

Ferman Milster, associate director of Utilities and Energy Management.

“We’ve saved a quarter of a million to one million dollars a year, and we’re not increasing the global inventory of CO<sub>2</sub>,” Milster said. “It provides the university with a local business partnership where we’re both benefiting — Quaker gets money for oat hulls, and we get a source of fuel.”

Milster said the university spent two years developing, testing and getting permits for the separate fuel system added to the boiler for the purpose of burning hulls.

Since its installment, emissions of sulfur dioxide, carbon monoxide, nitrogen oxide, volatile organic compounds and particulate matter have decreased. Additionally, Milster said the university is in the process of adding the hull-burning fuel system to its second boiler.

Currently, energy generated from the burning of oat hulls accounts for 13 percent of University of Iowa’s total purchased energy.

## THE GRID

Comparing Big Ten schools on the basis of energy use comes with many caveats. Each school is unique and has different programs to achieve maximum efficiency.

One such caveat is that some universities have their own power plants. These schools, unlike those that purchase energy from outside companies, have the power to implement programs that control pollution and

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the university’s carbon footprint.

Some schools are signing up to take part in the Chicago Climate Exchange, the world’s first legally binding greenhouse gases registry, reduction and trading system. Members make a voluntary but legally binding commitment to reduce their production of greenhouse gas emissions by 1 percent each year.

Member universities include Tufts University, Michigan State University and the universities of Oklahoma, Iowa and Minnesota. Businesses that are members include Ford Motor Co., IBM, Motorola, non-governmental organizations and even cities. Universities that buy their energy from outside sources, however, cannot vouch for how it is produced.

But there are many other caveats to how each Big Ten school — indeed, each university in the world — makes its energy decisions, ranging from differences in power plant machinery and available funding to

proximity to natural resources and the existence of high-consumption buildings like hospitals and large laboratories. These variables leave moot any ranking of university energy efficiency, but they don’t negate the importance of questioning the manner in which these “mini cities” power their campuses — the very places where cutting-edge research on energy efficiency occurs. ☞

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## Innovative environmental initiatives in the Big Ten



### UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN

The University of Illinois at Urbana-Champaign is purchasing three utility-scale wind turbines. According to sustainability coordinator Matt Malten, this facility will be one of the first university-owned, multi-turbine, on-campus wind farms in the nation.

The ability to purchase the turbines, which will provide approximately 3 percent of the campus’ total energy consumption, was made possible in part by a student initiative, which raised and committed \$30,000 for the project. In 2003, the U of I became the first school in the state to institute a student fee in support of clean energy.

The fee will also be used to support:

- Purchase of a solar photovoltaic array and two green roofs for the new Business Instructional Facility, which is currently under construction.
- Design, construction and installation

of a reactor that will convert waste food grease from campus dining facilities into biodiesel for use in the university’s fleet.

- Support the campus research project on Miscanthus, a perennial grass that can be used as a renewable energy source; long-term plans are to plant 1,000 acres and to build a new boiler to use the Miscanthus as a supplemental fuel. —*Jessica A. Knoblauch*



### INDIANA UNIVERSITY

Indiana University has several innovative projects in the planning stages, including green buildings, composting and alternative fuel sources.

While the university claims to meet Green Building Council standards in the construction of new buildings and the renovation of older facilities, it is not yet taking part in the official program.

In addition, IU promotes carpooling among staff and faculty with cheaper parking permits for cars transporting three or more people. The university also facilitates

carpooling by finding people who travel to campus from the same origin.

The campus buses also use alternative fuel sources to reduce emissions.

—*Matthew Hund*



### UNIVERSITY OF IOWA

The University of Iowa’s Biomass Fuel Project helps decrease the amount of coal burned to provide energy while creating an environmentally friendly use for thousands of tons of oat hulls, a by-product of cereal manufacturing.

Unlike coal, burning oat hulls doesn’t result in new carbon dioxide emissions. The carbon dioxide released into the atmosphere equals the amount absorbed by the plant as it grew. The total amount of carbon stays the same. When fossil fuels are burned, additional carbon buried underground in coal and oil is released into the atmosphere.

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# Big Ten innovative environmental initiatives cont'd

The university has been replacing some coal with oat hulls since 2002. In 2005, more than 27,000 tons of oat hulls were consumed, accounting for 13 percent of the university's total purchased energy.

The University of Iowa's Combined Heat and Power (CHP) facility allows co-generation, a process that creates two sources of energy from one natural resource. The system works by running steam through a turbine generator, which turns a compressor, producing both thermal energy and electric power, according to Ferman Milster, associate director for utilities and management.

"This way you get two uses out of the steam, both heat and power," Milster said.

The steam, electric power and chilled water created by the system are distributed through a network of underground pipes and electric cables. The thermal energy heats and cools buildings, while the electric energy powers buildings.

According to Milster, the CHP facility's efficiency is about 60 to 80 percent, a dramatic improvement over the efficiency of separate heat and power systems.

The plant co-generates about 30 percent of the campus' total electric power needs, according to the university's facilities management Web page. —*Jessica A. Knoblauch*

## UNIVERSITY OF MICHIGAN

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University of Michigan's campus power plant burns natural gas to do two things at once — generate electricity and heat water into steam. This process, known as co-generation, reduces the electricity required on campus by using steam — instead of electricity — to heat campus buildings. By using less fuel, the university saves money and improves air quality.

U of M also has 250 ethanol-based vehicles on campus, including hybrid cars. All buses and service vehicles use biodiesel. This cuts down on emissions, protecting air quality.

The Wolverines also boast one of four buildings in the Big Ten certified by the Green Building Council, the S.T. Dana Building. This facility uses solar power for energy and skylights to reduce the amount of synthetic light required. —*Matthew Hund*

## MICHIGAN STATE UNIVERSITY

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In 2006, Michigan State University joined the Chicago Climate Exchange, a voluntary cap-and-trade program designed to lower greenhouse gas emissions, and has several projects underway to meet the requirements. They are: preparing to burn alternative fuel sources, including cornstarch waste, animal bedding waste and the sludge left behind after treating sewage; burning coal with a specialized boiler that reduces sulfur oxide and nitrogen oxide levels; using of low-sulfur coal; and using steam to create both thermal energy to heat buildings and electricity to power buildings, a process called co-generation.

MSU is also experimenting with "green roofs," flat roofs covered with a membrane and the plant *Sedum*, which decrease energy costs and filter pollutants. —*Matthew Hund*

## UNIVERSITY OF MINNESOTA

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The University of Minnesota's power plant burns oat hulls in place of fossil fuels to power the campus, reducing the production of carbon dioxide.

"Oat hulls burn extremely well, and they burn clean," said Jerome Malmquist, director of energy at the university.

Though the university's current boiler configuration requires that oat hulls be mixed and burned with coal, the ultimate goal is to burn them with natural gas or by themselves. "Though we're still burning some fossil fuels with the hulls, the savings in fuel costs are enormous," Malmquist said.

The university also has an on-going green lights program to change out older, less efficient lighting as buildings are remodeled. Switching to lower-watt light bulbs and using more efficient fixtures saves the university energy and money.

—*Jessica A. Knoblauch*

## NORTHWESTERN UNIVERSITY

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To reduce overall energy use,

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Photos courtesy of Photo Services at the University of Michigan

Solar panels adorn the roof of the LEED-certified Dana Building on the University of Michigan campus. Innovations like these reduce financial cost to the university, as well as its ecological footprint.



The Dana Building at the University of Michigan is specifically designed to be ecologically friendly.

# Innovation: Continued from page 18

Northwestern purchases only Energy Star-rated equipment and is installing sensors in 7,800 of its rooms to shut off lights when the rooms are empty. The university also hired a consultant to reduce the number of light fixtures around campus, both indoors and outdoors.

Current campus policy dictates that every new building erected by Northwestern must be certified by the Green Building Council. Today, Northwestern has one completed certified building — the Ford Engineering Design Center.

A majority of Northwestern's energy comes from a co-generation plant, and a large percentage of the remainder comes from wind power. Northwestern is also investing in alternate fuel research.

—Andrew Price



## OHIO STATE UNIVERSITY

Ohio State University is working toward owning two buildings certified by the Green Building Council before 2010 — the Nationwide and Ohio Farm Bureau 4-H Center and the Ohio Union. In addition, a proposal is underway to require all building projects at OSU to incorporate Green Building Council standards.

OSU has also begun conducting energy audits in campus buildings to assess areas where energy costs can be reduced. At the power plant, higher-efficiency boilers have been installed, and plans are underway to allow co-generation and alternative fuel source burning. —Andrew Price



## PENNSYLVANIA STATE UNIVERSITY

Penn State earned Green Building Council certification for two campus buildings — the Stuckeman Family Building and the Forestry Building.

Student and faculty engineers constructed an 18-foot portable solar array, totaling 30 53-watt panels that transfer energy to 12 photovoltaic gel batteries. Tied to the grid, the Center draws some of its energy use from the array. The university's Office of Physical Plant also utilizes solar energy.

On the university's main campus farm,

**Over the past five years, the University of Wisconsin-Madison has invested more than \$29 million in energy conservation projects, including upgrades to central chillers and boilers, 200,000 high-efficiency fluorescent light bulbs, 10,000 occupancy sensors and 3,000 water-saving plumbing fixtures.**

crops are fertilized by compost recycled from 1,900 tons of food waste collected from the university's cafeterias. All farming equipment runs on biodiesel fuel, and the electronic equipment draws power from on-site solar panels. Some renewable energy is also purchased to meet the farm's needs.

Penn State also participates in the American Indian Housing Initiative, which uses environmentally sound technologies to build affordable homes on Native American reservations. The university also competes in the Solar Decathlon, a program in which schools design, build and operate solar-powered homes judged on their aesthetic features and energy efficiency. —Andrew Price



## PURDUE UNIVERSITY

Purchasing vehicles that run on alternative fuels is mandatory at Purdue University's motor pool. The university will only consider purchasing vehicles capable of running on a fuel mixture that is 85 percent ethanol, 15 percent gasoline. All 120 vehicles in the current motor pool run on the corn-based fuel.

Additionally, the university owns a nine-vehicle fleet fueled by 5 percent biodiesel. The six motor coaches, two school buses and one transit bus operate during student events.

Two gasoline-electricity hybrid sedans are

being tested by the motor pool for fuel efficiency and operational convenience, which will be based on passenger feedback.

Also to be tested, this time by the university's power plant on the Wade campus, is biomass co-firing. Technicians will be adding switch grass to the coal, which burns to heat the electricity-producing boiler. As of the Spring '07 semester, the switch grass is still growing, but will be harvested and used as soon as possible, said Erick Van Meter, Purdue's director of utilities. The university will then evaluate its efficiency and consider implementing it on a larger scale.

Purdue also just retrofitted all of its West Lafayette, Fort Wayne and North Central campus lighting systems. Low-energy light bulbs, mostly halogen, have been installed in most fixtures, as well as motion sensors in a few rooms, Van Meter said.

—Andrew Price



## UNIVERSITY OF WISCONSIN, MADISON

The University of Wisconsin-Madison's "We Conserve" program focuses on reducing campus energy consumption per square foot by 20 percent by 2010.

"We believe sustainability cannot happen without maximizing energy conservation," said Faramarz Vakili, energy conservation program director.

UW-Madison is also a participant in the Wisconsin Energy Initiative, which was established in 1992 to increase the energy efficiency at state facilities.

Over the past five years, the university has invested more than \$29 million in energy conservation projects, including upgrades to central chillers and boilers, 200,000 high-efficiency fluorescent light bulbs, 10,000 occupancy sensors and 3,000 water-saving plumbing fixtures.

For these efforts, the university was awarded the U.S. Energy Association's 2004 Energy Leadership Public Service Award. —Jessica A. Knoblauch

**Matthew Hund, Jessica A. Knoblauch and Andrew Price** are first-year graduate students in the environmental journalism program at MSU. These vignettes on Big 10 universities are the second *EJ* appearance for Matthew and Andrew and the third for Jessica. Reach Matt at hundmatt@msu.edu, Andrew at pricean1@msu.edu and Jessica at knoblauch7@msu.edu.