



Center for Sustainable Systems

University of Michigan
440 Church Street, Ann Arbor, MI 48109-1041
phone: 734-764-1412 fax: 734-647-5841
email: css.info@umich.edu
<http://css.snre.umich.edu>

factsheets

University of Michigan Air and Water Pollutant Emissions

While consuming 7.8 trillion Btu of energy in 2005 for daily operations in support of 34,300 faculty & staff and 39,500 students,¹ the University of Michigan contributes to on- and off-site air and water pollution. As an environmentally-conscious university, UM continuously explore ways to cut emissions and reduce its effect on global warming while meeting the needs of the UM community. Various programs have been implemented to conserve energy and promote the use of renewable energy during the past decades. This factsheet highlights the University's effort in reducing air and water pollutant emissions and its accomplishments as computed by the Environmental Data Repository.²

Pollutant Emission Reduction Efforts



- The Central Power Plant (CPP) is a combined-cycle cogeneration plant that burns natural gas to produce steam and electricity that are used to heat and power buildings across campus. By using the exhaust steam for heat, the fuel efficiency of the CPP is twice as energy-efficient as conventional thermal-electric power plant. Natural gas also burns cleaner and emits less SO₂ and other harmful pollutants than coal. The CPP supplies half of the campus electricity demand and realizes significant pollutant emission reductions compared to buying electricity from the grid. Visible emissions from the CPP smokestacks are the excess water vapor from steam production.³
- UM has been a partner of the EPA Energy Star Buildings Program⁴ since 1997. Over a 7-year period, lighting and ventilation systems of the major buildings were optimized to reduce energy consumption, thereby reducing greenhouse gas emissions.
- 33kW photovoltaic panels were installed on the rooftop of the Dana Building during its renovation. UM contracted Renewable Choice Energy for a two-year term to supply wind-generated renewable energy certificates (RECs) to offset 50% of the emissions resulting from electricity use in the Dana Building. In addition to its renewable energy initiatives, the Dana Building was designed to be efficient and environmentally-conscious. As a result, it was LEED-certified with a gold rating by the US Green Building Council in 2005.
- UM has been purchasing fuels made from renewable sources (agricultural products like soybeans and corn) for its fleet for eight years. All the M-bus and trucks run on bio-diesel and ultra-low sulfur diesel. There are over 470 flexible-fuel cars (87% of car fleet) that can be powered by E85 ethanol fuel.⁵ The total fuel cycle greenhouse gas emissions for these fuels are lower than the emissions from burning fossil-based fuels because the burning of these fuels releases only the carbon dioxide previously taken out of the atmosphere by the crops during their growth.
- UM has several programs to encourage its community to commute using public transportation and thus reduce tailpipe emissions. UM operates its own free bus service, M-bus, to connect the central, medical, north, and south campuses. Since the 1970s vanpooling service has been sponsored by UM and offered to faculty and staff living in nearby cities.⁶ In August 2004, the M-ride program was launched; faculty, staff, and students can ride all the routes serviced by the Ann Arbor Transportation Authority (AATA) in Ann Arbor and Ypsilanti without paying a fare. Both programs have been successful, having shown large growth in ridership in the past few years.
- The Grounds Department has implemented programs to reduce road salt use since 1995. The Salt Use Improvement Team was established to develop best management practices and experiment with alternative chemicals and equipment in order to remove ice more effectively with less environmental damage. As a result, salt pollution to local water resources has been reduced.⁷
- UM voluntarily applied for the Municipal Storm Water Permit in 1995. The Storm Water Management Program was developed to eliminate storm water pollution from campus operations. UM also issues annual progress reports of the Program which can be assessed electronically at <http://www.oseh.umich.edu/stormwater/regs.html>.



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

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

³ http://www.energymangement.umich.edu/utilities/energy_management/conservation_guide.html

⁴ More information about the program can be obtained at http://www.recycle.umich.edu/utilities/energy_management/EnergyStar/

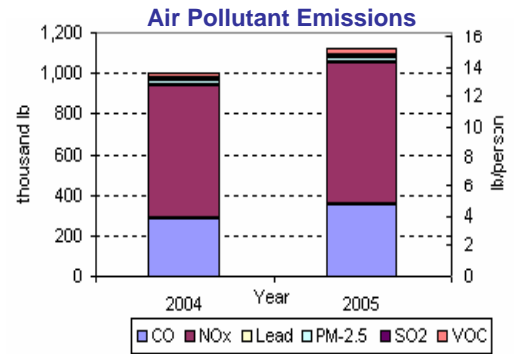
⁵ E85 is a blend of 85% ethanol made from agricultural products and 15% gasoline. B20 is a blend of 20% soy-based bio-diesel and 80% regular diesel, ultra-low sulfur diesel has sulfur content less than 15 parts per million

⁶ Latest information about the vanpooling services can be browsed at <http://www.parking.umich.edu/fleet/vanpool.html>

⁷ Information about the winter maintenance program of Grounds Department are at <http://www.oseh.umich.edu/stormwater/wintermaint.html>

Emissions and Accomplishments

- UM operations contributed greenhouse gas (GHG) emissions of 489,000 tonnes of CO₂ equivalents (CO₂Eq), or 6.62 tonnes CO₂Eq per person in 2005. The total emissions increased 2% compared with 2004, while the energy consumption increased by 3.3%. On average, US forests can sequester about 2.53 tonnes of CO₂ per hectare per year.⁸ UM owns over 5,800 hectares of forests and natural areas such as the Botanical Gardens & Nichols Arboretum in Ann Arbor, the Biological Station in Pellston, Michigan, Osborn Preserves in the upper peninsula of Michigan, and Camp Davis in Wyoming, offsetting roughly 15,000 tonnes of CO₂ emissions.
- 99% of GHG are from stationary sources, the remainder is from the University's fleet (mobile sources).

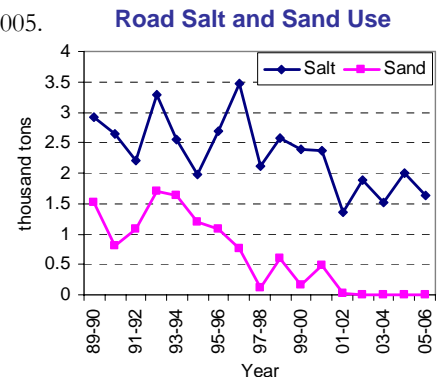


Stationary Sources

- In 2005, 160 tonnes of CO, 317 tonnes of NO_x, 1kg of lead, 12.6 tonnes of PM_{2.5}, 1.4 tonnes of SO₂, and 15.9 tonnes of VOC were emitted from stationary sources (e.g., CPP, Hoover boiler plant, UM Hospital). Compared with 2004, SO₂ emissions were cut by half, while others increased by 0-20%. The fuel consumed by CPP increased 2% between 2004 and 2005.
- The CPP uses 18% less fuel than comparable on-site thermal generation and purchased electricity, thereby annually reducing CO₂ emissions by 77,800 tonnes and NO_x emissions by 120 tons (2002 data).⁹ The emissions of pollutants such as CO and NO_x are 40% lower than the standards set by Michigan Department of Environmental Quality.
- The UM Energy Star Buildings Program is estimated to reduce consumption of 25 million kWh of electricity and \$9.7 million per year when it was fully implemented in all major buildings in 2005. It corresponds to reducing annual GHG emissions by 13,000 tonnes CO₂Eq at the current fuel mix.

Mobile Sources

- With 57-59% of the vehicle fuels containing renewable blends in 2004 and 2005, UM reduced consumption of non-renewable fossil-based fuels by 180,000 gallons and prevented 1,100 tonnes CO₂Eq of GHG emissions each year.
- M-bus served more than 5.19 million passenger-trips in 2005, a 10% increase compared to 2004. The UM population grew 1.6% during that time. The current bus engines emit at least 97% less hydrocarbons, 87% less particulate matter, and 28% less nitrous oxides than the engines from more than a decade ago.¹⁰
- The M-Ride program attracted over 1.6 million UM passenger-trips on AATA routes in 2005. This is equivalent to 21.7 rides per person per year.
- The vanpool service expanded rapidly in the past few years. The number of regular riders has increased five-fold since 1999. It served more than 300 faculty and staff living in 28 nearby communities and logged over 5.7 million passenger-miles of travel in 2005. By displacing 300 individual vehicles on the road, significant emissions are avoided.
- Although the size of campus increased over the past decade, the Grounds Department has successfully reduced the consumption of salt by 40% since 1995 and eliminated the use of sand. De-icers are applied to road surface mainly in granular form (e.g., rock salt, magnesium chloride); liquid de-icers such as brine and M-1000 are also used.



What you CAN DO to help...

- Support UM programs and initiatives in conserving energy and promoting the use of renewable energy.
- 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. Use of one of 3,410 spaces on bike racks which are located across 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.⁶
- When purchasing a vehicle, choose the one that has high gas mileage and runs on a renewable fuel such as E85 or bio-diesel.



⁸ Computed from "Inventory of US GHG Emissions and Sinks", USEPA #430-R-06-002, April 2006

⁹ 2003. "Sample Comparison of Combined Heat and Power (CHP) to Separate Heat and Power (SHP)." U-M Central Power Plant

¹⁰ Brown, D. 2001. "New University buses benefit commuters and environment." The University Record, January 29, 2001

