



Center for Sustainable Systems

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University of Michigan Energy Consumption and Conservation

factsheets

As an academic institution with over 27 million square feet of building space for 34,300 faculty & staff and 39,500 students,¹ the University of Michigan consumes a substantial amount of energy to maintain daily operations. Realizing the environmental and fiscal burden of energy consumption, UM has long been committed to maximizing conservation of electricity and fossil fuels. It is estimated that UM has accumulated over \$78 million in energy cost savings during the past three decades. This factsheet highlights the University's conservation effort and its energy consumption pattern as computed by the Environmental Data Repository.²

Energy Conservation and Renewable Energy Efforts

- The Central Power Plant (CPP) is a combined-cycle cogeneration plant that generates electricity and steam by burning natural gas. By using exhaust steam for buildings, the fuel efficiency of the CPP is approximately 86 percent, compared to a fuel efficiency of approximately 40 percent for most private utility plants. In 2002, CPP received the EPA Energy Star Combined Heat & Power Award for significant fuel energy savings.
- UM has been a partner of the EPA Energy Star Buildings Program³ since 1997. During the past decade, UM has implemented several cost-effective projects to increase the energy efficiency of its buildings. For example, the Green Lights program replaced old lights in buildings with more energy-efficient ones. In recognition of energy savings, UM received the "Leadership in Energy Management" award from Energy Star in 2004.
- Direct Digital Control is utilized to control heating, cooling, and ventilation systems of buildings. Microprocessor technology detects the building's environment and calculates the optimal response for the system to maintain the desired settings, thereby achieving greater energy efficiencies.
- The Plant Department works with building occupants, plant maintenance personnel, and facilities planning & design personnel to identify and implement effective energy conservation projects, such as installing a new halide lighting system in the Hatcher Library Grand Reading Room.
- The Dana Building was LEED®-certified at the gold rating by the US Green Building Council in 2005. Photovoltaic panels installed on the roof of the Dana Building generated 35MWh of electricity in 2005. A contract was also signed with Renewable Choice Energy to provide wind-generated electricity for the Dana Building in 2005 and 2006.⁴
- The design of the future UM C.S. Mott Children's and Women's Hospital has embraced energy conservation elements and will seek LEED® certification.⁵
- For over eight years, UM has been purchasing fuels made from renewable sources for its fleet. There are now over 470 flexible-fuel cars that run on E85 ethanol fuel, and all the M-bus and trucks are powered by B20 bio-diesel and ultra-low sulfur diesel.⁶
- The M-Ride program which allows UM faculty, staff, and students to ride Ann Arbor Transportation Authority (AATA) buses without paying a fare, was launched in August 2004 to encourage the use of public transportation for commuting within Ann Arbor and Ypsilanti. Vanpooling service has also been available to faculty and staff members living in nearby communities since the 1970s.
- Energy Fest has been organized annually since 1996 to raise public awareness about sustainability issues and to demonstrate UM's commitment to energy conservation, efficiency, and alternative technologies. It includes exhibits from several UM departments (e.g., Plant Operations division, Occupational Safety Environmental Health, Center for Sustainable Systems), student organizations (e.g., UM Solar Car Team), private businesses (e.g., DTE Energy), and local government (e.g., Ann Arbor Transportation Authority).



¹ FY2005 data obtained from Office of Budget and Planning (http://sitemaker.umich.edu/obpinfo/facts___figures)

² Environmental Data Repository project can be viewed at http://css.snre.umich.edu/css_doc/CSS05-11.pdf

³ More information about the program can be obtained at http://www.recycle.umich.edu/utilities/energy_management/EnergyStar

⁴ Elizabeth LaPorte. Winds of change at Dana Building. University Record. http://www.umich.edu/~urecord/0405/Jan10_05/21.shtml

⁵ The latest news from the Mott Hospital can be accessed via <http://www.med.umich.edu/opm/newspage/2006/mott.htm>

⁶ E85 is a blend of 85% ethanol made from agricultural products and 15% gasoline, B20 is a blend of 20% soy-based bio-diesel and 80% regular diesel, ultra-low sulfur diesel has sulfur content less than 15 parts per million.

Energy Consumption & Accomplishments

- In 2005, UM consumed over 7.8 trillion Btu of total energy.⁷ This includes consumption of 497,300 MWh of electricity bought from utilities, 5 billion cubic feet of natural gas, and 800,000 gallons of gasoline and diesel. The amount of energy consumed can power 42,000 Midwest households for a year.
- While the UM population grew 1.6% to 73,847 in 2005, the per capita energy consumption grew 1.7% to 18.31 barrels of oil equivalent/person, or 106 MBtu/person. This increase was partly due to the building of the Life Sciences Institute.
- Energy from renewable sources accounts for 0.3% of energy consumed by UM.

Buildings Energy Consumption

- 99% of the total energy was consumed by the 538 buildings owned by UM. With over 27 million square feet of building spaces, it is equivalent to 278,216 Btu/ft² in 2005 up from 270,768 Btu/ft² in 2004. The percentage of conditioned building spaces increased from 45% to 62% at the same time. Despite this growth, the rate of energy use (Btu/ft²) is 20% less than that in the 1970s.
- The Central Power Plant (CPP) consumed about 80% of the natural gas bought by UM. The CPP uses 18% less fuel than comparable on-site thermal generation and purchased electricity.⁸ Because of its higher efficiency, the CPP also reduces greenhouse gas emissions. (More information in *UM Emissions factsheet*)⁹
- Energy Star Buildings Program was fully implemented in all major buildings in 2005,¹⁰ saving an estimated 25 million kWh of electricity and \$9.7 million annually.

Transportation Energy Consumption

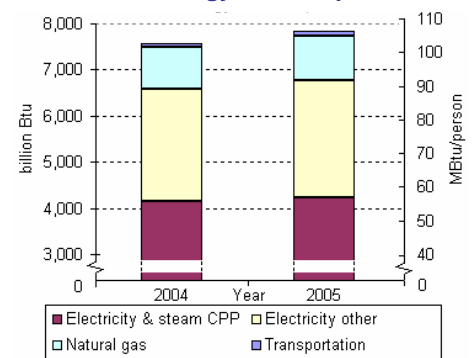
- The University's fleet of 1,100 cars, trucks, and buses consumed about 800,000 gallons of gasoline and diesel fuel per year in 2004 and 2005.
- The consumption of fuels containing renewable sources increased from 57% in 2004 to 59% in 2005. As a result, UM reduced consumption of more than 180,000 gallons of non-renewable fossil fuels in 2005.
- The M-bus accommodated 5.19 million passenger-trips in 2005, a 10% increase compared with 2004. The total bus energy consumption increased, but its energy intensity dropped from 7.5 kBtu/passenger-trip to 7.3 kBtu/passenger-trip.
- The M-ride program attracted over 1.6 million UM passenger-trips on Ann Arbor Transportation Authority (AATA) buses in 2005.

What you CAN DO to help...

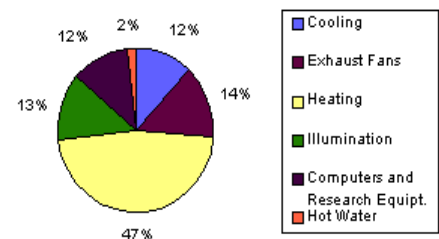
- Purchase products that have an Energy Star label.¹¹
- Consider turning off the computer if it is going to be inactive for more than 16 minutes. After 16 minutes, the energy to keep the computer running exceeds the start-up energy.¹² Utilities and Plant Engineering estimate that PC operations account for over 10% of all electricity currently used by UM.
- Switch off the lights in classrooms, offices, or restrooms when the rooms are not occupied. The energy saved by doing so far outweighs the slight reduction in lamp life.
- Commute to UM by public transit. The AATA and UM bus fleet run on bio-diesel and ultra-low sulfur diesel, and rides anywhere in Ann Arbor and Ypsilanti are free.
- Ride a bike. Make use of one of the 3,410 spaces on bike racks which are located throughout the Ann Arbor campus.
- If you live outside Ann Arbor, join the vanpool service to commute to work. In 2005, it served more than 300 UM faculty & staff living in 28 communities and logged over 5.7 million passenger-miles of travel.¹³
- Lower your thermostat in the winter and raise it in the summer.



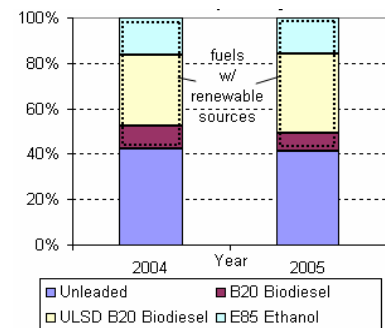
Total Energy Consumption



Energy Consumption Breakdown of a Typical UM Building



Vehicle Fleet Fuel Consumption



⁷ Total energy includes site use, plus losses for electricity grid transmission and distribution.

⁸ Brown, D. 2003. "U-M to receive EPA award at EnergyFest 2003." The University Record Online, September 19, 2003

⁹ Chan, W.C., B. Wilcox and G.A. Keoleian. "CSS Factsheets, UM Air and Water Pollutant Emissions." University of Michigan: Ann Arbor (2006): 1-2.

¹⁰ Rodriguez et al. (2002) *Sustainability Assessment and Reporting for the University of Michigan's Ann Arbor Campus*

¹¹ Energy Star products can be browsed at <http://energystar.gov>

¹² University of Michigan Plant Operations, "UM Guide to Energy Conservation, Energy Management" http://www.plantops.umich.edu/utilities/energy_management/conservation_guide.html

¹³ UM has sponsored vanpooling services since the 1970s. More info at <http://www.parking.umich.edu/fleet/vanpool.html>

