Higher Education in a Warming World

The Business Case for Climate Leadership on Campus

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This 8-page summary presents the highlights of Campus Ecology's acclaimed guide:

Higher Education in a Warming World

FOR MORE—a lot more—on campus climate leadership and smart, cost-effective solutions . . .

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www.nwf.org/CampusEcology/BusinessCase

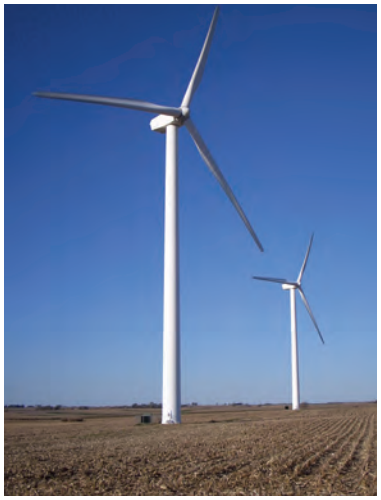
Published in 2008, this 60-page guide provides an overview of global warming science as well as the business, educational and moral arguments for confronting climate change. It showcases dozens of current, practical examples of innovative projects and ideas from a diverse group of over 100 campuses in 32 states. It also offers a detailed roadmap for how colleges and universities can plan and implement effective climate action, including financing strategies and creative ways to involve the campus community. Over 190 endnote references plus a wealth of helpful tips and resources are included.

Need ideas for climate action and sustainability that fit your school?

Contact National Wildlife Federation's CAMPUS ECOLOGY staff at Campus@NWF.org, www.CampusEcology.org or (703) 438-6000.

Leading the Future

If any sector of society has the potential to model the transition to a low-carbon future, it is higher education. As living laboratories wielding considerable influence and expertise, colleges and universities have been at the forefront in addressing global warming through innovative, cutting-edge energy conservation practices and clean power technologies. Author David Orr of Oberlin College says it well: "No institutions in modern society are better equipped to catalyze the necessary transition to a sustainable world than colleges and universities. They have access to the leaders of today and the leaders of tomorrow."



David J. Eagan

Turning the tide on global warming may be the most far-reaching challenge of our time, but it also is an extraordinary opportunity to create more efficient, resilient and sustainable colleges and universities—and to inspire students to commit to climate action in their lives and careers. Contrary to conventional opinion, the path to climate sustainability not only is technologically possible, but also can save substantial amounts of money and resources.

The 2% Pathway to Climate Stabilization

NWF joins other leading voices and organizations in a nationwide call to society—including higher education—to reduce carbon emissions by an average of at least 2% a year from 2005 levels. This goal will achieve a 30% reduction in carbon dioxide ($CO_{2)}$ by 2020 and 80% by mid-century. It is projected to cap CO_2 concentrations at 450 ppm and, it is hoped, avoid exceeding a 2-degree F increase in global average temperatures.

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Achieving the 2% per year goal can start with simple actions, but this call for emissions reduction on campus goes beyond small steps. Heeding the world's top scientists who warn that global warming will trigger a potential cascade of negative consequences, Campus Ecology urges bold action and critical leadership *now* and throughout the next decades. Our actions today will determine the fate of the climate for generations to come.

David J. Eagan

Students, faculty and staff from Iowa colleges and universities met at **Grinnell College** in 2007 to explore ideas for campus actions.

By committing to goal-driven climate action, campuses will:

- Reduce operating costs and generate favorable returns on clean energy investments;
- Create a buffer against uncertain energy supplies, rising costs and mandated emissions limits;
- Identify new research and service-learning opportunities;
- Prepare students for sustainability and climate leadership in their careers and communities;
- Foster a campus-wide ethic of environmental stewardship;
- Show leadership that will appeal to present and future students, parents and donors.

The Case for Climate Action Leadership in Higher Education

Colleges and universities are like towns or small cities in their size, environmental impact and financial influence. Roughly 1,000 schools in the U.S. have 5,000 students or more; some, counting faculty and staff, have weekday populations of over 60,000. In all, the nation's 4,100 campuses educate or employ around 20 million individuals. The economic clout of these schools is further multiplied by the hundreds of thousands of business suppliers, property owners, and other commercial and nonprofit entities associated with higher education.

"You can align profitability and social responsibility, and there is no reason we can't integrate concerns about long-term sustainability into every business decision that we make."

—Deborah Merrill-Sands, Dean, Simmons College School of Management (MA)

The nation's two- and four-year colleges and universities have a measurable impact on the U.S. economy and its greenhouse gas emissions. Collectively, they spend over $360 billion annually and hold roughly the same amount in endowment investments. The higher education sector represents about 3% of U.S. GDP and 2% of the workforce.

Institutions of higher learning have considerable influence over ideas, too. Starting in the 1970s, environmental activism on campuses helped steer the national conversation toward issues like clean air and water. It took a long time for schools to turn the spotlight on themselves, but now hundreds of campuses are integrating sustainability principles into their planning, operations, course offerings and research. Increasingly, terms like "environmental stewardship" and "sustainability" are appearing in college mission statements, master plans and press releases, with global warming often noted as the basis for intensified action. Across the country, energy conservation and capital improvement plans are being created based on measurable targets and timetables, with the goal of reducing the net campus footprint 80% or more by 2050—or sooner.

Campus Climate Footprint

From a climate standpoint, colleges and universities can be thought of as clusters of energy-consuming buildings, ranging from weekday-only classrooms and offices to energy-intensive research labs that operate 24/7. The quarter-million campus buildings in the U.S. currently have an operating price tag of $20 billion a year, or around $5 million per campus.

Oberlin College News Service

Adam Joseph Lewis Center for Environmental Studies, **Oberlin College.**

Buildings are by far the largest factor in the carbon "footprint" of most institutions, typically accounting for 70–90% of a school's greenhouse gas emissions. The majority of this CO_2 comes from campus heating/cooling plants and purchased electricity. Other sources include campus fleet vehicles, refrigerants, commuters, air travel and purchased goods.

But there are promising trends toward greater efficiency in heating, cooling, lighting and water consumption. New state-of-the-art "green buildings" are becoming campus showcases, as well as laboratories for learning. The Adam Joseph Lewis Center at **Oberlin College** (OH) is a prominent example with its zero-waste, energy-neutral design that integrates both the building and landscape into a super-efficient whole.

Opportunities for Campuses

Addressing climate change presents unique challenges, but offers five important opportunities:

1. **Returns on investment.** Energy conservation and other sustainability initiatives cut emissions and costs, with savings compounding year by year. Over the past ten years, energy-efficiency savings at the **University of California, Santa Barbara** have totaled over $36 million. Starting in the 1970s, the **University of Michigan** has saved over $78 million through energy conservation measures. And the **University of Alaska Anchorage** spends $2,000 less each year simply by using "greasel" (biodiesel) made from waste cafeteria cooking oil to fuel its one recycling truck. Many more examples are in the pages ahead.

2. **Minimizing unpredictable energy costs and supply.** In the past decade, energy prices have soared—a trend that is likely to continue. And when new structures are built, campus energy use goes up a notch, offsetting attempts to conserve. New construction at the **University of Wisconsin-Madison** from 2001 to 2006 increased campus square footage by 7%, while energy costs rose 77%.

   Cutting both energy demand and dependence on fossil fuels are ways to hedge against future volatility in costs and supply. This strategy worked for **Concordia University** (TX), which buys 100% renewable electricity through its local utility. In 2001, it locked into a fixed price for its mix of wind, biogas, hydro and solar power. At first the cost was slightly higher per kWh, but currently is 0.78 cents less per kWh due to fuel cost increases for conventional electricity.

3. **Hedging against legal uncertainty.** Most of the scientific community and much of the public are now convinced that global warming is a reality. Although its potential consequences are much less clear, many parties believe that regulation of greenhouse gases is inevitable. Campuses choosing efficiency, renewables and lower emissions not only are fiscally responsible but also can stay ahead of the regulatory curve if tighter limits on energy use are imposed. Already, **California** requires all companies, agencies and institutions in the state to reduce global warming emissions by 25% from 2006 levels. **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. **Ohio**, **Massachusetts** and **New Jersey** also have mandates affecting campuses.

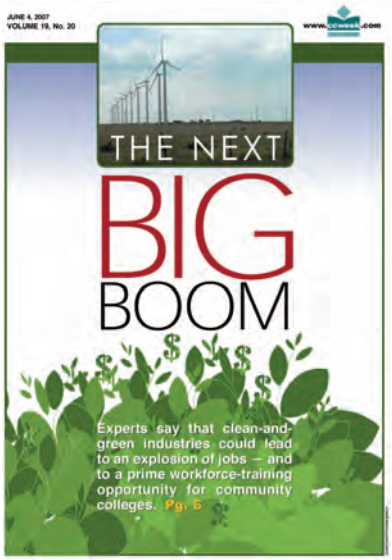
4. Educational, research and career opportunities. Climate change and sustainability are hot topics on campuses today—from guest speakers and new majors to large-scale research and teaching initiatives. New or revamped programs in renewable energy, global warming science, environmental economics and sustainability are attracting a growing number of students and teachers, as well as increasing investment in research and job training.

"I think young people are critical for success in climate stabilization. . . . So it's really important to train and develop multigenerational leadership models that are sustainable. You want the people who come right after your heroic victory to achieve their own. . . . Solving climate change is going to take one historic victory after another for the next hundred years."

—Michel Gelobter, author, *Changing the Social Climate*, 2006

To cite a few examples: At **Boston Architectural College** (MA) students can earn a Sustainable Building Design Certificate. **Illinois State University** offers a new multi-disciplinary bachelor's degree in renewable energy. **Aquinas College** (MI) launched a sustainable business major with concentrations in science and environmental studies. The **University of California, Berkeley** offers bachelor's, Master's and Ph.D. degrees in energy and resources.

One study shows that a national economy committed to 20% renewable energy could create 164,000 new jobs by 2020. Similarly, the Renewable Energy Policy Project estimates that 43,000 firms could create more than 850,000 new jobs if all components needed for the wind, solar, geothermal and biomass industries were made in the U.S.—a projected $160 billion manufacturing investment. Community and technical colleges are stepping up to meet that workforce training opportunity with programs in clean energy technology.



Pam Barrett, Publisher

Community College Week newspaper (June 2007) predicts an explosion of jobs in renewable energy, and urges campuses to meet that demand.

5. New funding sources. Government agencies and private foundations are expected to invest heavily in basic science, new technology development, educational initiatives and health-related research—all prompted by predicted consequences from climate change. Schools that become leaders in climate awareness and action may also attract new gifts and donations from alumni and other donors. At **Arizona State University**, a long commitment to environmental issues helped attract a $15 million gift from an ASU Foundation board member to launch the Global Institute for Sustainability and, subsequently, another $10 million to start ASU's new School of Sustainability.

Stepping Up: Strategies for Climate Action

Reducing the campus carbon footprint begins with a clear roadmap. While some schools have worked on energy conservation for decades, most are just beginning to chart comprehensive paths to a low-carbon future. Four steps are recommended to ensure success over the long term:

1. Establish an institutional commitment to reduce greenhouse gas emissions. A formal commitment provides the guiding authority and is often the starting point for campuses to begin planning for climate action. A high-level commitment to reduce campus emissions sends a clear signal to staff, students and faculty—and the more stakeholders involved in the policy decision, the more widely it will be accepted.

The **Middlebury College** (VT) Board of Trustees—having received a strong proposal and more than 1,250 signed endorsements from 70 different departments, teams, clubs, residences and individuals—committed the college to climate neutrality by 2016. The **University of New Hampshire** is committed to being a "Climate Protection Campus," as well as a model sustainable community in the state and region. It integrates the ethics, science, technology and policies of greenhouse gas reductions into the university's identity and practices. Four **University of Wisconsin** system chancellors—from the Green Bay, Oshkosh, River Falls and Stevens Point campuses—recently committed their schools to become energy independent by 2012.

Ball State University Photo Services

The new LEED-certified David Letterman Communication and Media Building at **Ball State University** (IN) honors their famous alumnus and financial supporter.

"Sustainability is now recognized as one of UNH's core identities and strengths with faculty, staff and students from many disciplines working together in new and innovative ways to advance a common goal."

—Mark Huddleston, President, University of New Hampshire, 2007

2. Build a climate action team. It takes creative, coordinated effort from staff, faculty, students and other stakeholders to analyze and implement climate solutions. Campus environmental councils, committees and task forces contribute know-how and a range of perspectives, and cultivate buy-in for proposed ideas. Climate teams should include campus operations staff and financial decision-makers, as well as others committed to cutting energy, emissions and costs. Many schools have hired sustainability coordinators or climate/energy specialists—which calls for a financial investment, but often pays major dividends in influencing climate action and providing continuity over time. At **Yale University** (CT), for example, an outreach staff member who was recently added to the sustainability team is having great success enlisting support from students and employees to reduce energy consumption in residence halls and offices.

Campus Ecology encourages all campus leaders to consider formalizing their carbon reduction goals by signing the **American College** and **University Presidents Climate Commitment** (ACUPCC), sponsored by Second Nature, Eco-America and AASHE, and endorsed by 25 organizations including the National Wildlife Federation. Visit www.PresidentsClimateCommitment.org

3. Conduct a greenhouse gas inventory. Calculating campus greenhouse gas emissions provides a benchmark for measuring progress toward the goal of reducing 2% or more per year. An inventory shows the biggest sources of emissions—which are also the biggest opportunities for reduction. For consistency, NWF recommends using the ***Clean Air–Cool Planet*** emissions inventory protocol (**www.cleanair-coolplanet.org/toolkit**) with its Campus Carbon Calculator.

4. Develop and implement a climate action plan.* While some campuses work on climate action "project to project," a formal plan is likely to yield greater results. It provides comprehensive cost-benefit analyses, gives clear direction and shows how a set of projects will work together over time. Key parts of a plan include: emission reduction goals; specific projects to implement emissions reduction including a full cost and lifecycle analysis for each project; and an implementation strategy that covers project priorities, timelines, benchmarks, and responsible personnel, plus addresses emissions "inflation" due to campus expansion. Exemplary planning documents can be accessed online for the **University of California, Berkeley** and **Middlebury College** (VT).

**Campus Ecology will soon release its "Guide to Climate Action Planning: Pathways to a Low-Carbon Campus," a comprehensive overview of the climate planning process featuring many campus examples.*

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
RESIDENCE HALLS			
Mudd-Blaisdell	65,496	888,951	14
Wig Hall	25,200	184,955	7
Harwood Court	63,100	339,434	5

kWh = Kilowatt hours

WHERE TO FOCUS PLANNING EFFORTS?

... Top 5 for a Fast Start

"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 (MA)

These five campus-tested strategies, ranked in order of emissions-saving potential, can lead to significant savings of both money and CO_2.

1. **Convert to carbon-neutral or lower-carbon energy sources (2-70% emissions savings).**
   Because fossil fuels are the primary contributors to campus emissions, switching to zero-carbon or low-emissions options like wind, solar and geothermal—whether installed on campus or purchased from the power company—can result in the greatest cuts in CO_2.

2. **Update efficiency of heating, ventilation and air conditioning (HVAC) (2-30% savings).**
   Here the goal is to target the biggest users of energy first, such as laboratories, swimming pools and older buildings. A building audit will determine the proper size system for current needs. Continuous commissioning keeps everything working at peak efficiency.

3. **Scale back heating, cooling and lighting demand (2-20% savings).**
   Some options, like changing thermostat settings, removing unneeded lights or closing unused spaces and buildings, require little or no upfront capital.

4. **Reduce plug loads (2-20% savings).**
   Increasing numbers of machines and devices are putting a strain on campus electrical supply networks. A combination of technological (lighting sensors, power-down software, Energy Star-rated equipment) and behavioral changes can cut overall demand.

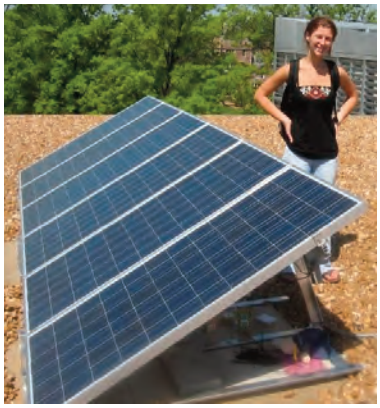
5. **Wise campus planning (priceless).**
   Comprehensive climate-based planning leads to greater levels of fiscal accountability, energy security and improved stewardship of resources. The commitment to take action sooner rather than later will lead to smart decisions and significant long-term emissions reductions.

Implementing Solutions

Deciding which projects to undertake boils down to one question: Does it cut emissions of CO_2 enough to meet campus goals? Here are just a few campus examples—the main report, "Higher Education in a Warming World" (**www.nwf.org/CampusEcology/BusinessCase**) has many more.

Energy Efficiency

At **Penn State University** (PA), a multi-campus retrofit of buildings is underway. This performance contract initiative is on track to cut total emissions by 2% a year, or 12% by 2012. **Texas A&M University's** campus-wide Metering, Retrofits and Continuous Commissioning Program cut energy consumption 33% per square foot and has saved more than $50 million in electricity, chilled water and hot water costs since 1996. Eight efficiency projects at the **University of North Carolina at Chapel Hill** saved $365,000 annually, with paybacks ranging from immediate to eight years. **Tufts University** (MA) installed "vending misers" on 90 vending machines and cut electricity consumption in half for an estimated savings of $17,000 annually.



Washington University in St. Louis

Solar PV panels on the roof of Olin Library, **Washington University in St. Louis**, 2006.

On-Campus Clean and Renewable Energy

The most promising path is the adoption of renewable energy sources that produce no net release of greenhouse gases. And the fuel for renewables is either free or lower cost than fossil alternatives, with price and supply more stable. **Butte Community College** (CA) saves $300,000 a year with its 1.06 megawatt solar PV system. The **Los Angeles Community College District** plans to install enough solar panels to take its nine campuses off the electric grid. **Monmouth University** (NJ) has the largest solar array east of the Mississippi, producing 6% of campus electricity needs and saving $150,000 in costs annually.

A wind turbine on the skyline makes a dramatic statement, and can generate power 24 hours a day. A commercial-scale, 1.6 MW wind turbine at **St. Olaf College** (MN) provides one-third of the school's electricity needs and saves $300,000 a year in utility costs. **Lakeshore Technical College** (WI) taps into the winds off Lake Michigan for about 3% of its electricity needs. The **Massachusetts Maritime Academy's** turbine saves $160,000 annually.

Geothermal heat pumps can be installed nearly anywhere to tap into the earth's steady temperatures. Such systems can heat and cool single buildings—or an entire campus. **Richard Stockton College** (NJ) has one of the country's largest closed-loop geothermal HVAC systems, providing 1,740 tons of heating and cooling capacity. **Hamilton College** (NY) added a geothermal system to its historic Skenandoa House residence hall, cutting energy consumption by 60% per square foot.

The first colonial campuses in the U.S. used biomass energy: firewood. Today, a biomass heating plant at **Mount Wachusett Community College** (MA) uses woodchips to supply 85% of campus heating needs. The **University of Idaho** burns forestry waste to cover 90% of its heating needs—at a quarter of the cost of natural gas. The **University of Iowa** replaced half of its coal with waste oat hulls for a savings $750,000 a year in fuel costs.

Green Buildings

Although often slightly more costly to build, green buildings are a bargain over their lifetimes. A new residence hall at the **University of South Carolina at Columbia** is larger than its sister hall, but costs 45% less for energy. **Harvard University's** (MA) renovation of a historic building earned the coveted LEED (Leadership in Energy and Environmental Design) Platinum certification. Across the U.S., hundreds of campus buildings are being built to LEED standards.

And More ...

Other important categories featured in the main report for emissions-reducing campus climate action are **transportation**, including fuels used in fleet vehicles, campus mass transit, car sharing, bicycling; **co-generation** to efficiently produce power and heat; purchase of **renewable energy credits** (RECs); and **protection and restoration of natural areas and wildlife habitat**.

FINANCING CLIMATE ACTION

To fund climate action, campuses are leveraging a variety of strategies including:

- **Performance contracts in which a private company finances and builds a project, and makes a profit based on project savings;**
- **Utility and government incentives such as rebates, subsidies, and grants;**
- **Student-led initiatives in which projects are funded through self-assessed fees;**
- **Revolving loan funds that provide zero- or low-interest loans for campus projects with short paybacks;**
- **Endowments which offer long-term stability as revenue sources;**
- **Individual action such as personal CO_2 offsets, and;**
- **Partnerships with local businesses—such as offering student discounts on energy-efficient bulbs and appliances.**

For examples, see www.nwf.org/CampusEcology/BusinessCase

References

Complete citations for all information in this document can be found in the full report *Higher Education in a Warming World* (**www.nwf.org/CampusEcology/BusinessCase**). See corresponding sections in the report to locate the appropriate endnotes.

ABOUT CAMPUS ECOLOGY

Since 1989, the National Wildlife Federation's Campus Ecology program has been at the forefront of promoting climate leadership and sustainability on colleges and universities nationwide. It offers expert assistance through its staff, publications, workshops, fellowship programs and web-based resources. In 2007, it launched a new initiative to recognize and cultivate **CAMPUS CLIMATE CHAMPIONS**—schools that demonstrate significant emissions reductions and engage their peer institutions, communities and elected officials in tackling global warming. Visit **www.CampusEcology.org**

Campus Ecology works with many partner organizations, including Energy Action Coalition's Campus Climate Challenge, Clean Air–Cool Planet, Association for the Advancement of Sustainability in Higher Education (AASHE), Leadership in Educational Facilities (APPA), and Society for College & University Planning (SCUP).

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