

Waste

RECENT ACCOMPLISHMENTS

- > **Recycling Increase** MU's recycling rate increased by 5 percent this past year and yielded more than \$86,000 from sales. MU avoided \$431,000 in waste transportation and disposal costs due to reduced landfilling and reuse of laboratory glass and chemicals.
- > **New Composting Project** In the fall of 2011 Campus Dining Services and the Bradford Research Center began construction on MU's new composting facilities with capacity to process food waste from the campus dining halls.

2012 – 2016 PLAN

- > **Recycling** Double recycling in the next five years.
- > **Compost** Increase amount of waste being composted.
- > **Zero Waste** Zero waste disposed in a landfill as a long term goal.

Food

RECENT ACCOMPLISHMENTS

- > **Local Food** Local food has grown to 14 percent of Mizzou's annual food procurement.
- > **Food Symposium** MU held a hugely successful food symposium with topics including ethanol demands, food safety and the local food movement. The university is planning another symposium in 2012.
- > **Farmers Market** Started in April 2009, MU's farmers market continues to showcase local farmers' goods the last Thursday of each month between April and October at Lowry Mall.

2012 – 2016 PLAN

- > **Local Food** Increase local food procurement to 20 percent by 2016.
- > **Community Garden** The university is planning a sustainable community garden to be located by Curtis Hall east of Sears Greenhouse. It will serve as a teaching tool and cultivate a community atmosphere on campus.
- > **Increased Awareness** Continue to provide community events like the food symposium.

Transportation

RECENT ACCOMPLISHMENTS

- > **MU Bike Resource Center** The Bike Resource Center opened this year to make bicycles a safe, affordable and viable option for commuting both around campus and Columbia. The center is open weekly and offers free bicycle repairs.
- > **WE Car** MU brought the vehicle sharing program to campus this year. For a nominal annual fee, the MU community gains access to vehicles while reducing congestion on campus.
- > **Bike Racks** Responding to increased bicycle ridership in recent years, MU has increased the number of bike racks on campus. There are now close to 6,000 bicycle parking spaces on campus.
- > **Commuter Parking** The number of commuting parking stickers issued is down 6 percent since 2007.

2012 – 2016 PLAN

- > **Mass Transit** The university has hired a mass transit consultant to assist the campus in assessing its transportation needs.
- > **Bicycle Safety** Continue to improve bicycle safety through education and awareness.

Landscape

RECENT ACCOMPLISHMENTS

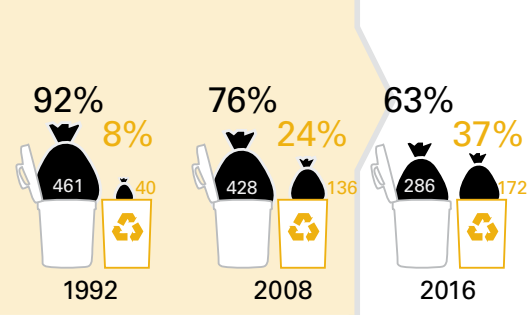
- > **Botanic Garden** The garden continues to grow in diversity and beauty. It has focused on bringing attention to plants that are pest resistant, adaptable to a variety of growing conditions and easy to maintain. Known as Plants of Merit, these plants are marked on campus by special signs.
- > **Engagement** Landscape Services has increased its engagement with the community through tree trails, three self-guided walks highlighting the diversity of trees on campus, and the Master Gardener Program that provides horticultural training to Missourians who then volunteer to help others learn about gardening and environmental education.
- > **Low Irrigation Rates** A recent MU study showed that the amount of water MU uses to irrigate the campus is extremely low relative to national averages.

2012 – 2016 PLAN

- > **Landscape Master Plan** MU will create a landscape master plan, which, among other priorities, will focus on increased Plants of Merit, increased plant and wildlife diversity, reduced irrigation and quality open space.

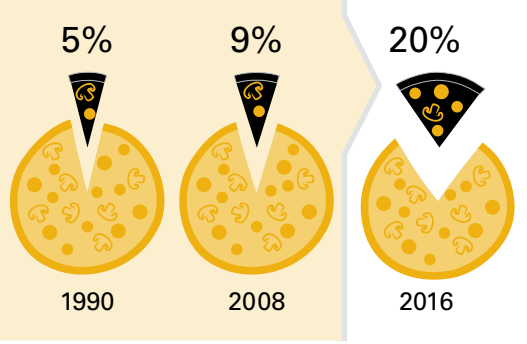
Annual Waste per Student (pounds)

Plan: 37% recycled waste by 2016



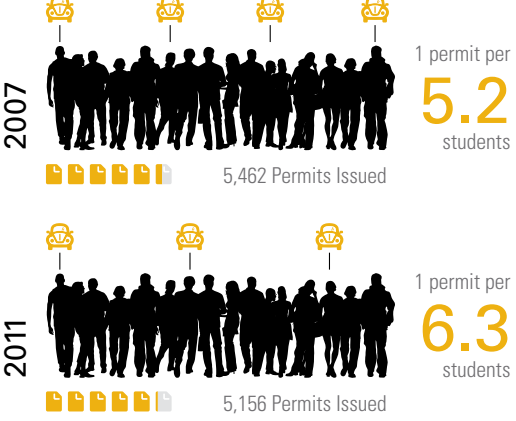
Local Food Procurement

Plan: 20% local food by 2016



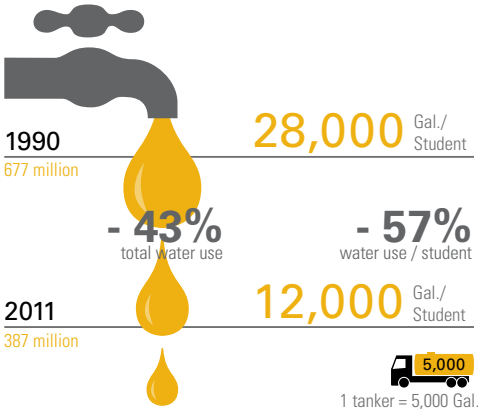
Parking Permits

6% reduction in student commuter permits since 2007



Annual Water Use (gallons)

43% reduction in total water use between 1990 and 2011



Additional Accomplishments and Plans

Education & Research

RECENT ACCOMPLISHMENTS

- > **Mizzou Advantage Sustainable Energy Initiative** Within this program, Energy Management partnered with university researchers to develop biomass specifications to meet the new biomass boilers needs, categorize the various resources of biomass supply for MU and identify potential research opportunities to enhance the development and use of biomass fuels.
- > **The Baskett Research and Education Area** The 2,266-acre facility, located five miles east of Ashland, Mo., is an integral part of Mizzou's mission of teaching, research and extension. It is used as an outdoor laboratory for several classes at Mizzou. Current research conducted by School of Natural Resources faculty includes the MOFLUX project and Deer Cam.
- > **Mizzou Dashboard Project** Real-time energy-monitoring web tool expanded to nine residence halls yielding 6.8 percent average energy reductions. The dashboards are part of an educational campaign to engage students in conserving energy in their daily lives.
- > **Solar and Wind** Energy Management has been researching the economic viability of solar and wind technologies and plans to install both solar and wind demonstration projects on campus in 2012. These projects will be accessible to MU students and faculty to evaluate and learn firsthand how these technologies are best applied in Missouri.

2012 – 2016 PLAN

- > **Sustainability Courses and Research Identification** Develop an easy-to-use method for identifying courses and research initiatives at Mizzou that are both sustainability related and focused.
- > **Sustainability Definition** Develop definitions for sustainable research and sustainable education.
- > **Cutting Edge** Continue cutting edge education and research initiatives in the area of sustainability.

Outreach

RECENT ACCOMPLISHMENTS

- > **Missouri Environmental Assistance Center** A partnership between MU Extension and the MU College of Engineering assists Missouri businesses in improving their business efficiency by reducing their energy costs, reducing waste and understanding environmental permits and regulations.
- > **Sustainahouse** Opened in 2011, Sustainahouse brings sustainability-minded students together for a community living experience that emphasizes environmental responsibility.
- > **Service Learning** The Office of Service Learning created a staff position focused on sustainability. Participants doubled this past year and included projects such as assisting the city of Columbia with its greenhouse gas inventory.

2012 – 2016 PLAN

- > **City Collaboration** Increase collaboration with the city on overall sustainability initiatives particularly around education and awareness.
- > **Engagement** Increase MU community engagement related to sustainability initiative.
- > **Sustainability Tours** Establish Campus Sustainability Tours highlighting the university's successes and how the participants can assist to reduce the campus's overall environmental impact.
- > **Student Sustainability Awareness Survey** Conduct a student awareness survey to assess general sustainability awareness and gauge improvement over time.



University of Missouri Campus Facilities

180 General Services Building

Columbia, MO 65211

t: 573.882.3091 – <http://sustainability.missouri.edu/>



Under newly installed bike racks outside the sustainability office, MU installed a detention system to reduce stormwater runoff and improve water quality.

Planning, Design & Construction

RECENT ACCOMPLISHMENTS

- > **Campuswide LEED** MU has established a campuswide approach to LEED certification for its major renovations and new construction projects. It includes sustainable design guidelines, pre-certifying certain campus-wide LEED credits, and training for MU staff and local contractors.
- > **Energy Consultants Toolbox** MU created an energy consultants toolbox enabling the university to engage consultants more easily on building projects. The consultants will perform energy modeling on major construction projects and provide guidance on increasing energy performance.
- > **Stormwater Management Plan** This past year, MU worked with Geosyntec consultants to complete a stormwater master plan.

2012 – 2016 PLAN

- > **Sustainable Design Guidelines** MU will begin implementing its sustainable design guidelines and update as needed. The university will also align the sustainable design guidelines with the Green Book, the University of Missouri systemwide construction standard.
- > **LEED Buildings** MU has eight buildings in planning, design or construction that are slated to pursue LEED certification.
- > **Increasing Sustainability** MU will strive to increase the level of sustainability of its buildings over time.

Purchasing

RECENT ACCOMPLISHMENTS

- > **Surplus property** More than \$722,000 of MU surplus property was sold or reused on campus this past year.
- > **eProcurement** The University of Missouri System's electronic purchasing tool, eProcurement, is saving the university significant amounts of money and reducing the amount of paper used in ordering and invoicing.

2012 – 2016 PLAN

- > **Sustainable Purchasing Policy** Develop a user-driven, system-level sustainable purchasing policy.
- > **Education and Awareness** Increase awareness of sustainable purchasing options available to MU through community education initiatives.
- > **Surplus Property** Develop new software to better track surplus property.



**ENVIRONMENTAL STATEMENT**  
Printed on 100 percent recycled paper that contains 60 percent post-consumer waste.

| TREES            | WATER            | ENERGY            | SOLID WASTE   | GREENHOUSE GASES     |
|------------------|------------------|-------------------|---------------|----------------------|
| 7<br>fully grown | 3,039<br>gallons | 2.5million<br>BTU | 105<br>pounds | 631<br>pounds of CO2 |



# Climate Action Plan Update

UNIVERSITY OF MISSOURI  
MARCH 2012 DRAFT

2012

## Reaffirming the Commitment

MU Chancellor Brady J. Deaton signed the American College and University Presidents' Climate Commitment (ACUPCC) in January 2009. Adhering to the Commitment, in January 2011 MU submitted its initial Climate Action Plan. The first phase of the plan outlined strategies for the university to reduce greenhouse gas emissions by 20 percent from the 2008 emissions baseline. Going forward, MU decided on a rolling five-year plan that would be reviewed on an annual basis. This is the first update to the Climate Action Plan. The updated plan identifies major sustainability trends, includes progress MU has made in the last year and outlines the plan for 2012 – 2016. The update's highlights include:

- > Reducing greenhouse gas emissions by 30 percent by 2016.
- > Establishing a precedent-setting contract for biomass procurement.
- > Opening the bike resource center.
- > Targeting zero waste.
- > Identifying sustainability-related courses and research.



Construction on the new biomass boiler is scheduled to be complete in summer 2012. It will begin burning sustainably harvested wood chips by fall.

## Sustainability Rock Star using STARS®

This past year the Princeton Review Guide to Green Colleges described MU as a Sustainability Rock Star. Keeping up with this legacy, the University of Missouri has determined to utilize STARS, a self-reporting framework that enables the university to measure its sustainability performance. An acronym for Sustainability Tracking Assessment and Rating System™, STARS was developed by the Association for the Advancement of Sustainability in Higher Education (AASHE) with participation from the higher education community. The system includes environmental, economic and social indicators, which are divided into four categories related to campus activities:

- > Education & Research
- > Operations
- > Planning, Administration & Engagement
- > Innovation

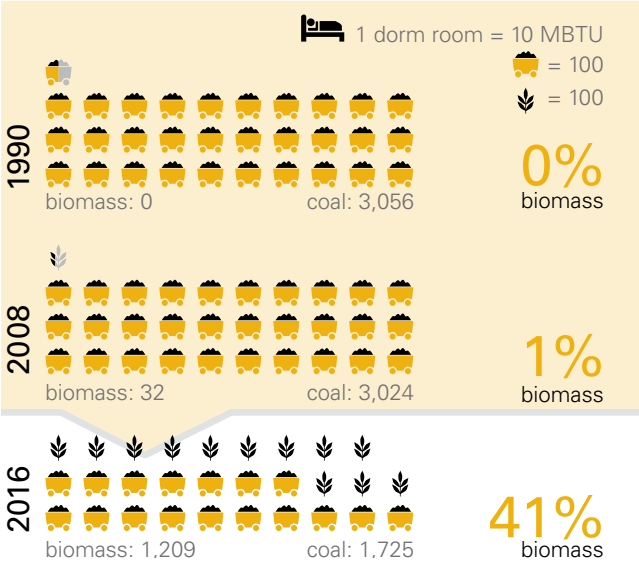
All of the requirements for evaluating and scoring institutions are transparent and made publicly available. Points are earned in each category and lead to a STARS Rating of bronze, silver, gold or platinum. MU is in the process of collecting STARS data and plans to submit for a rating in 2012. <https://stars.aashe.org/>



MU Energy Trends 1990 – 2016

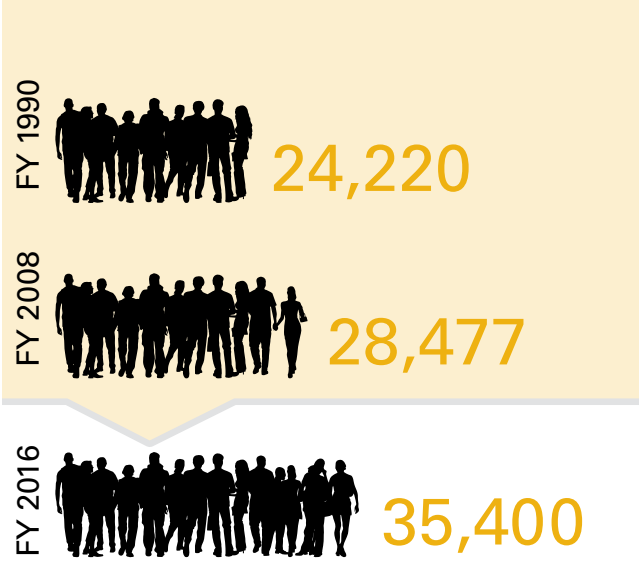
Fuel Consumption (thousand MBTU)

Plan: 41% biomass-to-coal ratio by 2016



Total Student Population

Plan: 20% increase in student head count from 2008 to 2016

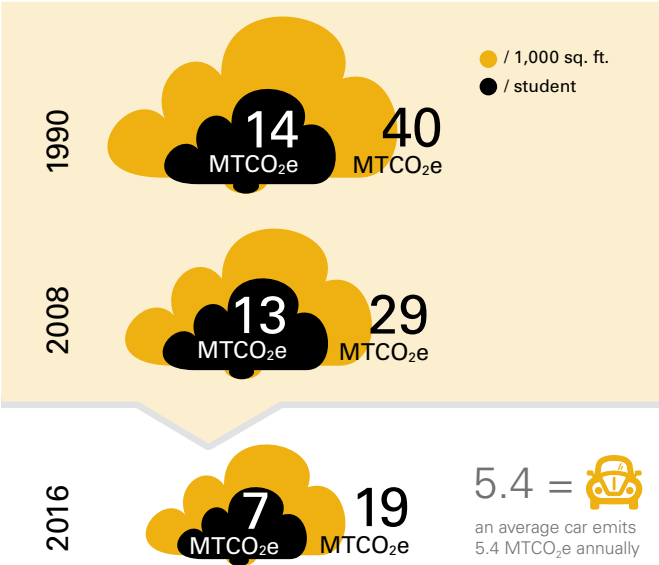


MTCO2e: Metric Tons of Carbon Dioxide Equivalent    KBTU: 1,000 British Thermal Units    MBTU: 1,000 KBTU

MU's Campus Facilities–Energy Management has been actively pursuing energy conservation and cost-saving opportunities since the mid-1970s. In 1990, a formal energy conservation program was created and, as a result, energy use per square foot in campus educational and general space has decreased by 14 percent and total water use has decreased by 43 percent. This is true despite the fact that education and general space has grown by 33 percent during the same period. Energy Management keeps an updated list of energy conservation measures on its website. <http://www.cf.missouri.edu/energy>

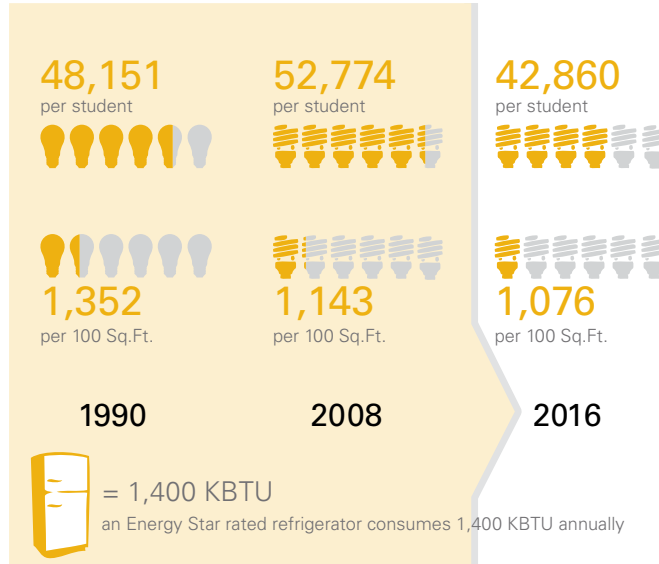
Greenhouse Gas Emissions (MTCO<sub>2</sub>e)

Plan: 54% reduction in emissions/student from 2008 to 2016

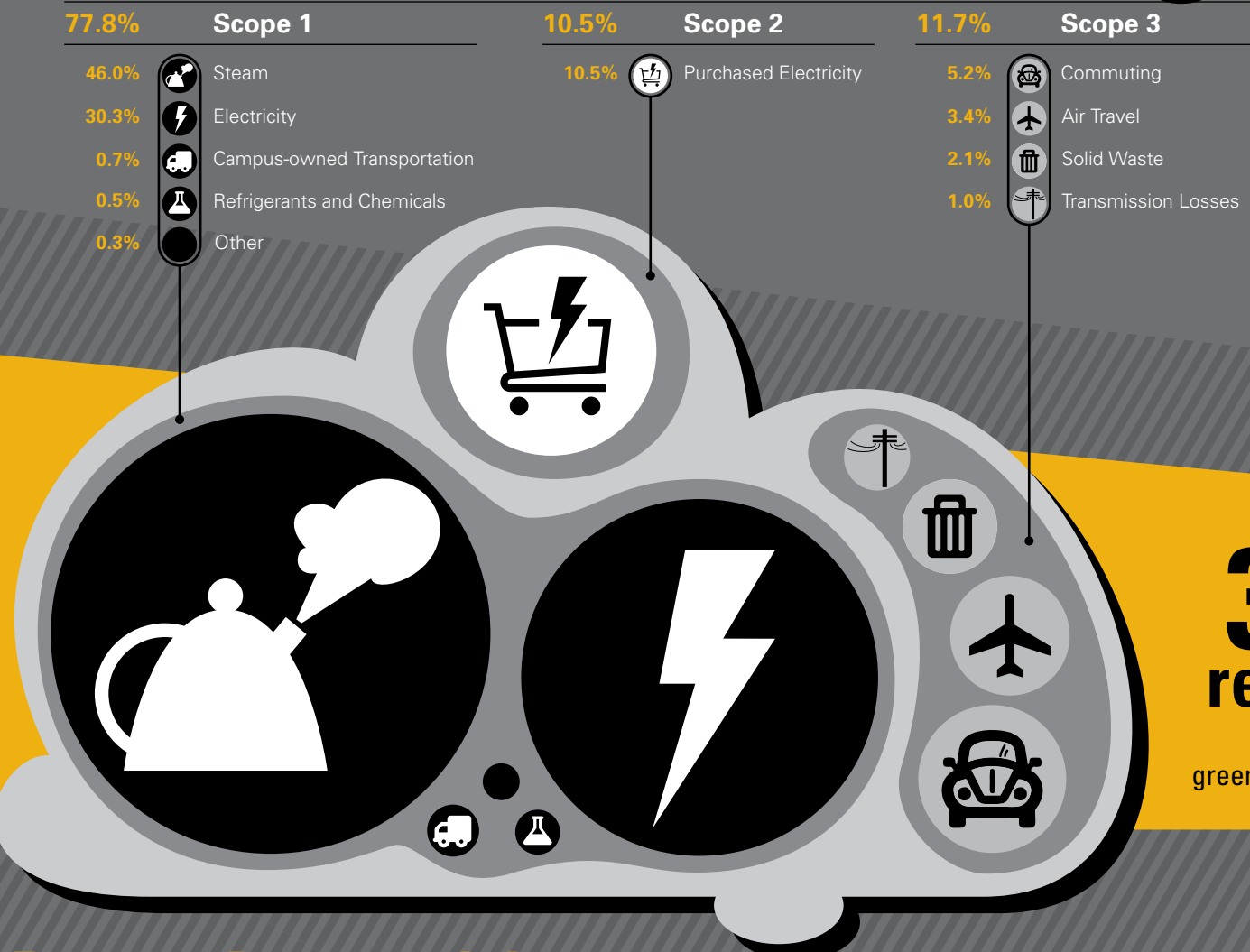


Energy Use (KBTU)

Plan: 19% reduction in energy/student from 2008 to 2016



2008 Emissions Baseline



Recent Accomplishments

- Carbon Emission Reduction** As of July 2011, the campus already has achieved close to a 9 percent reduction.
- Biomass contract** MU Power Plant's biomass supply contract with Foster Brothers Wood Products of Auxvasse, Mo., sets a precedent for sustainable biomass procurement. Wood waste from manufacturing will initially comprise up to 90 percent of the fuel. The remaining 10 percent will be harvested from managed forests in accordance with the Missouri Woody Biomass Harvesting Best Management Practices Manual. Construction began on the new biomass boiler and is on track to begin operations in fall 2012.
- Fuel Mix & Purchased Power** This past year, coal use and emissions decreased with increased use of biomass and natural gas.
- Construction and Weather Normalization** Building energy intensity increased due to renovations and new construction.

MU SUSTAINABILITY MILESTONES

| 1839                        | 1888  | 1893                                       | 1917  | 1970                  | 1981                              | 1989                | 1990   | 1990  | 1990                                      | 1995   | 1998   | 1999                              | 2004                                       | 2005                                 | 2007                          | 2009  | 2009   | 2010  | 2010                | 2011   |
|-----------------------------|---|--|---|-----------------------|-----------------------------------|---------------------|--|---|---|--|--|-----------------------------------|--|--------------------------------------|-------------------------------|---|--|---|---------------------|--|
| MU founded in Columbia, Mo. | Missouri Agricultural Experiment Station opened | Combined heat and power plant in operation | Nation's first soil erosion study conducted at MU | First Earth Day at MU | First campus master planner hired | MU Tree Trails open | Chancellor Monroe funds energy efficiency measures | Formal energy conservation program created in Campus Facilities–Energy Management | Environmental Affairs Council established | Environmental studies initiatives director appointed | Certificate program in environmental studies created | Mizzou Botanic Garden established | College Avenue pedestrian bridge completed | Biomass first used at MU Power Plant | Sustainability Plan developed | Environmental Affairs Committee includes sustainability | Chancellor Deaton signs Presidents' Climate Commitment | EPA Energy Star Combined Heat and Power awarded to MU | Climate Action Plan | Established precedent-setting biomass contract |

2016 Emissions Plan



2012 – 2016 Plan

- Target a 30 percent carbon emission reduction from the 2008 emissions baseline. The target is based on the following assumptions:
  - Fuel Mix & Purchased Power** Emissions will decrease significantly with reduced coal use and substantial increases in biomass and natural gas with the new biomass boiler starting production in 2012.
  - Construction & Energy Conservation** Energy conservation measures combined with space no longer used will offset the additional emissions due to renovation and new construction.
  - Other Measures**
    - MU will purchase wind power and explore opportunities for increasing renewable energy in its portfolio.
    - MU will continue to require energy modeling on all major construction projects and set targets for new construction to achieve 25 percent improvement, and renovations to achieve 15 percent improvement over code standards.
    - MU will perform enhanced commissioning on all major construction projects.
    - MU will continue to optimize space on campus.
- MU will implement additional renewable-energy technologies.
- Optimizing power plant fuel mix will further decrease emissions.
- Investing in conservation options with longer paybacks and lower returns on investment will permit the university to implement additional strategies.
- Continued space optimization and creating "swing space" will allow more aggressive conservation measures in alignment with renovation projects.
- Increased energy-efficiency measures and evaluating building-performance standards will further reduce emissions.
- MU will continually investigate new technologies as they become available.
- When economically feasible, MU will increase power production efficiency.
- Implementing end-user accountability will contribute to reductions.