

Undergoing a comprehensive planning process and having a plan with goals and benchmarks provides numerous advantages in carbon-emission reduction. Having a plan means that you can:

Keep emission reduction on track in the short and long term. A plan that identifies the emissions reduction of each project and sets an implementation schedule over the short, middle, and long term will ensure that colleges can make steady progress toward their climate goals. A climate plan, while decades-long in scope, typically functions in a stepwise, iterative manner. While its overarching aim is to reach agreed-upon targets, it will realistically do so in increments of 2–5 years, depending on the time required to plan and complete specific projects. This project-based timeframe will fit with most campus planning and budgeting cycles while leading to the desired emissions savings over the long run.

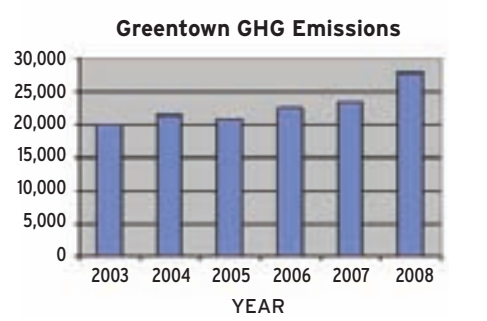
Account for the big picture. A number of campuses have achieved impressive cuts in energy use and emissions, but because of new construction projects and other increases in power consumption, overall gains have been small. A comprehensive plan takes these and other factors into account and makes sure that net reductions are sufficient to keep the campus on target. While steering the campus toward its long-term goal, the plan addresses everything that can enhance or impede success. Following a well-researched plan also helps avoid the problem of the "random project" approach, which for schools lacking clear, achievable goals and stated targets leads to uncertain emissions-reduction outcomes. And having a plan allows campuses to tap into the considerable financial savings that can result from resource-efficiency projects—an opportunity that might otherwise have been missed.

"Random Project" Portfolios –

Does your campus take this approach to emissions reduction?

"Greentown University" Energy Projects

1. Plant 12 acres of trees – 2003
2. Upgrade chillers – 2004
3. Light fixture replacement – 2005–2007
4. Dorm energy competitions – 2006 to present
5. Five new LEED buildings – 2008



This hypothetical example illustrates how, despite good projects and good intentions, greenhouse gas reductions may not add up to a net decrease without a calculated strategy to ensure that greenhouse gas cuts outpace gains.

Engage and develop the collective expertise of the campus community. Because any plan aiming to change so much about how a campus functions will necessarily affect operations, student life, finance and academics, ensuring the integration of the climate action plan with ongoing planning in all areas of the campus is the most certain way to bring about long-term success. Committing to an emissions-reduction goal and climate plan can stimulate creative ways to accomplish what at first may seem like a daunting challenge. There will be a synergy resulting from the team effort of students, faculty and staff that can lead to new ways to solve both technical and behavioral issues. For example, residence hall energy competitions—which often are a collaboration between students and staff—have yielded impressive results on campuses all across the country. At Oberlin College (OH), students who developed a resource monitoring system to measure energy use in campus residences went on to form a successful business to market similar high-tech monitoring systems to other institutions. In the coming decades, employers will be looking for candidates having real-life experience with emissions inventories, climate planning and implementation of technical solutions. The college and university campus can become a kind of proving ground and training facility for people who will lead the transition to a low-carbon future.

MYTH:
Emissions reductions of the required magnitude are impossible and the technology doesn't exist.

REALITY:
Significant emissions reductions are achievable—many schools and businesses have proved that steep cuts are possible using off-the-shelf technology and intelligent management practices.

Improve campus-community relations. As college campuses are rarely isolated from the cities and communities around them, developing a plan will call for engaging with local and regional officials, perhaps even partnering with them in ways beneficial to both. Transportation issues and water management are examples of potentially fruitful areas of collaboration. Service learning projects in the community can not only satisfy academic requirements, they can also address sustainability concerns outside areas relating strictly to environmental sustainability. This can build stronger relationships with the local community and create avenues for students, faculty and staff to share their climate expertise beyond the campus borders.

II. ELEMENTS OF AN EFFECTIVE CLIMATE ACTION PLAN

• What is a Climate Action Plan?

- An official campus-approved plan or roadmap, ideally integrated with the Campus master plan and strategic plan, for carrying out a suite of activities designed to reduce net greenhouse gas emissions from campus operations by a targeted amount over a specified number of years.
- A comprehensive assessment of emissions-reducing projects, including an evaluation of environmental, social and economic costs/benefits.
- A living, flexible document that can be adjusted in light of new challenges, opportunities or scientific understanding.

These broad definitions begin to lay out the function of a climate action plan, but say little about the complexity and dynamism of the development process. Fortunately, the steps required to create a successful plan are fairly straightforward and well within the capabilities of any college or university. Every institution has individuals, often in a number of departments, with the skills to lead or facilitate a planning process. This section lays out one overview of this multi-dimensional process and illustrates with examples from a number of early leaders in climate planning.

• Learning from leading campuses

The very best planning is informed by "environmental scanning," which takes into account the external forces that have to be dealt with in order to achieve an objective. Part of this process is exploring the planning actions of others in order to discover lessons learned and best practices—and to avoid reinventing the wheel.

This guide is part of the environmental scanning process. Its remaining sections draw from the extensive experience of seven colleges and universities that either have an approved plan in place or currently are planning-for-a-plan. Other campuses could have been included in the group, but these seven "advisory campuses" offer a range of institutional sizes and types as well as climate planning experiences. While most examples will feature these schools, other campuses are mentioned when helpful.

For each of the seven institutions, NWF interviewed a key staff member who has been deeply involved in the planning process. These advisors not only explained the "state of the plan" on their campuses in detail, but also shared opinions about climate planning as well as tips for ensuring success. A summary of the status of each school is provided in the next section. Further details of their campus plans are outlined in Appendix A.

Schools and staff interviewed (interviews in March 2008)

- **Brown University, RI** – **Chris Powell**, Director of Sustainable Energy and Environmental Initiatives
- **Middlebury College, VT** – **Jack Byrne**, Campus Sustainability Coordinator
- **Oberlin College, OH** – **Nathan Engstrom**, Coordinator, Office of Environmental Sustainability
- **University of California, Berkeley** – **Fahmida Ahmed**, Sustainability Specialist. (as of May 2008, Manager of Sustainability Programs at Stanford University)
- **University of California, Santa Barbara** – **Perrin Pellegrin**, Sustainability Manager
- **University of Colorado at Boulder** – **Dave Newport**, Director, Environmental Center
- **Yale University, CT** – **Julie Newman**, Director, Office of Sustainability

There are other excellent campus examples, with more appearing all the time . . .

The seven featured campuses in this guide are certainly not the only schools working toward and achieving significant emissions cuts. To cite just a few other examples:

Butte College, CA. This two-year community college is on track to become carbon neutral by 2015 and is employing energy efficiency measures in all campus facilities. It runs the largest community college transportation system in California, recycles over 75 percent of its waste, and has installed a 1.06 megawatt solar PV system that generates nearly a third of campus electricity use while cutting 1,200 tons of emissions annually.

College of the Atlantic, ME. Using purchased carbon credits to earn carbon neutrality in December 2007, this small, private liberal arts college of 300 students has offset all of its greenhouse gas emissions. To directly reduce emissions, it has also begun work to improve energy efficiency in all buildings, including replacing incandescent bulbs with compact fluorescents. Alternative commuting methods such as carpooling and biking have been promoted.

University of Minnesota-Morris. As one of the first schools to install a commercial-grade wind turbine, UM-Morris anticipates becoming "climate positive" by 2012. It will completely replace its fossil fuel emissions through a combination of wind, biomass and efficiency measures–and require no additional commercial carbon offsets. It might even be the first school to put net electrons back into the grid.

"We have much more to do to directly reduce our emissions, but it is satisfying to know that for the last 15 months our contribution to the increase of greenhouse gases in the atmosphere adds up to zero."

–David Hales, President, College of the Atlantic

• The planning process

It is fair to say that the seven advisory campuses would rank "process" as the number one consideration in climate action planning. And this process is intimately tied to each school's values, traditions, decision-making pathways, finances and people-power. (Hint: Read your school's strategic plan before you start. You may find very helpful language in it, especially in the Vision and Mission.) "But there's no cookbook on this stuff," notes Dave Newport at the University of Colorado about his campus's efforts. "We're making it up as we go." There are some obvious steps, of course, but each must be tailored for a site-specific, successful fit.

While getting the process right is a campus-by-campus experience, a review of climate planning documents and interviews with the seven advisory campuses revealed three broad dimensions of climate action planning. While there is considerable overlap between these three, it is helpful to think of climate planning as an integrated framework of people, process and products.

Three dimensions of climate action planning

People – Planning involves wide representation from campus stakeholders and others, including administrators, sustainability coordinators, chief financial officers, facilities and other staff, faculty, trustees, students, community members, and more. Much of the work is done by committees, subcommittees, classes and interns who tackle different aspects of the planning process.

Process – An integrated series of steps is needed, including commitment from campus leadership, establishing and developing working groups, conducting an inventory, feasibility analyses (to vet technical and financial options), prioritizing and proposing projects, getting stakeholder buy-in, approving the plan, and implementation followed by ongoing review, revision and reporting.

Products – Climate planning results in a set of documents including a commitment statement, emissions inventory, portfolio of projects and strategies, scenarios for reaching reduction targets, official approval of projects and timeline, final plan (internal and public versions) and progress reports.

The rest of this section is an overview of the building blocks of the process: the steps and considerations that most current climate planning initiatives have in common. This guide provides a menu of ingredients and options for proceeding. Each school, however, has to chart its own course to some extent, adapting existing templates to its own unique circumstances—and in doing so will learn much about its environmental footprint and opportunities for achieving climate-conscious sustainability.

The steps below follow the general order in which they are likely to occur, but the elements of the planning process will occur in different combinations and with varying timelines on different campuses. There was considerable variability in the planning experiences of the advisory campuses, and some examples will be provided.

Steps to a low-carbon campus

1. **Commitment to emissions reduction**
2. **Institutional structures and support**
3. **Emissions inventory**
4. **Developing the plan**
5. **Recommendations, approval and implementation**
6. **Climate action planning over the long haul**

1. Commitment to emissions reduction

A formal, high-level commitment is often the starting point. This step can occur openly through public statements or policies set forth by top leadership, and may include specific, science-based reduction targets or goals. Or it can happen more internally, through guidelines for energy conservation and other emissions-reducing activities undertaken by facilities and other staff. Once such a commitment is made, it becomes the guiding authority for action and sets the wheels in motion. There are several routes by which this happens:

Campus initiatives. Prompted by student efforts or visionary leadership, schools have launched their own goals for emissions reduction. Middlebury College exemplifies this process; its initial commitment in 2004 set a goal to reduce climate-warming emissions to 8% below 1990 levels by 2012. But because a major facilities project—a new biomass gasification plant—was predicted to exceed that goal in 2008, students came back to push for a loftier goal. Over the first six months of 2007, students put together a convincing argument to go climate neutral by 2016, which the trustees approved in May 2007. The same month, Middlebury's president also signed the American College & University Presidents' Climate Commitment.

State laws. Emissions targets and timelines are in the works for many states, and currently several have passed legislation mandating reductions. Laws in New York and California were both mentioned previously. In Colorado, the governor signed a climate action plan in 2008 requiring emissions to be cut 20% below 2005 levels by 2020 and 80% by 2050.

Presidents Climate Commitment. Although barely a year-and-a-half old, the American College & University Presidents Climate Commitment (ACUPCC or PCC) currently has over 550 signatory campuses whose presidents have pledged to conduct an emissions inventory and come up with a plan to reach climate neutrality by a chosen target date. It has proven to be an effective catalyst, says Yale's Julie Newman, "engaging other institutions across the country who might not otherwise have had the fire to respond" to the call for climate action. This program is cosponsored by the Association for the Advancement of Sustainability in Higher Education (AASHE), ecoAmerica and Second Nature.

National Wildlife Federation Climate Champions program. The Campus Ecology program of NWF is teaming up with selected partner campuses to adopt the 2% per year pathway for net emissions reduction, with a minimum goal of 30% by 2020 and 80% by 2050. Participants receive support from Campus Ecology to help develop their climate action plan and projects and establish collaborative relationships with neighboring campuses. The Champions program is designed to support campuses that have already set or plan to set carbon-reduction targets and timetables. Most, for example, will have already signed the Presidents Climate Commitment or plan to do so in the near future.

Integrated, Strategic & Aligned Planning

CAUTION: It is very easy, in the case of climate action planning, to focus only on linkages between campus operations/facilities and finance. However, it is always preferable to plan in a fully integrated way—by also establishing good connections to the academic, learning mission of the school. In the view of professional planners, the most effective plans address this inherent overlap among all three dimensions. It is not a coincidence that ACUPCC guidelines call for curricular tie-ins as part of climate planning.

Diagram courtesy of *Guide to Planning for Change* by Donald M. Norris and Nick L. Poulton, September 2008, Society for College and University Planning (SCUP).

2. Institutional structures and support

Developing and implementing effective climate solutions is a people-intensive team process. In addition to top leaders, it requires coordinated effort and creative input from staff, faculty, administrators, students and other on- and off-campus stakeholders. Not only does this encourage greater buy-in for proposed ideas, but it brings know-how and a range of valuable perspectives to the table. Viewed another way, climate action planning needs to be integrated across the core functions of the institution (see diagram).

Committees and task forces. The climate planning process is invariably a team effort, and the membership of the various committees assigned the task is often key to acceptance of its recommendations and ultimately its success. By having broad representation in the group, it can help ensure greater cooperation by nonmembers and increased likelihood of acceptance of the committee's recommendations.

"Bimonthly meetings with our Chief Operating Officer and active subcommittees on energy, transportation and materials are keys to the momentum of our Cool-It initiative to reduce NWF's own carbon footprint."

—Julian Keniry, Senior Director, NWF Campus & Community Leadership

Here are four planning group examples. All included staff, students, faculty, administrators and sometimes community members.

Yale University	The **Energy Task Force** convened until a plan was approved in 2005. Facilities engineers and campus administrators continue to meet on a monthly basis for implementation updates.
University of Colorado at Boulder	A high-level **Steering Committee** was established when the ACUPCC was signed in Feb. 2007. A 30-member Working Group (dubbed the "worker bees," led by Dave Newport) formed later.
Oberlin College	The **Committee on Environmental Sustainability**, includes the city council president and head of the local utility as members.
University of California, Berkeley	In 2004, the **Chancellor's Advisory Committee on Sustainability** was formed. In 2005 it conducted the first Campus Sustainability Assessment and supported the climate action feasibility study.

Point person. Each of the seven campus staff persons interviewed held key roles in the climate action planning process, and their understanding of institutional structures and politics helped smooth the process. For example, upon arriving at the **Yale** campus in 2004 to coordinate its sustainability effort, Julie Newman set out to first determine how decisions were made on campus and who made them. She then asked the Associate Vice President of Facilities Operations to chair the Energy Task Force because, as she noted, "if he was overseeing the activities, he would take ownership of the set of recommendations that would emerge." While only a relatively small number of U.S. campuses have staff positions dedicated to energy planning or sustainability, the consensus among the advisory campuses was that it is preferable to have someone who can devote time to shepherding the planning steps from beginning to end.

SWOT and TOWS Analyses

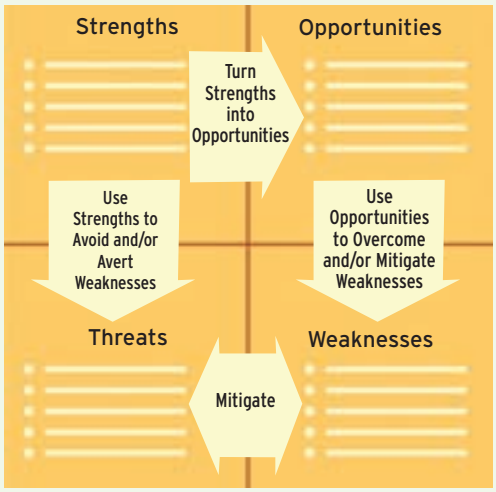
The Society for College and University Planning (SCUP) recommends that early in the planning process several SWOT analyses (Strengths, Weaknesses, Opportunities and Threats) be conducted of relevant campus departments/groups as well as the entire campus, with regard to the mission of achieving significant carbon emissions reduction. The exercise should engage motivated stakeholders from student life, academics, operations, finance and facilities. The broader the team, the more valid the assignment of variables and broader the sweep of pertinent variables. There are other, similar tools, but this one is familiar to most planners

Simply, a SWOT analysis asks the group to set a goal describing where they want to move to from where they are now, and then identify Strengths, Weaknesses, Opportunities and Threats that might influence the transition. Those are best laid out in a grid as shown in Figure 1. On opposite corners, the group's internal strengths and weaknesses are listed. On the remaining corners, opportunities and threats are identified that exist in the external environment in which the planning takes place. It is important the team first define what is internal and external in reference to the desired future destination

Even when performed by inexperienced planners, a SWOT analysis offers a way to examine variables that can be manipulated in various ways to achieve a desired state. Once the grid is assembled, it can be used to answer these four important questions:

- How can we best use our strengths?
- How can we strengthen areas in which we are weak, or render weaknesses irrelevant?
- How can we exploit the opportunities?
- How can we defend against threats?

SWOT and TOWS Analyses

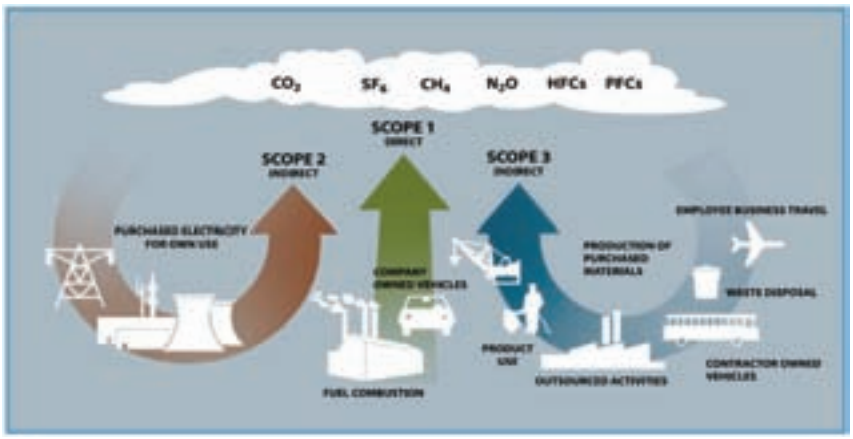


A SWOT analysis can continue as a living document throughout the life of the planning process and even implementation. It provides a way to collect the insights and knowledge of an ever-widening group of actors and stakeholders.

Outside assistance. **Middlebury**, **Yale** and **Oberlin** hired consultants to help assess options and costs for energy retrofits and clean energy installations. **Middlebury's** energy audit of campus buildings was done in conjunction with its master planning process. The audit ranked buildings based on their energy efficiency performance and provided a series of measures for improving energy savings in buildings that were below the standard. The college is developing a schedule of efficiency improvements with the assistance of Efficiency Vermont, the state's energy efficiency utility. **Oberlin's** comprehensive study, done by the Rocky Mountain Institute in 2002, has helped inform the current round of climate action planning on campus.

Studies by outside consultants ultimately do not substitute for on-campus, stakeholder-based planning, but they can greatly expand and deepen awareness of sources of energy waste, opportunities for improved energy efficiency, and locations where a variety of clean energy strategies—ranging from geothermal to wind to solar—may be appropriate. To compensate for shortfalls of campus expertise and funding, an energy service company (ESCO) can help manage and finance components of climate action plans. Although traditionally focused on projects such as lighting and HVAC efficiency that have shorter project payback periods, more ESCOs are beginning to incorporate clean energy projects with longer payback horizons.

Emissions Sources: Scopes 1, 2 and 3



Source: 2005–2006 Greenhouse Gas Emissions Inventory, Environment Protection Agency Victoria, Melbourne, Australia.

3. Emissions inventory

A key step early in the CAP process is to calculate the baseline level of campus greenhouse gas (GHG) emissions. Most schools try to chart their emissions back to 1990, but often records are incomplete, especially in areas like transportation. The inventory chooses a recent year (such as 2005) as its baseline year for comparing future reductions with annual or longer-term reduction targets.

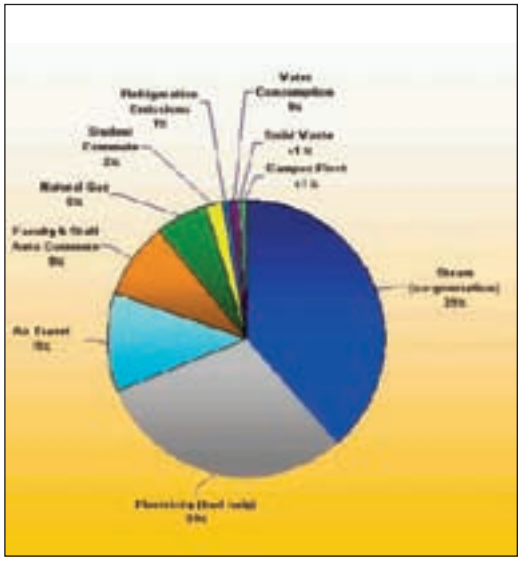
What is counted? All GHG emissions-producing activities on and off campus are fair game, but most schools focus only on direct and selected indirect sources. In the terminology of inventories, these are known as boundaries or "scopes," which are defined as:

SCOPE	EMISSIONS INCLUDED
Scope 1: Direct emissions	On-campus heating and cooling, fleet vehicles
Scope 2: Imported emissions	Purchased electricity and steam
Scope 3: Other indirect emissions	Staff and student commuting, air travel, recycling and waste disposal, food, production and transport of goods and services, construction

All campus inventories should at least count Scopes 1 and 2 emissions. And to be comparable to most other existing inventories (including those of ACUPCC signatories) they should also count emissions from staff and student commuting, air travel and waste disposal. If records from past years are unavailable, programs can be started to capture the necessary data in the future.

Many types of indirect sources may be difficult to measure, such as emissions from the production and transport of paper and food, but they still are important. Few schools would be able to adequately account for emissions, for instance, that occurred halfway around the world to produce college T-shirts and books, but the total from all such sources can be substantial. As calculated in an exercise directed by Sustainability Specialist Fahmida Ahmed, **UC Berkeley's** inventory total would *more than double* if indirect emissions from construction, campus procurement and other remote sources were counted. Because campuses and other large organizations help generate the demand leading to Scope 3–type emissions, estimating and trying to reduce those emissions can help us exert influence on manufacturers and suppliers.

Using a calculator. The emissions inventory process is fairly straightforward—"Plug and chug," as **CU-Boulder's** Dave Newport refers to it—using database-driven software to crunch the numbers. The state of California provides its own calculator tool for state agencies and businesses, and some campuses have developed and adapted their own inventory tools. NWF and many other organizations recommend using the free online *Campus Climate Action Toolkit* with its "Campus Carbon Calculator" developed by **Clean Air-Cool Planet** (CA-CP). It is regarded as one of the best and most user-friendly inventory tools and is consistent with key standards of the Greenhouse Gas Protocol (GHG Protocol) of the World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI). According to AASHE's list of 38 completed GHG inventories (as of July 2008), 23 campuses used the CA-CP calculator, and 15 used all other tools combined.



Calculator tools can show emission sources in a variety of graphic formats, including pie charts. This shows 2006 emissions data from **UC Berkeley.** The campus total, including air travel and commuting, is 209,000 metric tons CO_2 equivalent.

NWF has a partnership with CA-CP, and Campus Ecology staff are trained to provide assistance with using it. The CA-CP calculator can be tailored to accurately tally CO_2 and other greenhouse gases from all direct and indirect sources pertinent to campuses, regardless of location, when adjusted for the "emissions factors" of local utility companies and other variables. By using the same calculator tool, schools can more accurately compare and contrast their emissions totals. A consortium of schools in the Northeast, which includes **Yale** and **Brown**, recently agreed to adopt the CA-CP calculator to ease comparability of data among peer schools and to help better understand regional sources of emissions. In 2008, an improved version of the calculator will be released, which offers the capacity to analyze potential emissions-reducing campus energy projects using such metrics as capital costs, life-cycle costs, payback, CO_2 reductions and other criteria needed to evaluate the worthiness of a project.

When to inventory–and who does it? While the numbers produced by an emissions inventory are vital to the overall planning effort, they are not necessarily needed before project assessment begins. Dave Newport, who has guided climate planning efforts at both the **University of Florida** and **University of Colorado**, invoked the "80–20 rule" to show the need to get started with planning:

> *"Don't let the inventory get you down. It seems like a lot of people can't start planning until they have their inventory. I always tell people: Just look at your utility bill and get to work on energy because that's 80% of your load. So while you're putting your inventory together, start working on your plan. Don't make it linear; it can be concurrent."*

But around the United States, many—probably most—schools use the inventory as a starting point. While it may quantify what may already be obvious in terms of the major emitters on campus, it does help show where the biggest gains could be made. At **Pomona College** (CA), the inventory identified the most energy-intensive buildings (see table).

For the **University of California, Berkeley**, the inventory was the first step for creating a climate action plan or roadmap. Sustainability specialist Fahmida Ahmed called their inventory "a means to an end; without it we couldn't get a picture of what to measure and what to manage." She referred to it as their institutional "diagnosis" that revealed the campus emissions "anatomy" and hence the best places to begin work.

Where would you invest funds to cut energy and emissions at Pomona College (CA)?

ENERGY INTENSITY: A COMPARISON

Non-residence buildings/facilities	Total sq. feet	kWh used 2005-2006	kWh per sq. foot
Pendleton Pool	500	301,867	604
Seaver Biology Bldg.	13,672	1,499,138	110
Pauley Tennis Complex	1,243	91,760	74
Hahn Building	27,000	1,286,274	48
Frank Dining Hall	19,637	646,190	33
Residence halls			
Mudd-Blaisdell	65,496	888,951	14
Wig Hall	25,200	184,955	7
Harwood Court	63,100	339,434	5
Clark I, III, V	116,600	404,377	3

Oberlin College also worked on its inventory first, with completion anticipated in fall 2008, and will use that data along with findings from a building efficiency and heating plant study to "inform in a very significant way its overall recommendations and climate action plan," notes Sustainability Coordinator Nathan Engstrom.

Given the relative simplicity of calculator tools (though they look daunting at first glance), the inventory can even be tackled by one person—preferably with plenty of help in securing the data. At **Penn State University**, for example, the inventory and report were conducted as a Master's student thesis. At a number of campuses, including **Middlebury College**, the inventory has been done by a team of students in a class or as a group Master's project. (At Middlebury, the inventory report was also accompanied by a well-researched set of project recommendations.) Whether conducted by students or staff, the inventory process typically takes from two to six months, depending on the complexity and availability of the data, and the number of hours devoted to the task.

FOR LINKS TO SAMPLE INVENTORIES, SEE

- AASHE's "Campus Greenhouse Gas Emissions Inventories" http://www.aashe.org/resources/ghg_inventories.php
- Clean Air-Cool Planet's "Climate Action Toolkit" http://www.cleanaircoolplanet.org/toolkit/content/view/146/132

4. Developing the plan: What's included?

Exploring and vetting options for cutting the campus emissions footprint is the heart of the climate action planning process. Whether or not inventory data is ready, the work teams of staff, students and faculty can get rolling right away. If well designed, the end product of this process will be a set of recommendations that have a high probability of being accepted by the president and trustees (or their equivalent) who have the authority to give the final stamp of approval.

Working the stakeholders. Nothing was more obvious during the interviews with the seven advisory campuses than the importance of people. College and university personnel are not known for their reticence, but for their diverse and often outspoken opinions. And despite the recent surge of global warming awareness based on climate science, not everyone is a believer.

At the **University of Colorado**, Dave Newport spends a considerable amount of time taking his climate plan "road show" around campus to promote ideas and get input—both early in the process and later as the plan takes shape. The most convincing approach, he finds, is one based on common sense and the business argument. Reflecting on this people-intensive process, Newport notes, "my job is to make nice with every campus stakeholder group we can find, put out information on what we're doing and planning, get their input on what we should do, and bring all that back to the group."

The larger the institution, the harder this task may be. At large public universities with their decentralized decision-making structures, figuring out who's in charge of what can be difficult. Fahmida Ahmed of **UC Berkeley** pointed that out several times: "The challenge during the planning year was working the system—learning the decision points, what is ultimately important to the university and getting decisions passed in a milestone-based approach." The terms "stakeholders" and getting "buy-in" were central themes at every school.

The many stakeholder groups on campus are a valuable source of input; people in different positions and departments will contribute a range of ideas. This was demonstrated at a recent gathering, convened by NWF, of students, faculty and staff from colleges and universities in Iowa. Participants of the workshop identified more than 14 stakeholder groups common to their campuses and each group generated several recommendations for climate action projects. One aid in identifying stakeholder groups is working with people on campus who, due to their professional responsibilities, may already know who those groups are and have experience planning with them.

"Don't overlook the experienced people who have managed your institution's existing strategic planning, master or campus planning . . . including staff in institutional research and planning roles, and your president's executive assistant."

–Nancy Tierney, President of the Society for College and University Planning and Associate Dean of Planning and Facilities, University of Arizona

UC Santa Barbara follows a portfolio approach to reducing its greenhouse gas impact. This means aggressively pursuing low cost, high-return, energy efficiency upgrades, while making strategic investments in cost-effective renewable energy and continuing to promote energy education for all campus constituents. This approach ensures the biggest impact with the finances available and tackles the problem of global warming from several angles.

Project identification and evaluation: Cost-benefit and feasibility analysis. Because no single project can do it all, the typical approach is to explore a wide variety of possible projects and actions. For each idea, a cost-benefit analysis is conducted using criteria that permit a ranking of options in terms of their net CO_2 reduction. To achieve significant and lasting reductions in GHGs, climate action plans need to encourage as many "real" on-campus projects as possible. Purchasing green utility power produced off-site or renewable energy certificates are also important methods to verifiably reduce emissions. Buying retail carbon offsets is always a consideration, but usually is last on the list of preferred options, and attention must be given to the environmental quality of any offsets.

Portfolio Approach: Identifying and Ranking Projects

When looking for places where emissions can potentially be cut, there typically are four categories to consider. The first two result in genuine reductions in campus energy use and emissions; the other two take credit for emission cuts elsewhere. This four-part model was used by both **UC Berkeley** and **UC Santa Barbara**, but aspects of it were found in other planning efforts as well.

1. **Infrastructure.** Every campus has a wide variety of large and small projects that affect energy consumption and emissions in some way. Projects range from changing light bulbs to installing entirely new heating plants, from thermostat setbacks to overhauling whole buildings—and with capital costs ranging from a few thousand to tens of millions of dollars. On-campus renewable energy installations are an especially effective way to cut emissions.

2. **Behavior changes.** Because they rely on altering human behavior, projects in this area are less predictable and the outcomes harder to calculate—but savings can nonetheless be substantial. Behavior changes rely on educational efforts and social influence to lead to changes in how people manage energy use over which they have direct control, such as computer settings, plug-in machine loads and commuting options. Dorm energy-reduction competitions are a popular strategy for altering student power consumption. One example is **Yale**, which in the last two years cut energy use by 10% in its residential colleges.

3. **Green power and renewable energy certificates (RECs).** Dozens of campuses purchase green power blocks or RECs based on energy produced by wind farms and other renewable energy sources for sale in local, regional or national markets. A number of campuses in **Colorado** are looking into a collective strategy to buy direct renewable energy, and the **University of California System** is considering buying into a solar energy (PV) farm. For top campus purchasers of green power, see the EPA Green Power Partnership program at http://www.epa.gov/grnpower/toplists/top10ed.htm.

4. **Carbon offsets.** During times when long-term infrastructure and behavior change projects are being developed, there may be a need to cut additional emissions in the short term. Carbon offsets—especially high-quality, verifiable offsets—can be a good stopgap measure. Because of uncertainties about the retail offsets market, however, some schools are in the process of creating their own local, third-party certified carbon offsets. **Brown**, **Yale** and **CU-Boulder** are all working on community-based carbon offset programs in their communities, creating offset projects "that you can ride your bike past," as Dave Newport puts it. For a review of retail offsets and a list of providers, see Clean Air-Cool Planet's "Consumer's Guide to Retail Carbon Offset Providers" at http://www.cleanair-coolplanet.org/ConsumersGuidetoCarbonOffsets.pdf

"UCSB's portfolio approach . . . means aggressively pursuing low-cost, high-return energy efficiency upgrades, while making strategic investments in cost-effective renewable energy and continuing to promote energy education for all campus constituents. This approach ensures the biggest impact with the finances available and tackles the problem of global warming from several angles."

—From UC Santa Barbara's draft Sustainability Plan, May 2007

When exploring the range of project options, different schools use a variety of economic, environmental and social criteria in their analysis matrix. By using such metrics, projects can be compared on their relative merits. Common criteria include:

ECONOMIC	ENVIRONMENTAL	SOCIAL/EDUCATIONAL
Return on investment/IRR	Tons of CO_2e reduced	Recruit top students and faculty
Net present value (NPV)	Tons of coal not burned	Positive public relations
Initial capital cost	kWh saved	Support local economy
Simple payback	Energy intensity	New courses and research
Annual cost/savings	Acres of forest preserved	Aesthetic benefits
Life-cycle cost	Vehicle use reduction	Career training
$ per Metric ton carbon dioxide equivalent (MTCDE)*		

*For a definition of MTCDE, see Appendix B.

This following portion of the analysis table for **Middlebury College's** plan shows a few of their approved projects. The biomass project will have the most dramatic impact, cutting campus emissions by 40%.

Project	Initial Capital Investment	Annual Cost Savings	Internal Rate of Return	Metric tons CO_2 Reduced
Biomass gasification cogeneration system	$11,000,000	$1,093,000	7%	15,000
Replace windows in buildings	$205,000	$9,600	N/A	220
Monitoring and control systems	$18,700	$18,000	96%	8
Lighting efficiency measures	$3,370	$10,000	300%	5

Source: Middlebury Carbon Neutrality Board Recommendations, May 2007

For **UC Berkeley**, Fahmida Ahmed explained the project evaluation process (see chart for summary of financial outcomes):

> *"We used three key metrics for the financial analysis: project cost, payback or internal rate of return and university dollars invested per metric ton of CO_2e. For each project we calculated these values using the data on cost and energy saved by implementation. The assumptions on costs and energy savings were verified by staff members in Facilities Services, the Office of Environment, Health & Safety, and industry research on energy conservation."*

Capital Cost	Annual Operating Cost (HR)	Annual Operating Cost (Other)	Annual Savings (often in avoided costs)	Net Savings	Simple Payback (years)
$13,995,731	$126,000	$784,310	$4,618,165	$3,381,310	4.1

UC Berkeley. With an initial investment in infrastructure projects of $14 million (one-time capital) and an additional $1 million annual operating cost, the university can break even around the 4th year and will start saving approximately $3 million annually for a net savings of around $16 million in eight years.

During the planning process, all project analyses need to bring a timeline into the equation. In determining the relative benefits of different emissions-reducing strategies, planners need to compare costs and savings over one or more timeframes (5, 10, 20 years) to see where the numbers end up over time. Campus growth also needs to be factored in, to get a more realistic view of true net emissions reduction. **Yale University**, for example, expects a 15–20% increase over their current size by 2020 which has to be worked into calculations of net CO_2 reduction—and into other campus planning efforts to minimize the effect of that growth on the carbon footprint.

"I do 'practical sustainability.' If I need funding for a project, I have to show the cost-benefit analysis and argue why it's important. Yes, we do some demonstration projects, to make a statement. But for the most part my projects have paybacks and savings and there are metrics involved."

–Perrin Pellegrin, Sustainability Manager, UC Santa Barbara

And project analysis doesn't fully end when the green light is given to proceed with implementation. Lisa McNeilly, Director of Sustainability at **UC Berkeley**, stresses that it is important to establish a process to continually analyze and update project evaluations and keep track of successes.

The new 2008 version of Clean Air-Cool Planet's Climate Action Toolkit makes it easy to evaluate project costs and benefits. Just enter basic data about a project and it will produce a table with payback, return on investment, net present value, GHG reduction and cost per ton of CO_2e reduced.
Visit http://www.cleanair-coolplanet.org/for_campuses.php.

Financing. A key step in evaluating a project is to investigate financing opportunities and constraints. Sources of funding will factor heavily into later decisions about which projects are more feasible, especially when considering those with higher pricetags and longer paybacks. It pays to learn early about campus guidelines—official or otherwise—dictating the length of payback period needed before a project is deemed a worthy investment. People trying to make change happen on a campus find it easy to see budget officers as foes. Instead, budget planners (a budget is a plan, expressed in dollars) can be among the best friends of the climate action planning process on campus by working the dollars to make things happen.

Funding sources beyond the base budget include endowments, state and utility grants and rebates, environmental loan funds, student referendums, alumni gifts, ESCOs, the Clinton Climate Initiative[4] and traditional loans. At **UC Santa Barbara**, for example, a million-dollar lighting retrofit had a 1.5-year payback due to impressive energy savings and a rebate that paid 37% of the initial cost. For more on financing, see NWF's *Higher Education in a Warming World: The Business Case for Climate Leadership on Campus* (**www.nwf.org/CampusEcology/BusinessCase**).

The search for funding should be an exercise in thinking big. Campuses often find that a project portfolio is more attractive when profitable, short-payback projects help support ones that are more costly or have lower returns on investment. When "bundled" together, a mix of projects can be implemented at a net profit over time as with **UC Berkeley's** 14 sustainability projects mentioned above, or at **Mount Wachusett Community College** (MA), which replaced its heating plant with a carbon-neutral system and launched many other changes.

"We implemented $4.3 million of infrastructure improvements and it didn't cost Mount Wachusett a nickel. That's the way to make it work, by compiling ECMs (energy conservation measures). You start to bundle big projects with smaller ones, and that makes the whole package more attractive."

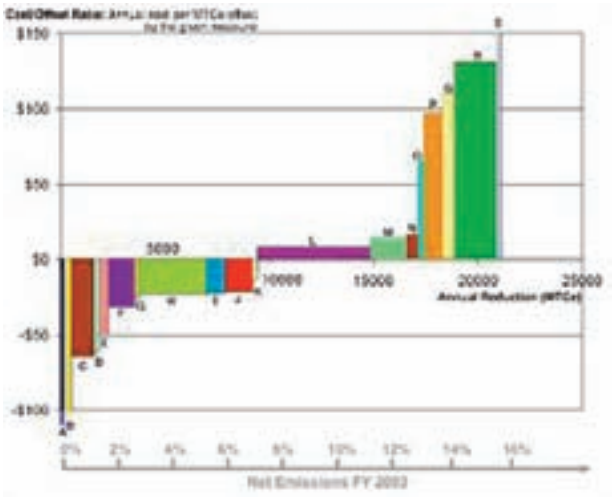
–Ed Terceiro, Executive Vice President and CFO, Mount Wachusett Community College

Reduction target. While it might be tempting to think that campus leaders could just pick a reduction target that staff could easily meet, the opposite is usually the case. When first launching into the planning process, most advisory campuses had a general idea where reductions needed to focus but resisted a final recommendation until they were able to run the numbers on the portfolio. Campuses signing on to the ACUPCC, for example, knew that climate neutrality was the ultimate goal, but that they also needed to delineate shorter-term interim targets. **UC Berkeley's** interim target—1990 emission levels by 2014—was based on a solid financial analysis showing how the necessary reductions could be achieved, but only through the year 2014. Further cuts will need to be calculated for the years following the initial target.

YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Replace high-intensity lighting with T5 fluorescents: 1.4%	Increase parking rates, begin carpooling: 0.1%	Chiller plant: Install variable speed operation: 1.0%	Chiller plant: Heat recovery: 0.8%	Retrofit fume hoods: 1.3%
Behavior change projects: 0.7%	Solar PV installation: 3.3%	Rooftop-mounted wind turbines: 0.2%	Building insulation retrofits: 2.1%	Decentralize hot water: 0.9%
Year total: 2.1%	Year total: 3.4%	Year total: 1.2%	Year total: 2.9%	Year total: 2.2%
Cumulative: 2.1%	**Cumulative: 5.5%**	**Cumulative: 6.7%**	**Cumulative: 9.6%**	**Cumulative: 11.8%**

In NWF's view, a science-based reduction target—whatever its exact percentage or time frame—needs to adhere to the 2% net minimum reduction per year below a 2005 baseline, in order to reach the recommended levels of a minimum 30% reduction by 2020 and more than 80% by 2050. This is the minimum pace of reductions needed to stabilize atmospheric CO_2 and keep global average temperatures in check. See NWF's The 2% Solution: National Policy Options (**http://www.nwf.org/globalwarming/pdfs/NationalPolicySolution.pdf**).

Ranking the projects. Once all cost-benefit data are in hand, project options can then be ranked by one or more criteria to determine which are most feasible and likely to achieve the needed levels of CO_2 reduction. Different approaches to ranking have been used by different campus planning groups, and the variety can be seen in the various online climate reports. In its 2007 report, for example, **Yale** states that it "evaluated on the basis of *resulting carbon reduction per operating dollar incurred*. Projects yielding the largest return were undertaken first so that emission reductions could be achieved as quickly as possible." Based on similar cost-benefit screening, **UC Berkeley** took an initial 25 sustainability projects and whittled the list down to 14, which were approved for the plan based on their dual potential for emissions reduction and cost effectiveness.



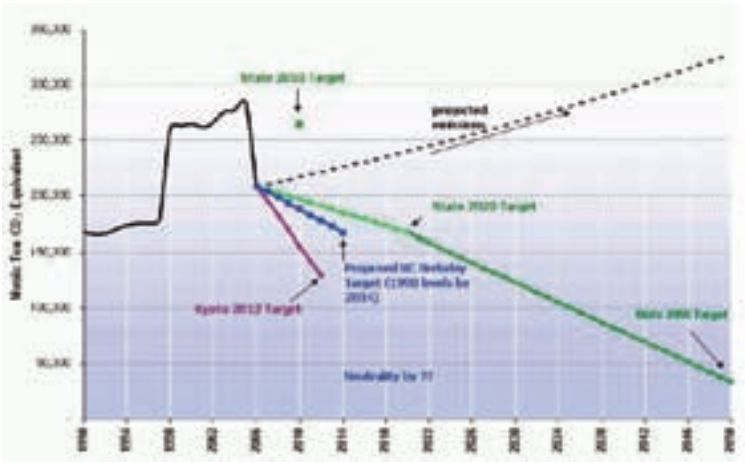
Climate action project analysis at Duke University. Projects are represented by bars showing both annual costs/savings (length of bar) and metric tons of CO_2e (width).

A feasibility study in 2005 by **Duke University** identified 11 projects (represented by bars below the zero line on the graph) that would reduce emissions at a profit. These projects would yield savings from $13/MTCDE for expanding a dorm energy conservation contest to $498/MTCDE for purchasing 12 high-capacity buses to cut overall fleet size, and reduce annual emissions by 7% (9,500 MTCDE). If the remaining eight projects in the graph were added, a total of 15% of emissions could be reduced at no net cost. And as fossil fuel prices spike and technology improves, additional projects are likely to become cost-effective.

While dollars-per-metric-ton-of-emissions (MTCDE) may be the most useful metric from a business standpoint, climate action plans can also account for social benefits. In January 2003, sixteen students and two faculty members from **Middlebury College** generated one of the nation's first climate action "plans" (a proposal) in just four weeks. They ranked 53 projects according to four indicators: financial, emissions reduction, technological uncertainty and "other costs and benefits" (including research and educational opportunities, community and public relations, and other environmental benefits such as habitat preservation). All four indicators were then incorporated into a single summary index used to rank the projects, ensuring that Middlebury's institutional values were reflected in project rankings.

Background, benefits and relevant information. In addition to the specifics of the emissions-mitigation strategy, CAP documents can also include important background narratives and other information that help strengthen the case for climate action. It might review past activities and accomplishments; **SUNY-Buffalo's** *UB Green 2007 Climate Action Report*, for example, lists energy-saving projects spanning more than two decades. For each project category such as energy conservation, transportation, green construction and renewables, explanations usually are provided to illustrate how proposed savings will be achieved. **UC Santa Barbara's** plan lists current practices, action items, long- and short-term goals, barriers and more for each topic. Other topics that might be important to some stakeholders include other campus planning efforts, personnel involved, financing strategies, policy implications, risks and institutional barriers. Some proposals, such as **Middlebury's**, explained advantages that go beyond money and CO_2, such as social and environmental benefits and, in particular, the many educational opportunities inherent in climate action on campus.

University of California, Berkeley - Scenarios of emissions reduction under different targets.



Scenarios. To make sense of the numbers and to illustrate alternative schemes and pathways for reducing emissions, some campuses organize their findings into several scenarios, each plotted as a different line across time and emissions levels. Typically, these graphs include a business-as-usual trajectory showing how emissions would head relentlessly upward without intervention. This graph from **UC Berkeley** shows how its emissions cuts by target year 2014 (blue) will be steeper than those required by state law (green). The line ends at that year because the campus has not yet determined its next reduction target.

Campus buy-in. Coming full circle, as the planning process nears completion it is just as important to keep "working the stakeholders." There may be new personnel or new student or administrative leaders, but mostly there will be a lot of people who want to be kept in the loop.

Nathan Engstrom of **Oberlin** referred to this later planning phase when he said, "Then there will be sort of an informal process of shopping the plan around, at least components of it, to other stakeholders who may not have a seat at the committee table." For Dave Newport at **CU-Boulder**, it meant another "road show" to reconnect with and promote the latest recommendations with campus groups. And at **Middlebury College**, to ensure widespread support for its completed plan for carbon neutrality, planners took the extra step of securing over 1,200 signed endorsements representing 70 different departments, teams, clubs, residences and individuals—and on a campus of only 2,400 students.

"Checking with stakeholders must be inclusive enough to win over the skeptics during the process rather than having them come out of the woodwork at the end."

–Nathan Engstrom, Sustainability Coordinator, Oberlin College

Timeline. Every campus will have a different trajectory for its planning process. There will be variations in available staff time, student interest, funding for consultants, leadership support and many other factors. Signatories of the Presidents Climate Commitment have a particular incentive to keep the process moving; when presidents sign, they agree to complete their CAP within a two-year period. And unanticipated issues may arise that require extra attention. Early in the planning cycle, Oberlin secured funding to do a study of alternatives to its coal-fired power plant because of its potentially large impact on carbon reduction. The planning committee is waiting for the results of that study, postponing completion of its CAP by several months.

University of California, Berkeley - CalCAP planning calendar, October 2006 to May 2007

In general, however, the timeline for completing the inventory and plan seems to range from 8 to 14 months. When a skilled climate planner is on board and the organization is ready to act, the process may flow quickly. Fahmida Ahmed was instrumental in crafting **UC Santa Barbara's** carbon-neutrality feasibility study before being hired by **UC Berkeley** to launch a similar effort. She was able to coordinate and complete Berkeley's plan in eight months (see timeline chart), but she also gives ample credit to "key supporters who promoted the effort and helped the work along."

5. Launching the plan

To the best of our knowledge, as of mid-2008 only a handful of U.S. schools have an approved climate action plan and have started the implementation phase. In the group of seven advisory campuses, **Yale**, **Middlebury**, **Brown** and **UC Berkeley** are officially underway with a plan, with Brown's approval coming most recently in January 2008. Hundreds of campuses are currently thinking about or working on plans, however, so the landscape of climate action planning will change dramatically in the next few years.

Recommendations and approval. If the planning committee has done its homework and there are no surprises, approval of CAP recommendations may only be a matter of walking through the formal steps, though some changes are likely. The final OK, for which a working budget is part of the package, is often granted at the highest levels of the institution—usually the board of trustees or regents. Here is where having collaborated with top campus officials in operations, finance and other areas can pay off again. If they attend these meetings, the regents or trustees will see that the CAP efforts are integrated with the work of people they regularly see and interact with.

At **UC Berkeley**, the committee focused its recommendations on a list of 14 sustainability projects that, when implemented, will reach the emissions goal by 2014. These were approved by the Chancellor. At **Brown University**, in contrast, the plan was adopted only after some changes were made. Brown President Ruth Simmons only approved the recommendations that were infrastructure-based with solid emissions cuts, but held off on the idea of purchasing commercial carbon offsets as a method for cutting CO_2. President Simmons, notes committee chair Chris Powell, "is staunchly for doing things that are measurable and definable." And as an alternative to retail offsets, Brown will be developing its own local carbon-use reductions through a program run by students that has a $350,000 startup fund to develop projects.

Like Brown, many campuses (and businesses) try to minimize their purchases of retail carbon offsets. This choice concurs with the protocol outlined by the nonprofit **Architecture 2030** and its collaborators who recommend that carbon offsets, if used at all, account for no more than 20% of an institution's total emissions reduction.

Implementation. Launching specific projects is what all the months of planning have been geared toward, but there still will be many details to be worked out. Ideally, some projects may already be underway, such as the biomass gasification plant at **Middlebury**. It was scheduled to come online 18 months after their plan was approved, cutting campus emissions 40% in one step. The plant was a major 5-year investment project, but many smaller projects can be started and completed within one to three years resulting in steady cuts to CO_2. At Yale's new Kroon Hall (to open in late 2008), a smorgasbord of clean energy projects will minimize emissions from a single building. It will be heated and cooled by geothermal and passive solar and powered in part with solar PV.

Like planning, implementation is an iterative process and adjustments will be needed over time. Any really useful plan is not set in stone, it is a living document. Partly, this is because not all of the implications are apparent in the planning phases. Shifting into action mode at **UC Berkeley** brought at least one surprise, according to Fahmida Ahmed. She observed that some of the stakeholders involved in the planning process raised new questions and concerns during implementation. "This just shows that creating a readily implementable climate plan requires a level of institutional tune-up and interdisciplinary participation that is still rare in the realm of sustainability. The knowledge base is evolving fast, but iteration seems inevitable for an institutional change of this magnitude." Launching approved projects is a kind of "ground-truthing" that occurs during the various steps of the project cycle, such as when hiring contractors, securing estimates, sourcing technologies and accommodating the concerns of campus personnel affected by the changes. Maintaining good working relationships with stakeholders is needed as much during implementation as during planning.

Since the approval and implementation phase is when a plan goes public, it presents an ideal opportunity for the president and other leaders to renew efforts to educate the campus community about climate change and how everyone can play a part in the solution. It is also a time to celebrate and publicly recognize the many participants in the CAP process. This is one more instance where finding motivated staff on campus can pay off. Tap the expertise of the media, public relations or communications office to be part of the planning and publicity process. They already know how to do effective outreach and event planning.

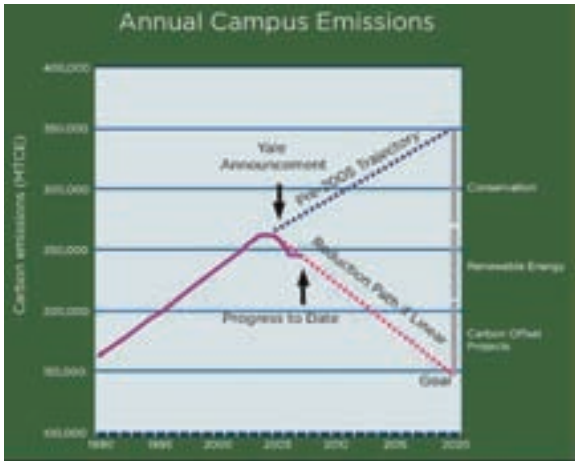
6. Climate action planning over the long haul

For most schools, winning approval of their first plan will be just a step in what is likely to be a decades-long series of related climate action planning exercises. Changes in budgets, personnel, campus priorities and energy-saving technologies and opportunities will likely prompt revisions to earlier plans. New interim targets will need to be calculated (NWF recommends the science-based 2% minimum per year reduction as a guide), and future scenarios may have to include stricter state or federal rules for emissions.

Keeping good records on all the metrics of the unfolding plan will be essential not only for internal tracking of projects, but also for periodically reporting on progress to the media and public. **Yale** publishes an annual executive summary report, for example, that shows how well they are sticking to their intended emissions reduction (see graph). They are also committed to completing a greenhouse gas inventory every 3–5 years. An updated 2002–2007 inventory is to be published in fall 2008. **Brown** plans to do a similar annual progress report. **UC Berkeley** also will be doing regular reporting.

The costs of such reporting need to be built into the budget, and the responsibility needs to be in someone's job description. Campus information technology staff have been helpful in creating software tools to visually represent goals and accomplishments; the more sophisticated of these are called "dashboards."

Having a working plan also presents a tremendous opportunity for promoting sustainability and for incorporating climate-related policies and activities into campus practices and environmental management systems. Sustainability goals and guidelines can be integrated into orientation events, residence life, professional development, reporting procedures, annual recognition programs, performance evaluation, academic courses and more.



Yale University Emissions Reduction trajectory from their 2007 annual report. Yale's goal: To reduce CO_2 to 10% below 1990 levels by 2020.

Recognizing those who are responsible for accomplishing goals of the plan is important. The **University of Colorado at Boulder's** Environmental Center has presented its annual Campus Sustainability Awards every year since 1997. Honorees include individuals and departments recognized for their efforts in green purchasing, recycling and other contributions toward decreasing the environmental footprint of the campus. In 2008, CU's Chancellor G.P. "Bud" Peterson presented the awards. To broaden the significance of such opportunities, a campus recognition event can occur in conjunction with the annual national Campus Sustainability Day[5] sponsored by SCUP each October.

In his closing comments during the interview for this monograph, CU Environmental Center Director Dave Newport advised that, above all, "Don't let climate action planning preclude *action*." Once underway, every school will discover there is a wealth of possible actions. Newport boils it down: "Get to work—start doing stuff."

III. CAMPUS EXAMPLES: APPROVED PLANS AND PLANS-IN-THE-MAKING

• A comparative look at seven schools and their climate plan status

The seven schools featured in the previous section are highlighted again here. There are other exemplary schools and many excellent examples of emissions-reducing initiatives, but these seven campuses offer a good cross section, with up-to-date information on how climate planning works in higher education. Because the aim of climate plans, ultimately, is to cut 80% or more from current emissions by mid-century, all approved plans and plans-for-a-plan are works in progress and will be so for decades. The schools listed in the table below are among the first to get started.

Stripped to its essentials, a climate plan is a strategic set of measurable goals, projects and steps that can reach a carbon target. If all goes "according to plan," their combined contributions will keep emission reductions on track. But the original route on the roadmap may not be the one through which an institution reaches the destination. If one project idea is delayed, falls short or falls through, the climate team would be well-advised to have a few backup ideas ready to go. Chris Powell at **Brown University** was an energy manager in the private sector before coming to work for the campus physical plant and thus was accustomed to responding to changing fiscal, technical and political conditions. The plan he helped develop at Brown has built-in reserve capacity and, as he puts it, always has "another tab we can pull in a given year to make sure we meet our yearly reduction commitment."

Of the seven schools, four have approved targets and plans, and three have plans still in the making. The table below gives a summary of key comparative numbers. In **Appendix A**, further details for each school are provided on targets, inventories, planning committees, emissions-reduction strategies and campus leadership. A list of relevant websites is also given for each school. These stories and online resources are models to be learned from and to increase our imagination about the possibilities.

SCHOOLS WITH APPROVED PLANS

School (# students)	Date Approved	Emissions Target	Interim goals	Reductions to date	Inventory baseline year & tons	PCC*	Planning process duration
Middlebury College (2,400)	May 2007	Carbon neutral by 2016	To be determined in 2008	(Est. 40% from baseline by December 2008)	2006 30,000 MTCDE**	Signed May 2007	7 months in latest round
University of California, Berkeley (34,000)	April 2007	By 2014: 26% below 2006 levels (= same as 1990 levels)	No formal goal	Not available	2006 209,000 MTCDE	Signed March 2007	8 months
Brown Universtiy (8,000)	January 2008	By 2020: 42% below 2007 levels for existing facilities (15% below 1990 levels); 25-50% better than code requirements for new construction; 15-30% better than code requirements for acquired facilities	No formal goal	Not available	2006 209,000 MTCDE	Signed March 2007	8 months
Yale University (11,300)	October 2005	By 2020: 43% below 2005 levels (10% below 1990 levels)	No formal goal	14% (approx. 6% per year)	2005 260,000 MTCDE	No	12 months

*PCC = Signatories of the Presidents Climate Commitment
**MTCDE = Metric tons of carbon dioxide equivalent

SCHOOLS WORKING ON PLANS

School (# students)	Emissions Target	Interim goals	Inventory baseline year & tons	PCC*	Planning process duration
University of Colorado at Boulder (29,000)	Carbon neutrality	Colorado mandate: 20% by 2020, 80% by 2050	2005 120,000 MTCDE	Signed February 2007	March 2007-present (est. completion May 2009)
Oberlin College (2,800)	Carbon neutrality	To be announced	2007 45,000 MTCDE	Signed November 2006	November 2006-present
University of California, Santa Barbara (21,000)	Carbon neutrality	2000 levels by 2010, 1990 levels by 2020, 80% below 1990 levels by 2050	2000 47,600 MTCDE	Signed March 2007	March 2007- present (est. completion December 2008)

IV. OPPORTUNITIES AND LESSONS LEARNED

Much could be written on the many benefits, opportunities and challenges associated with the quest for a low carbon future. And as more schools, businesses and communities step forward with a commitment to climate action, the list of advantages will lengthen. Cutting carbon levels in the atmosphere is a solvable problem—and because it is one we *must* solve, it is more helpful to capitalize on the positive outcomes and make the most of what we learn over the course of this collective journey in the years ahead.

This section explores briefly some of those positives to climate action planning on campus and mentions a few of the lessons learned.

"Earlier this year, I was asked to present on a topic: 'Grand Challenges of Climate Change.' I said, "I can't think of any." From my perspective, they're all opportunities. And the leadership act for the movement is in projecting a positive future."

–Michel Gelobter, Changing the Social Climate, 2006

• Educational opportunities and student involvement

Climate change and sustainability are hot topics on campus. From guest lectures to new majors to large-scale research and teaching initiatives, they are attracting a growing clientele of students and teachers, and an increasing investment in research and job training, especially in the community college sector. But the process of climate action planning itself also has been a valuable learning opportunity for the students who have been involved. While only a few students sit on actual planning committees, interest in global warming and involvement in climate action is widespread. At schools like **Yale** and **UC Berkeley**, students are engaged in a broad range of activities such as developing a local carbon offsets program, running energy-reduction contests in their residence halls, sponsoring lectures on climate change, changing light bulbs and planting green roofs. At **CU-Boulder**, students have been environmentally active for over 37 years—since before the EPA was established. Concern over climate change has stirred even greater levels of involvement at CU in recent years.

Community and Campus Partnership: Local Carbon Offsets

With support from the Sidney E. Frank Foundation and the Office of the President, **Brown University** has provided $350,000 to support a pilot program to reduce greenhouse gas emissions in the greater Providence, Rhode Island, area. The **Community Carbon Use Reduction at Brown (CCURB)** program will catalyze reduction of local carbon emissions by investing in a range of local energy-saving projects, with more than half of the funds earmarked for student-initiated ideas. The first set of projects, approved in spring 2008, includes installing high-efficiency lighting, programmable thermostats and weatherization in low-income Providence neighborhoods.

"The biggest difference that the climate plan has made in a 48,000-person campus is to create the awareness, the momentum and a sense of purpose of why climate change is really an important business, social and economic opportunity—for any institution, especially an academic one where we educate future leaders."

–Fahmida Ahmed, Sustainability Specialist, UC Berkeley

• Integration with other campus planning efforts

Climate planning is the new kid on the block in terms of traditional master plans, capital development and other types of campus plans. In the book *Degrees That Matter: Climate Change and the University*, authors Ann Rappaport and Sarah Hammond Creighton note that "a climate action program cannot be effective unless it actively informs other planning efforts and in turn is informed by other plans." Although few climate plans exist today, their role in overall campus planning is certain to grow.

With its climate plan in place, **Middlebury College** is further along than most schools. Its recently adopted master plan has sustainability and carbon emissions reduction as a core theme that is addressed in nearly every chapter of the plan. Middlebury's recently completed carbon

neutrality implementation plan (*Winning the Race Together: Achieving Carbon Neutrality by 2016*) includes a process for integrating carbon neutrality efforts with the master plan where the two overlap. At **CU-Boulder**, in contrast, Dave Newport reports that until the committee completes its plan and works up the cost-benefit analyses, they won't be in a position to offer much input on other campus plans, though that will occur in the future. One strategy to get the attention of campus leadership has been to emphasize the financial advantages to climate action. At **UC Berkeley**, **Brown University** and elsewhere, showing the savings benefits was a surefire way to put the case for climate planning into terms that related to the larger planning picture.

Leaders of a climate action planning process should, very early on, make sure they are familiar with any existing plans, especially the campus master plan and strategic plan. Things to look for include upcoming revisions to such plans (opportunities for integration) and plan language. There may already be phrases or goals, for example in the mission and vision of a campus strategic plan that align perfectly with a climate action plan. It is important to know if these exist. Also important to know is who is responsible for those plans and related planning. Those individuals represent sources of knowledge about planning processes and about creating and measuring progress toward goals that should not be overlooked. And they are likely to be surprisingly supportive.

• Accounting for campus growth

One of the biggest challenges at nearly every school has been to achieve net emissions reduction, especially given the past couple decades of booming campus growth. **Penn State University**, for example, is midway through a six-year (2006–2012), multi-campus building retrofit initiative. It is on track to cut emissions 29.5% overall from 2006 levels, but due to anticipated campus growth over those years the net reduction will be just 17.5%. In a time of both increasing fuel costs and pressure to reduce consumption and emissions, campuses are rethinking how they need to grow. At **UC Santa Barbara**, aggressive conservation measures have kept energy consumption relatively constant while the campus has grown considerably in building space. Many schools are adopting green building and efficiency standards, often following LEED (Leadership in Energy Efficiency and Design) guidelines for new and existing buildings. At Yale, all new construction is committed to LEED-Silver certification, which will help ensure that buildings are more energy efficient, resulting in fewer emissions than a conventionally built structure. While new construction will still increase the total climate footprint, building LEED is a way to lessen the impact of additional buildings.

Campuses are known for systems of managing campus space that are sometimes Byzantine in their complexity. It is probably a truism that campus space can always be better managed. Large campuses often have staff dedicated to managing campus space who are likely to have many suggestions for its more efficient use. In the short term, these ideas can result in energy savings and perhaps, in the long term, result in less need for additional built space.

• Collaboration among campuses

Climate change awareness has led to a flurry of collaborative efforts among campuses and students nationwide. There have been major recent events like Focus the Nation and Powershift that have mobilized thousands of students. National, regional and local conferences have drawn staff, faculty and students together to work on global warming solutions. The ACUPCC held two national summits (2007 and 2008) to educate presidents and chancellors about global warming and enable them to share ideas and solutions from their campuses. A new consortium of universities in **Colorado** is working together to try to broker a major purchase of renewable

energy that would be shared among schools in the state. And the ten campuses of the **University of California System** are looking into ways to support a solar PV farm that will provide renewable energy to all.

Schools also learn about climate planning from one another. As more campuses enter the planning arena, an increasing number are sharing their knowledge and experiences through websites, webcasts and conferences. NWF's **Campus Ecology** program has been organizing a series of multi-campus gatherings to explore the benefits and strategies of climate planning; it also hosted a webcast—Campus Climate Action Plans—in October 2007 that featured the experiences of several schools. (See http://www.nwf.org/campusecology/resources/teleconferences.cfm) A relatively new online social and collegial network, the Campus Sustainability Planning Network (www.campussustainability.info) hosted by SCUP provides Facebook-level functionality for its users in a space dedicated to planning for campus sustainability. AASHE has made many of its energy and global warming resources public so that institutions can see what others are doing and how. Within the year, AASHE will offer an online "Higher Education Climate Action Registry" (HECAR) for colleges and universities to post their climate action plans, GHG inventories and other climate information in a central place.

A specific lesson learned was noted by Dave Newport at **CU-Boulder**, which has been using the **UC Berkeley** climate plan as its primary model. He said, "The biggest thing that Berkeley taught us was the need, from the get-go, to have the planning process be integrated with your CFO's [chief financial officer's] normal budget planning processes. . . . So we made sure early to get the CFO on the team." And recently, sustainability directors from **Yale**, **Harvard** and other Ivy League schools formed a new consortium to share ideas and develop effective strategies for reducing emissions. Julie Newman at Yale, who leads the group, reflected on its main benefit: "The collaborations are essential for the exchange of knowledge and lessons learned."

• Mechanism for responding to new savings opportunities

Once a plan is in place, it becomes a system for analyzing new project ideas for their cost and emissions benefits. On campuses with approved plans like **Brown**, ongoing implementation needs to be accompanied by an attentiveness to other project possibilities or new funding sources like rebates and grants. Director of Sustainable Energy and Environmental Initiatives Chris Powell is always scanning the horizon: "If there's any point in time where the economics (for new projects) makes sense, I'll be right there with a plan ready to go." That is part of the climate action strategy of **Tufts University** (MA). Staff of the Tufts Climate Initiative are responsive to new emissions-saving opportunities as they arise. When an athletic center expansion was proposed, TCI Program Director Sarah Hammond Creighton worked with facilities staff early in the planning process to develop ideas to save costs as well as cut CO_2.

DETAILED CAMPUS EXAMPLES

1. Schools with approved climate action plans

- **Middlebury College,** Middlebury, Vermont

Students: 2,400 undergraduates

CAP committees: (1) The Carbon Neutrality Initiative Task Force existed from February to May 2007 to evaluate potential costs, risks and organizational impact of achieving carbon neutrality by 2016. It had 16 members: 9 college staff and 7 students. (2) The MiddShift Implementation Working Group began in November 2007 to develop a more detailed roadmap or neutrality plan outlining how zero emissions will be achieved. Its first report was submitted in April 2008. The Middshift group has 16 members, including 13 facilities and college staff, 2 students and 1 faculty member. These are divided into an Advisory Committee and a Steering Committee with 8 members each.

Plan approved: May 2007

Sustainability contact: Jack Byrne, Campus Sustainability Coordinator

Emissions inventory: Baseline year 2006; 30,000 MTCDE. Middlebury's first inventory was conducted in 2002 using the Clean Air-Cool Planet inventory tool and covered the years 1990 and 2000. The inventory was updated in 2006 using a combination of Clean Air-Cool Planet, World Resources Institute and EPA tools tailored specifically to Middlebury's emissions. Because their electric utility is mostly hydro and nuclear, emissions from electricity account for just 3% of the campus total. The inventory includes employee commuting and outsourced travel.

Emissions target in 2004: Middlebury was an early leader in formal climate action. In 2004, trustees approved Middlebury College's Commitment to Carbon Reduction. Approval was based largely on a detailed study and report by students in 2003, which ranked more than 50 projects by environmental and financial criteria. The original target—10% below 1990 levels by 2012—will be met by the new biomass cogeneration plant slated for operation in late 2008. Because a new target was needed, students led a new push for achieving carbon neutrality.

Current emissions target and timeline in more detail: The new target is carbon neutrality by 2016. This is the year named by NASA scientist James Hansen by which global emissions must "turn the corner" to avoid runaway negative consequences. Along with the target, a preliminary list of projects and risk analyses presented to trustees in May 2007 was also approved.

Interim targets: To be set forth in 2008 plan.

Strategy to reach target: Initiatives include a biomass plant that will be powered by wood chips, operational adjustments such as energy efficient lighting and building-efficiency upgrades, and after all other economically feasible efforts to reduce carbon have been exhausted, the purchase of carbon offsets.

Projects completed or underway: The biomass gasification cogeneration plant, expected to be completed by December 2008, will cut fuel oil use by 1 million gallons and CO2 emissions by 12,500 tons or 40%. An energy services contractor was hired to do an audit of campus buildings.

Top leadership support: According to Byrne, leadership from the President and other top administrators has been absolutely essential. He notes further that, "It's also been very healthy in the sense that there's a receptivity and a willingness to set ambitious goals and to respond to students who are pushing that envelope."

Special features: Middlebury College is one of eleven schools that will serve as pilot schools for the Clinton Climate Initiative.[6]

WEBSITES & RESOURCES (all accessed April 2008)

New Target – Carbon Neutral by 2016
http://www.middlebury.edu/administration/enviro/initiatives/climate/New+Target+-+Carbon+Neutral+by+2016.htm

Trustees' Resolution on Achieving Carbon Neutrality – May 2007
http://www.middlebury.edu/NR/rdonlyres/8EC111B3-A3DF-406A-A5F8-FA2D65B13F37/0/CNResolutionB0233491final.DOC

Carbon Neutrality Toolkit: A Proposal for Carbon Neutrality – January 2007
https://segueuserfiles.middlebury.edu/midd_shift/Middshift%20Carbon%20Neutrality%20Toolkit.pdf

Carbon Reduction Resolution – news story
http://www.middlebury.edu/administration/enviro/initiatives/climate/carbon_reduction_resolution.htm

Carbon Neutrality at Middlebury College: A Compilation of Objectives and Strategies – 2003
http://community.middlebury.edu/~cneutral/es010_report.pdf

Environmental Affairs office
http://www.middlebury.edu/administration/enviro

Carbon Neutrality by 2016 – Draft – Summary and Recommendations to Trustees – May 2007
http://www.middlebury.edu/NR/rdonlyres/2345132D-7970-4876-BE6F-F5197B611E7C/0/CarbonNeutralityBoardRecommendation.doc

Winning the Race Together: Achieving Carbon Neutrality by 2016
(To be released Summer 2008)

• University of California, Berkeley

Students: 23,100 undergraduates; 34,000 total with graduate and professional students

CAP committee: Cal Climate Action Partnership (CalCAP) Steering Committee, made up of 27 members: 9 students, 13 administrators and staff and 5 faculty. CalCAP's mission was to develop a strategy for significantly reducing UC Berkeley's GHG footprint without compromising its operations.

Plan approved: April 2007

Sustainability contact: Lisa McNeilly, Director of Sustainability. (Fahmida Ahmed, formerly the Sustainability Specialist at UC Berkeley, is now Manager of Sustainability Programs at Stanford University. As a graduate student, Fahmida co-wrote the climate plan for UC Santa Barbara.)

Emissions inventory: Baseline year 2006; 209,000 MTCDE. Inventory was conducted in October 2006 using the state of California Climate Action Registry calculator. CCAR requires that yearly updates and data are audited annually by a third-party verifier and made available to the public via the internet.

Emissions target in brief: 1990 emissions level by 2014 (26% cut from 2006 baseline)

Interim target: There are no formal interim goals, notes Ahmed, because 2014 is only a few years away. This "aggressive deadline," as she calls it, will require average annual cuts of over 3%, based on the 8 years from 2006 to 2014 and also accounting for campus growth.

Approved emissions target and timeline in more detail: UC Berkeley's target will reach 1990 levels six years earlier than the target set by California Assembly Bill 32, the Global Solutions Warming Act.

Strategy to reach target: The Chancellor approved 14 projects, with a probable combined total of $3 million a year in cost savings and a 4-year simple payback. If implemented, the plan will be worth $16 million (in present terms based on net present value calculation) in net savings by 2014. Seven of the 14 projects are infrastructure-related, and seven are behavioral. Proposed emission-reduction projects include implementing Energy Star (EPA) computer settings, retrofitting bathrooms to conserve water, installing efficient lighting and improving the campus heating plant. Steps to encourage staff and students to conserve energy include expanding the number of electric fleet vehicles, introducing a shared campus bicycle program, encouraging a department-level energy reduction effort and bolstering use of videoconferencing rooms.

Anticipated campus growth: Growth projections from Berkeley's long-range development plan were incorporated into the emissions target, so the target date of 2014 is keyed to that. It is not only based on the inventory of 2006, notes Ahmed, "It's based on where things will be in 2014 if the campus continues to grow at the rate we estimate."

Top leadership support: In Ahmed's words, "The Chancellor [Robert Birgeneau] is very on board." And UC Berkeley Vice Chancellors Nathan Brostrom and Ed Denton have been instrumental in developing and implementing the plan. Vice Provost Cathy Koshland chairs the CalCAP Steering Committee that steered the effort.

WEBSITES & RESOURCES (all accessed April 2008)

CalCAP Climate Action Partnership
http://climateaction.berkeley.edu

CalCAP Steering Committee Members
http://sustainability.berkeley.edu/calcap/docs/CalCAP%20Steering%20Committee%20Members.pdf

GHG Reduction Feasibility Study 2006–2007 Final Report – July 2007
http://sustainability.berkeley.edu/calcap/docs/CalCAP%20Report%20FINAL%202007.pdf

UC Berkeley Sets Aggressive Emission Reduction Targets
http://www.berkeley.edu/news/berkeleyan/2007/05/02_summit.shtml

Emissions Inventory 2006
http://sustainability.berkeley.edu/calcap/inventory-2006data.html

Climate Action Course Report – December 2007
http://sustainability.berkeley.edu/calcap/docs/CalCAP_course_final_report.pdf

California Climate Action Registry Reporting Online Tool
http://www.climateregistry.org/CARROT/public/reports.aspx

• **Brown University,** Providence, Rhode Island

Students: 6,000 undergraduates; 8,000 total with graduate and professional students

CAP committee: Energy and Environmental Advisory Committee, with 12 members including 4 students, 2 facilities staff, 3 other university staff, and 3 faculty members.

Plan approved: In January 2008, trustees approved some but not all of the committee's recommendations and formally launched implementation of the plan.

Sustainability contact: Christopher Powell, Director of Sustainable Energy and Environmental Initiatives

Emissions inventory: Baseline year 2007; 73,000 MTCDE. Brown's first inventory was conducted in 1998 and has been revised yearly. They have developed their own calculator system based on WRI/WBCSD protocols along with EPA's eGRID for emissions due to electricity. 1990 emissions were approximately 50,000 MTCDE.

Emissions target in brief: 42% below 2007 levels by 2020 (15% below 1990 levels) for existing buildings

Interim target: Approximately 4% per year

Approved emissions target and timeline in more detail: Emissions reduced 42% below 2007 levels by 2020 in *existing* (2008) facilities. Interim goals will be set as soon as possible and monitored annually.

Strategy to reach target: Emissions will be reduced by 25–50% below the standard required by state code for all new construction. New construction will, at a minimum, meet the Leadership in Energy and Environmental Design (LEED) Silver standard. Emissions will be reduced for all newly acquired facilities by a minimum of 15 percent and as much as 30 percent.

Reductions will be achieved by a mix of energy efficiency improvements, conservation and other measures. These include switching the fuel that powers the central heating plant to cleaner natural gas when available, implementing new lighting technologies, improving the energy efficiency of buildings, increased cogeneration of electricity and using renewable energy sources when appropriate. According to Powell, there is an extensive "internal" plan—which is not public—that contains all the technical notes, costs analyses, financing numbers and other details need to implement projects in the plan.

Reductions to date: Projects are on target to reach approximately 6% reductions in 2008.

Anticipated campus growth: Taking anticipated campus growth into account, the emissions in 2020 will roughly equal 1990 emissions levels (rather than being 15% below).

Projects completed or underway: 2008 reductions will be primarily due to fuel switching from #6 fuel oil to natural gas. Retrofits of lighting, motors and mechanical equipment have been completed in many existing buildings. Over $5 million in investments to increase efficiency have been approved for completion in fiscal year 2008, and $15 million have been allocated for improvements in the coming years. An energy-management policy establishes energy-saving indoor temperatures as well as staff responsibilities to conserve energy.

Progress reports: To be done annually.

Top leadership support: "President Ruth Simmons," notes Powell, "has been right on board with this from day one."

Renewables: There are no significant opportunities for solar or renewables at Brown's city-based campus in the Northeast. Staff are looking into potential investments, however, in wind farms.

Special features: A local carbon-offsets program is underway called Community Carbon Use Reduction at Brown (CCURB) with a $350,000 startup fund. Twenty proposals from students are being reviewed for funding. One idea is to give away thousands of energy-saving CFL bulbs in low-income neighborhoods.

WEBSITES & RESOURCES (all accessed April 2008)

Brown University Environmental Change Initiative
(http://www.brown.edu/Research/ECI)

Brown is Green
(http://www.brown.edu/Departments/Brown_Is_Green)

Administration-Approved Recommendations – January 2008
(http://www.brown.edu/Facilities/Facilities_Management/energy_admin_approved_rec.php)

Energy and Environmental Advisory Committee Policy Recommendations
(http://www.brown.edu/Facilities/Facilities_Management/energy_policy_recommendations.php)

Strategic Planning: Strategic Energy and Environmental Plan
(http://www.brown.edu/Facilities/Facilities_Management/energy_strategic_planning.php)

Emissions Inventory Overview
(http://www.brown.edu/Facilities/Facilities_Management/energy_performance.php)

Community Carbon Use Reduction at Brown (CCURB) project
http://www.brown.edu/Departments/CCURB/about.html

Brown University Initiatives on the Environment
http://www.brown.edu/Departments/Brown_Is_Green/documents/Environmental_Action.pdf

• Yale University, New Haven, Connecticut

"This rapid progress—14% emissions reduction in 2 years—has given us confidence that we are going to achieve our reduction well before our 2020 deadline."

–Richard C. Levin, President, Yale University

Students: 5,300 undergraduates; 11,300 total with graduate and professional students

CAP committee: Energy Task Force, comprised of 12 members: 4 students, 3 facilities staff, 3 other university administrators and staff, and 2 faculty members.

Plan approved: October 2005

Sustainability contact: Julie Newman, Director, Office of Sustainability

Emissions inventory: Baseline year 2005; 260,000 MTCDE. Students conducted the first inventory in 2002. A revised inventory will be released in June 2008 that uses the Clean Air-Cool Planet emissions calculator tool.

Emissions target in brief: 10% below 1990 levels by 2020

Interim target: No formal interim goal, but internal agreement about pace of reduction.

Approved emissions target and timeline in more detail: 10% below the University's 1990 level by 2020. Reaching that target will require Yale to reduce emissions 43% below its 2005 level. This goal is consistent with a similar commitment by the Connecticut State Legislature, as well as the New England Governors and Eastern Canadian Premiers Climate Action Plan. Transportation not included in emissions target due to lack of data back to 1990 but will be proposed for inclusion by 2008.

Strategy to reach target: The campus plans to reach its goal through a combination of methods: a strong energy conservation program, investing in alternative energy sources, implementing on-site renewable and clean energy demonstration projects, and creating local carbon offsets. Energy conservation is expected to cut consumption by 15% at residential colleges over a three-year period and by 10% at all other facilities.

Reductions to date: From roughly November 2005 through December 2007, Yale cut emissions 43,000 metric tons from its 2005 level. This gives a 2-year average reduction of around 6% per year. This reduction is based on the estimated tonnage (287,000 MTCDE) from the business-as-usual trajectory. Emissions in 2007 were down to 244,000 MTCDE.

Anticipated campus growth: Due to planned growth of 15% by the year 2020 (from its 2005 total of 13.5 million square feet) , Yale's overall emissions-reduction goal will need to be 58% below the level of emissions projected for 2020.

Projects completed or underway: A 40 kW photovoltaic system at the Divinity School and 250 kW fuel cell have been installed. By 2007, residential colleges had cut their energy use by 10%. Kroon Hall, the new home of the School of Forestry and Environmental Studies scheduled for a 2008 completion, will be LEED-Platinum with a 100kW PV array, geothermal heating and cooling and other energy-saving features. A new cogeneration power plant is expected to add a 17% drop in CO_2 when it comes online in 2009.

Progress reports: Annual reports are published on web.

Top leadership support: As Newman notes about President Richard C. Levin, "We're no longer having to ask him to endorse anything, we're actually now trying to keep up with him. It went from us introducing this to him and seeking his endorsement to now where he's off and running as an advocate—as a staunch advocate—for GHG reduction."

Special features: Yale is proposing a fund to launch a local carbon-offsets program. Students will have a significant role in developing the projects. Yale also just acquired a 1,200 acre property—the former Bayer pharmaceutical complex—which will add substantially to square-footage in future.

WEBSITES & RESOURCES (all accessed April 2008)

Yale Office of Sustainability
(http://www.yale.edu/sustainability/index.html)

Energy Task Force Charter
(http://www.yale.edu/sustainability/EnergyCharter.pdf)

Greenhouse Gas Reduction Commitment – October 2005
(http://www.yale.edu/sustainability/yaleCommits.htm)

Yale's Greenhouse Gas Reduction Strategy – August 2007 Report
(http://www.yale.edu/sustainability/greenhouse9_112.pdf)

Yale Reduces Greenhouse Gas Emissions by 17% – January 21, 2008
(http://www.yale.edu/opa/newsr/08-01-21-01.all.html)

Inventory and Analysis of Yale University's Greenhouse Gas Emissions – October 2005
(http://environment.yale.edu/documents/downloads/v-z/wp_7_yale_ghg.pdf)

University breaks ground for its most green building – Kroon Hall
(http://www.yale.edu/opa/v35.n28/story6.html)

New energy programs helping Yale to achieve its goal of reducing greenhouse emissions 43% by 2020 – April 2008 –
http://www.yale.edu/opa/ybc_sustainability/story2.html

2. Schools working on plans

• University of Colorado at Boulder

Students: 24,500 undergraduates; 29,000 total including graduate students

CAP committee: A high-level CAP steering committee formed around March 2007 and includes Vice Chancellors plus the Mayor of Boulder and Director of the Governor's Energy Office. The Carbon Neutrality Working Group (CNWG) started in September 2007. It has 30 members including students, university staff and faculty and community members. The CNWG is composed of six teams: energy supply, energy conservation/facilities, transportation, materials management, behavioral conservation, and policy initiatives.

Sustainability contact: Dave Newport, Director, Environmental Center

Emissions inventory: Baseline year 2005; 120,000 MTCDE. 140,000 tons in 2007, up from 120,000 tons in 2006 due to switch from natural gas back to coal as power plant fuel. Inventory created using the Clean Air-Cool Planet calculator tool.

Planning efforts: Several iterations of a comprehensive sustainability plan, Blueprint for a Green Campus, have been created since 2000, with the latest version in 2006. Prompted by signing the PCC in February 2007, CU-Boulder initiated a formal CAP planning process. The Carbon Neutrality Working Group was appointed by the Chancellor to write a Comprehensive Plan for Carbon Neutrality, which the CNWG hopes to complete by December 2008, with a stakeholder-reviewed version ready by May 2009. Emphasis is on combining the carbon-reduction plan with a sustainability program. Each of the six teams is exploring options and evaluating them for cost, carbon and collateral benefits like education, research, service, community partnerships and campus life. They will develop several scenarios for reaching neutrality that eventually will be presented to the President and Board of Regents for a decision.

Emissions target in brief: Carbon neutrality, as directed by the PCC.

Interim targets: CU will comply with State of Colorado guidelines: 20% by 2020 and 80% by 2050. On a shorter time frame, the Colorado Governor's Executive Order from April 2007 mandates a 20% total energy reduction in state facilities by June 30, 2012 (total energy, not energy per square foot), based on levels in FY 2005–2006. The CNWG is focusing first on meeting that challenging goal.

Strategy to reach target: CU hopes to get to the 20% by 2020 target by fuel switching and large-scale renewables. In general, they will focus on conservation and efficiency, as much renewable energy as possible, and creditable, meaningful offsets. According to Newport, the plan will primarily address the next 7–10 years, which is as far ahead as CU's capital improvement plan and the local utility plan go.

Reductions to date: CU has been reducing energy use per square foot around 5% per year since 2005.

Anticipated campus growth: As Newport noted, "We're adding space and running it off coal, so our emissions are going up." Thus any reduction estimates will have to account for campus growth.

Projects completed or underway: Many initiatives have been completed or are in progress. CU has a very aggressive conservation and efficiency program and was the nation's first campus to purchase wind energy credits with student fees, according to the EPA.[7] They currently are looking into securing renewables on a large scale by working with several other Colorado universities to form a consortium to deliver renewable energy to campuses across the state.

Top leadership support: Chancellor G.P. "Bud" Peterson signed the PCC and has dedicated himself to achieving carbon neutrality. He also serves on the steering committee of the PCC.

Special features: In a January 2008 initiative, CU-Boulder students voted to move $50,000 a year in student funding currently used for wind energy into the governor's new program—the Colorado Carbon Fund—for local carbon offsets. CCF's innovative approach to reducing carbon emissions is to raise funds from public and private sources and invest them in Colorado community-based clean-energy and climate-mitigation projects.

WEBSITES & RESOURCES (all accessed April 2008)

Environmental Center
http://ecenter.colorado.edu

CU Students End REC Purchases, Switch to Local Offsets
http://ecenter.colorado.edu/in_the_news/press_releases/CO_Carbon_Fund_PR.pdf

Greening of State Government, Colorado Governor Executive Orders, 2007
http://www.colorado.gov/energy/greening/index.asp

Dave Newport's course: Carbon Neutral University Planning
http://www.cucommunities.org/cnup/schedule.html

• Oberlin College, Oberlin, Ohio

Students: 2,600 undergraduates; 2,800 total including graduate students

CAP committee: Committee on Environmental Sustainability has 15 members: 6 college staff and administrators, 6 faculty members, 2 students, 2 community members. Committee was formed in Nov 2006, the same month that then-President Nancy Dye signed the PCC. Members include Oberlin's Provost, Vice President of Finance, Director of Facilities Operations, Director of Facilities Planning and Construction, Vice President of Development and Alumni Affairs, and the Sustainability Coordinator. Community members include the City Council President and the Director of the municipal utility.

Sustainability contact: Nathan Engstrom, Sustainability Coordinator

Emissions inventory: Baseline year 2007, approximately 45,000 metric tons CO2e. Inventory will be completed in fall 2008.

Calculator tool used: Clean Air-Cool Planet

Planning efforts: An initial climate action plan was released in 2002 by the Rocky Mountain Institute, a consulting firm. Titled *Oberlin College: Climate Neutral by 2020*, it offered energy and cost-saving scenarios for reaching neutrality. Due to concerns over some of the cost-saving estimates, energy data projections, timelines and a lack of stakeholder input while the recommendations were being developed, the report was never approved by the college or implemented. A new planning effort was launched shortly after Oberlin signed the PCC in November 2006. But according to Engstrom, work on the CAP has been slowed to await data from a study of opportunities for efficiency improvements in existing facilities and the college's coal-fired central heating plant. The study is on track to be completed in summer 2008, and its findings will inform the direction of the CAP. The campus has hired an energy consultant and also is looking into how outside help might be incorporated through Clinton Climate Initiative.

Emissions target in brief: Climate neutrality, ultimately, as directed by the PCC.

Emissions targets and timeline in more detail: To be determined later in 2008.

Strategy to reach target: Nothing yet to report.

Anticipated campus growth: Campus growth has been slow in recent years but the pace is expected to pick up. Construction will soon be underway for a large new Conservatory of Music building, and planning has just begun for a new residence hall, both of which are expected to be LEED-Gold certified. The idea of reducing campus built space or keeping it the same has caught the attention of Oberlin's CFO, though no proposals are on the table.

Projects completed or underway: The AJ Lewis Center is a net zero-energy building, one of only a few in the United State. It produces 13% more energy than it consumes, on average, due to electricity produced by 160 kW of PV plus geothermal heat. The college purchases more than 40% of its electricity from green energy sources.

Top leadership support: Former President Nancy Dye was one of the first to sign the PCC, and new President Marvin Krislov (as of July 2007) is "clearly and publicly on board," notes Engstrom.

Special features: The college owns a block of real estate and buildings in downtown Oberlin. The college is conducting a feasibility study for a block-scale redevelopment and CO_2 contributions will be factored into the planning.

WEBSITES & RESOURCES (all accessed April 2008)

Oberlin College – Environmental Sustainability website
http://www.oberlin.edu/sustainability

Office of Environmental Sustainability brochure
http://www.oberlin.edu/sustainability/about/brochure.pdf

Committee on Environmental Sustainability
http://www.oberlin.edu/sustainability/about/committee.html

Oberlin's Sustainability Portfolio: Carbon Neutrality
http://www.oberlin.edu/sustainability/portfolio/carbon_neutrality.html

Campus Resource Monitoring System
http://www.oberlin.edu/dormenergy

Adam Joseph Lewis Center for Environmental Studies
http://www.oberlin.edu/ajlc/ajlcHome.html

Oberlin College: Climate Neutral by 2020 – Executive Summary – 2002 (12 pages)
http://www.naels.org/Assets/naels_documents/CCN/Oberlin2020ExecSumJan02.doc

Oberlin College: Climate Neutral by 2020 Report by Rocky Mountain Institute – 2002
(125 pages)
http://www.nicholas.duke.edu/news/roberstonseminars/swisher-oberlin2020final.pdf

University of California, Santa Barbara

Students: Students; 18,000 undergraduates; 21,000 total including graduate students

CAP committee: The Energy Team is the informal name for a group consisting of the Director and Associate Director of Facilities, Campus Energy Manager, commissioning and project engineers, a financial staff person and the Sustainability Manager. Students are not regular members but attend some meetings to propose ideas for projects.

Sustainability contact: Perrin Pellegrin, Sustainability Manager.

Inventory: Baseline year 2000; 47,600 metric tons CO2e. UCSB has done an inventory for four years using the State of California Climate Action Registry calculator. Emissions from commuters and air travel were not included in the past, but will be in the future. The annual update of inventory is third-party certified and made available to the public (see address below).

Planning efforts: There is a detailed campus sustainability plan that includes goals for reducing emissions. The committee intends to have a climate neutrality plan ready by December 2008. It will use a portfolio approach: Conservation projects, renewables and, if necessary, offsets.

Emissions target in brief: Climate neutrality, as called for by the PCC and University of California Office of the President

Interim targets: UCSB seeks to meet the GHG reductions listed in the Governor's Executive Order S-3-05. It requires emissions reduction to 2000 levels by 2010, 1990 levels by 2020 and 80% below 1990 levels by 2050. As of March 2008, the campus is only 3% away from the 2000 level and 22% away from its 1990 level, accounting for anticipated growth.

Emissions target and timeline in more detail: Based on recent projections, UCSB is confident they can reduce CO2 despite anticipated campus growth, cutting an estimated 20,000 MTCDE by 2020 and 70,000 metric tons by 2050.

Strategy to reach target: Major efforts in energy conservation have been made over the past ten years, and more are planned for the future. UCSB has a green building policy which states that all new buildings programmed after July 1, 2004 must meet LEED-Silver certification and surpass Title 24 by 20%. Facilities staff is recommissioning existing buildings and piloting the U.S. Green Building Council's Portfolio Program, which aims to achieve LEED for Existing Buildings certification.

Reductions to date: From 2000 to 2005 the campus cut a total of 11,300,000 kWh and 8,080 tons of CO_2. Cumulative savings are over $1.4 million per year in energy costs.

Anticipated campus growth: The Energy Team's calculations include estimates from UCSB's Long-Range Development Plan that looks 25 years ahead. Without efforts to reduce, CO2 emissions are projected to rise approximately 1.5% per year or 60% from present levels by 2050 (rising from approximately 53,000 MTCDE in 2006 to 80,000 in 2050 if unchecked).

Projects completed or underway: UCSB currently has 60 kW of photovoltaic capacity. The campus will be installing another 133 kW PV system on the roof of Rec Center II in summer 2008. In 2006–2007, they purchased RECs for 2.3 million kWh of renewable electricity. Projects currently underway are expected to add another 7,400 MTCDE of emissions reductions by the end of 2008.

Top leadership support: Chancellor Henry T. Yang is strongly in support of climate neutrality. He organized the March 2007 event in which all 10 UC chancellors signed the Presidents Climate Commitment and currently serves on the ACUPCC Steering Committee.

Special features: The Green Initiative Fund was created by students in spring 2006 with the charge to "reduce the University's impact on the environment." Students voted to increase their own fees by $2.60 per quarter, contributing approximately $182,000 a year towards TGIF.

WEBSITES & RESOURCES (all accessed April 2008)

Office of Sustainability
http://sustainability.ucsb.edu

Climate Change Action at UCSB – December 2007
http://sustainability.ucsb.edu/plan/docs/minutes/climate_action2-20-2008.pdf

UCSB Energy Projects Summary – 2000 through 2005
http://sustainability.ucsb.edu/_client/pdf/energy_projects_summary_04_11_07.pdf

UCSB Campus Sustainability Annual Report – 2006–2007
http://sustainability.ucsb.edu/_client/pdf/Annual_report2006_2007.pdf

UCSB Campus Sustainability Plan, Executive Summary – February 2008
http://sustainability.ucsb.edu/plan/docs/SustainPlanExecSumm_2_6_08.pdf

UCSB Campus Sustainability Plan – May 2007
http://sustainability.ucsb.edu/plan/docs/Draft_Sustain_Plan_5-07.pdf

Campus Climate Neutral Group Project
http://fiesta.bren.ucsb.edu/~ccn

Changing the Campus Climate: Strategies to Reduce Greenhouse Gas Emissions at The University of California, Santa Barbara – A Bren School of Environmental Science and Management Master's Project – May 2006
http://fiesta.bren.ucsb.edu/~ccn/Finalreport.pdf

California Climate Action Registry Reporting Online Tool
http://www.climateregistry.org/CARROT/public/reports.aspx

UCSB Institute for Energy Efficiency – Launched February 2008
http://www.iee.ucsb.edu

APPENDIX B

RESOURCES ON CLIMATE CHANGE AND CAMPUS ACTION

Reports

Apollo Alliance. *New Energy for Campuses: Energy-saving policies for colleges and universities*, 2006. http://www.apolloalliance.org/downloads/resources_new_energy.pdf

Intergovernmental Panel on Climate Change (IPCC). *Summary for Policymakers:, Fourth Assessment Report*, 2008. http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf

National Wildlife Federation. *Higher Education in a Warming World: The Business Case for Climate Leadership on Campus*, 2008. www.nwf.org/CampusEcology/BusinessCase

Stern, Nicholas. *Stern Review: Economics of Climate Change—Executive Summary*, 2006. See "Figure 3: Illustrative paths to stabilise at 550 ppm CO_2e," p. xii. http://www.hm-treasury.gov.uk/media/4/3/Executive_Summary.pdf

Books

(College and university)

APPA / NACUBO / SCUP. *The Business Case for Renewable Energy: A Guide for Colleges and Universities*, 2006

Norris, Donald M. and Nick Poulton. *A Guide to Planning for Change. Society for College and University Planning*, September 2008.

Orr, David W. *Design on the Edge: The Making of a High-Performance Building*. Cambridge. MA: MIT Press, 2006.

Rappaport, Ann and Sarah Hammond Creighton. *Degrees That Matter: Climate Change and the University*. Cambridge, MA: MIT Press, 2007.

Simpson, Walter. *The Green Campus: Meeting the Challenge of Environmental Sustainability*. APPA: Leadership in Educational Facilities, 2008. https://www.appa.org//Bookstore/product_browse.cfm?itemnumber=436

Toor, Will and Spencer Havlick. *Transportation and Sustainable Campus Communities*. Washington, D.C.: Island Press, 2004.

General

Brown, Lester. *Plan B 3.0: Mobilizing to Save Civilization*. New York: W.W. Norton & Co., 2008.

Flannery, Tim. *The Weather Makers: How Man is Changing the Climate and What it Means for Life on Earth*. Jackson, TN: Grove Press, 2005.

Organizations and websites

American College & University Presidents Climate Commitment (ACUPCC).
http://www.presidentsclimatecommitment.org

Association for the Advancement of Sustainability in Higher Education (AASHE).
http://www.aashe.org; AASHE Bulletin. http://www.aashe.org/publications/bulletin.php

Campus Sustainability Day (CSD). CSD #6 is October 22, 2008. http://www.scup.org/csd

Campus Sustainability Planning Network. http://www.campussustainability.info

NWF Campus Ecology. http://www.nwf.org/CampusEcology The home page links to many NWF reports, publications, campus project yearbooks, podcasts (from the ongoing webconference series), climate action fellowships and many other resources.

NWF Campus Ecology. *Chill Out: Campus Solutions to Global Warming*, 2008 Winners.
http://www.nwf.org/CampusEcology/chillout/co08_winners.cfm

NWF Campus Ecology. *Focus the Nation—2% Solution Webcast*. January 31, 2008.
http://www.focusthenation.org/2percentsolution.php

Climate action plans, inventories and tools

AASHE. Campus Climate Action Plans Completed
http://www.aashe.org/resources/cap.php

AASHE. Campus Emissions Inventory Collection
http://www.aashe.org/resources/ghg_inventories.php

AASHE. Campus Global Warming Commitments
http://www.aashe.org/resources/gw_commitments.php

ACUPCC, Overview and Examples of Climate Action Plans
http://www.presidentsclimatecommitment.org/html/overview.php

Clean Air-Cool Planet (CA-CP). Campuses for Climate Action and Campus Toolkit
http://www.cleanair-coolplanet.org/for_campuses.php

Clean Air-Cool Planet (CA-CP). Emissions inventories and list of campus examples
http://www.cleanair-coolplanet.org/toolkit/content/view/146/132

Common Energy. University Carbon Dioxide-Neutral Plans
http://www.uvic.commonenergy.org/wiki/University_Carbon_Dioxide-Neutral_Plans

Construction Carbon Calculator
www.BuildCarbonNeutral.org

Economic Input-Output Lifecycle Assessment Model
www.EIOLCA.net

United States Green Building Council (USGBC) manages LEED certification
http://www.usgbc.org

Campus Climate-related Reports and Studies

College of the Atlantic Carbon Net Zero website
http://www.coa.edu/html/carbonzero.htm

University of Wisconsin-Oshkosh Campus Sustainability Plan, 2006
http://www.uwosh.edu/assets/announcement/sustainability

University of Florida Carbon Neutral Assessment Project, 2004
http://www.icbe.com/about/uf/documents/UF_Carbon_Neutral_Assessment_Project.pdf

Williams College (MA) Climate Action Committee Report
http://www.williams.edu/go/cac

What's an MTCDE? (Metric Tons Carbon Dioxide Equivalent)

This is the unit of measure often used to report greenhouse gas amounts.

(Sometimes noted as e-CO_2 or CO_2e) It means:

MT = Metric Tons. Most of the world is on the metric system and its tons (often spelled tonnes) are 1,000 kilograms each or 2,205 U.S. pounds. (In measurement circles, our 2,000 pounds is called a "short" ton.)

CDE = Carbon Dioxide Equivalent. Some greenhouse gases have a more potent warming effect than carbon dioxide. The "warming potential" of methane (CH_4) is 21 times that of CO_2. Nitrous oxide (N_2O) is 310 times as potent. 100 pounds of methane, for example, has the warming effect of 2,100 pounds of CO_2. The CA-CP tool factors these differences into the emissions total.

Endnotes

[1] Step It Up 2007. http://stepitup2007.org
Focus the Nation. http://www.FocusTheNation.org
Campus Climate Challenge. http://www.CampusClimateChallenge.org

[2] American College and University Presidents Climate Commitment.
http://www.presidentsclimatecommitment.org

[3] SUNY Buffalo.
http://wings.buffalo.edu/ubgreen/content/policies/policy_executiveorder111.html

[4] Clinton Climate Initiative press release.
http://www.presidentsclimatecommitment.org/ACUPCC-CCIpartnershipfinalrelease.pdf

[5] Campus Sustainability Day – http://www.scup.org/csd/index.html

[6] Clinton Climate Initiative –
http://www.presidentsclimatecommitment.org/ACUPCC-CCIpartnershipfinalrelease.pdf

[7] CU-Boulder Partner Profile. Green Power Partnership.
http://www.epa.gov/grnpower/partners/partners/universityofcoloradoatboulder.htm