

**Energy Reduction and Conservation Progress Report
October 2009**



Energy Reduction and Conservation Efforts Progress Report

October 2009

There is no single solution to reducing energy use on campus. Changes must occur in many areas in order to reduce the campus environmental footprint.

During the last four years, the campus has increased its intensity in reducing energy. The greatest challenge still facing the campus in energy use is the continued growth in new space/square footage. It will be important for the campus to manage the energy impact of new and renovated space for the most minimal energy impact. Using available new technologies and equipment that yield significant energy savings will be important as well.

The following is a progress report capturing the past year of ongoing campus changes, including the cumulative impact of the changes to the campus overall. The impact of these changes is balanced against the continued practice of using the institution's resources wisely by piloting new ideas and technology for full understanding of the impact before campus wide implementation and the realization that human behavior is a significant part of the solution.

Energy Reduction and Conservation Efforts

Campus Overall:

- The campus average annual increase in electrical consumption over the last eight years has been two percent per year.
- Campus electrical consumption from one year ago has increased less than one-half of one percent (.4). This reduction has been achieved even with the addition of 100,000 gross square feet.

This represents a 1.6 percent avoided campus energy consumption, which is equivalent to the energy consumption of 770 average homes in the United States.

This is a cost savings of \$556,000.

- The kilowatts hours used have decreased by four percent per person in the last year.
- The kilowatt hours usage per gross square foot has remained steady over the last two years, even with the addition of 160,000 gross square feet.

Progress of Energy Reduction and Conservation Initiatives

1. Building Energy Management

- **Reduced HVAC Run Times:**

Approximately 100 of the 579 campus buildings account for close to 85 percent of the total campus square footage. One year ago, the goal was to reduce the HVAC running times in each building.

Results: To date, 217,000 hours of HVAC run time reductions have occurred in 55 of the major campus buildings, the average of a three percent energy reduction in each of these buildings. This is equivalent to the usage in 500 average homes in the United States.

This is a cost savings of \$421,000.

- **Classroom Consolidation:**

One year ago, seven buildings were identified for a classroom consolidation effort. This effort identified a set of buildings where there may be one class keeping a particular building open later in the evening. The strategy was to relocate these classes to a building in the same area that already had multiple classes scheduled and the HVAC and building systems were already running until later hours.

Results: The seven buildings had a reduced electrical consumption ranging from two percent to 20 percent. These buildings reduced the electrical consumption by 211.3 megawatt hours and CO₂ emissions by 423 metric tons. This classroom consolidation is equal to the usage in 35 average homes in the United States.

This is a cost savings of \$30,000.

New Initiatives with Consolidation Efforts

Weekend Consolidation: In the coming year, the focus will involve weekend event consolidation in five buildings. On the weekend, many times, a single event may keep an entire building open. The approach and strategy for this consolidation is the same as it was for classroom consolidation.

Summer Period: In addition, data and information will be reviewed to identify similar types of approaches or strategies for the summer school period.

- **Retro-commissioning:**

Retro-commissioning optimizes HVAC systems where building purposes have changed over time. This is a five-year plan to retro-commission all general fund buildings and auxiliary facilities. A 10-year plan to retro-commission Residential and Hospitality Services facilities has been developed to integrate retro-commissioning into the renovation plans for the residence halls during this period.

Results: After one year of implementation, five buildings have been retro-commissioned and 12 buildings are in progress. In the five completed buildings, more than 400 megawatt hours of electrical consumption and more than 1,200 tons of CO₂ emissions have been avoided, which is equal to 104 average homes in the United States.

This is a cost savings of \$93,000.

- **Central Smart Metering Management:**

This is a three-year plan to implement a digital metering system that will enable Physical Plant and the Power Plant to access real-time electrical data. This will provide the capability to manage building consumption and real-time feedback to occupants and the Physical Plant on the efficiency of building HVAC systems.

Results: The implementation began in July 2008, and currently 26 buildings have smart-metering technology and 30 buildings are in the process of having such technology implemented. The plan over the next three years is to implement smart metering in more than 200 buildings.

2. Behavior and Campus Culture Change

- **Environmental Stewards:**

In April 2008, the campus launched an environmental steward program. This was a program that required units and departments to identify an "advocate" for their area to assist in educating and implementing behavior changes.

Results: More than 600 stewards have been identified. Stewards receive monthly building reports reflecting changes in their building's energy consumption, recycling, and reduction in landfill waste.

New Initiative with Environmental Stewardship Efforts

MSU Green Certification Program: This program, which is just being launched, is designed to provide departments and units with a self-assessment in terms of implementation of "best practices." The program is designed to recognize, assist, and promote units that are taking steps toward reducing their environmental footprint. Units that practice conservation behaviors will receive MSU Green Certification. Buildings where all units are certified will be given the MSU Green Certified Building designation.

3. Power Plant

- **Alternative Fuels to Coal:**

Alternative fuels continued to be burned at the Power Plant. This year, more natural gas was burned due to its lower cost versus the cost of coal at certain periods during the year.

Results: During calendar year 2008, more than 40 tons of alternative fuels, including corn starch and wood waste from campus, were burned. This is the equivalent of fueling for five average homes in the United States. Finding a source for these alternative fuels is part of the challenge.

Next Initiatives: Developing a long-range energy plan that results in developing a portfolio of alternative energy sources for the future is under way. The biofuel processing plant, which was approved for authorization to plan, has been put on hold because the payback on the facility was too long. Other alternatives are being explored.

4. Computer Lab

- **Software Management Technology:**

This technology will allow remote management of computers in terms of hibernation and shut-down modes when computers are not being used.

Results: Applying this technology in all of the general fund computer labs is estimated to save nearly 35 percent in electrical consumption. The plan is to implement this technology over the next year to 2,000 machines, resulting in a savings equivalent to the electrical usage of 17 average homes in the United States.

5. New Technologies

- **Sensor Lighting and Lab Controls:**

Sensor lighting technology has been installed in 17 classrooms. Lab control technology has been piloted in 20 different labs to maximize air exchange and air quality to reduce electrical consumption through gained efficiencies.

Results: Modified controls in both the Chemistry and Food Science and Human Nutrition buildings have resulted in a 1.5 percent electrical reduction for the buildings. The classroom technology savings is in the process of being measured and monitored. There are more than 1,200 fume hoods in labs across the campus, so new technology can have a significant impact in energy management.

This is a cost savings of \$12,000.

- **Specialty Fixtures:**

New high-intensity fluorescent lighting fixtures have been installed in a portion of the Pavilion for Agriculture and Livestock Education.

Results: This has reduced the electrical lighting load by 46 percent.

- **Energy-efficient Bulbs:**

There were a combination of strategies used to increase lighting efficiencies – lighting fixture replacement, classroom scheduling, and CFL swap out. Residence halls have implemented a free light bulb exchange program in which students may swap incandescent bulbs for compact fluorescent bulbs.

Results: South Complex halls (Wonders, Case, Wilson, and Holden) saw an eight percent reduction in electrical energy during the 2008 calendar year.

The cost savings was approximately \$50,000.

- **Solar Lighting:**

Photovoltaic lighting has been installed at the new MSU Surplus and Recycling Center. Results will be measured over the next year, but it is expected that the photovoltaics will supply five to ten percent of the building's electrical consumption. In addition, rainwater collection tanks were installed at the facility.

6. Pilot Projects

- **Solar Lighting:**

Photovoltaic lighting has been installed in the public drop-off area at the Recycling Center.

- **LED Lighting:**

LED street lighting fixtures have been installed in an area to pilot the effectiveness of this technology. Initial data from this pilot show no energy savings. More testing will be done with other styles of replacement LED street lighting fixtures.

- **Variable Air Volume System Controls:**

A control algorithm has been installed on the variable air volume system in the Law College Building. This technology provides fan power in response to demand, and early results show a 25 percent reduction.