

Middle Tennessee State University Energy Management Guidelines

June 2012

Statement of Purpose

Purpose

The purpose of this document is to provide energy management guidelines that direct activities and decisions in the areas of energy use and consumption at Middle Tennessee State University (MTSU). These activities and decisions should support and enhance the mission of the university while promoting fiscal and environmental stewardship. To be effective, stewardship is a responsibility that is shared by the entire campus community. As such, this document provides a basic description of the MTSU utility systems and guidelines that address the major areas of energy management and energy end-use including:

- Facilities Operations
- Plant Operations
- New Facilities Design
- Employee Involvement

Overview

Energy and utilities are essential for a functioning campus. From the facilities that are occupied, to the technologies in use, to the vehicles in use for transportation; they all require some form of energy to be useful and effective. While recognizing the important benefits deriving from energy, Middle Tennessee State University (MTSU) also recognizes the costs associated with consuming energy – primarily economic and environmental.

Challenges

Given the size of the campus and the complexity of operations, there are challenges to energy management and conservation. They include:

- The age and condition of the buildings and utility infrastructure
- The differing availability of automated controls and technology in facilities
- High student density leading to higher rates of facility scheduling and energy usage
- Capital and operating budget constraints
- Increasing regulation
- Periodic volatility of energy markets

Description of On-Campus Utilities

Heating

The majority of the campus facilities receive heat from a central steam system. Steam is produced in the Central Steam Plant and distributed through an underground piping network to the facilities where it is used to heat separate hot water systems that serve the HVAC and domestic water needs. The steam plant uses natural gas (and fuel oil back up) to drive a turbine and two boilers to produce the steam.

There are several buildings, particularly on the perimeter of campus, that are not served by the steam plant – their HVAC and domestic water heating systems are typically natural gas-fired.

Cooling

The majority of the campus facilities receive cooling from a central chilled water system. The campus has a central chilled water system that consists of two chiller plants that are interconnected providing chilled water to the campus facilities for HVAC cooling and dehumidification.

There are several buildings, particularly on the perimeter of campus, that are not served by the chiller plants – their HVAC cooling systems are typically electric direct expansion (dx).

Electrical Power and Cogeneration

Since 1998, MTSU has operated a natural gas-fired cogeneration plant that produces both electrical power and heating for the campus. The Cogeneration Plant consists primarily of a 5 megawatt (mw) turbine and a heat recovery boiler. The turbine produces 40% to 45% of the power consumed by the campus. The residual heat is used to generate steam for campus heating.

The additional power required by the campus is supplied by the local utility, Murfreesboro Electric Department (MED).

Green Power

MTSU is a major purchaser of green power through the Tennessee Valley Authority's Green Power Switch (GPS) program. The amount of power purchased equates to 10%-13% of the power consumed by the campus annually. Participation in the GPS program is a function of the Sustainable Campus Fee (SCF) program and is reviewed annually for renewal.

MTSU also has a several smaller renewable energy projects including a solar array for power generation, solar powered fans, and power generating exercise equipment in the Recreation Center. Small scale renewable energy projects are frequently submitted and evaluated as part of the SCF program.

Transportation

Vehicles in the Motor Pool fleet are available to be used for University business. The fleet consists of sedans, vans, and micro-buses in order to effectively accommodate the transportation needs of the campus. The fleet has recently added fuel efficient hybrid sedans and an electric vehicle.

Facilities Operations

Space Temperatures

Space temperature schedules are established to provide an appropriate measure of comfort during occupied hours and energy conservation during unoccupied hours.

Space Temperature Set Points – Occupied Hours

Winter Set Point – 70°F

Summer Set Point – 74°F

Space Temperature Set Points – Unoccupied Hours

Winter Set Point – 68°F

Summer Set Point – 76°F

Individual space temperature schedules may be modified to (1) accommodate specific research or equipment requirements, (2) account for specific HVAC or mechanical maintenance issues, or (3) provide for additional savings

Lighting

Lights in individual spaces such as offices and classrooms should be turned off during unoccupied hours and when not needed during occupied hours.

- Occupancy sensors are to be programmed to turn off 20 – 30 minutes after the space is unoccupied (excessive on/off cycling of lights due to short intervals can shorten the useful life of the lamps).
- Manual light switches should be used to turn lights off during unoccupied hours and when not needed during occupied hours.

Corridors and public space lighting systems may be connected to a control system that controls the lights via a time schedule. Local overrides are typically provided in these spaces.

Lights in storage rooms and other non-occupied spaces should remain off when the space is not in use.

Office Equipment and Appliances

See Employee Involvement

Plant Operations

Chiller Plants

Facilities Services will operate and maintain the chilled water plants in a cost effective manner while meeting the functional cooling requirements of the facilities being served. This includes, but is not limited to:

- Efficient chilled water temperature control
- Efficient condenser water temperature control
- Efficient chiller and cooling tower scheduling
- Efficient distribution system operation (pumping, flow control, etc)

Cogeneration and Heating Plant

Facilities Services will operate and maintain the cogeneration and heating plant in a cost effective manner while meeting the functional power and heating requirements of the facilities being served. This includes, but is not limited to:

- Employ cost effective natural gas purchasing practices
- Make-or-buy considerations for 5mw turbine and electrical power
- Efficient boiler scheduling
- Efficient auxiliary system scheduling and operation

Central HVAC Controls

For the facilities connected to and controlled by the central Energy Management System (EMS), Facilities Services will operate and maintain the HVAC systems in a cost effective manner while meeting the functional environmental control requirements of the facilities being served. This includes, but is not limited to:

- Programming appropriate temperature set points for air and water systems
- Programming set-backs and warm-up cycles for systems during unoccupied hours
- Employ energy conservation protocols for HVAC and lighting systems where applicable

New Facilities Design

MTSU will employ appropriate energy management considerations and technologies in the design of new facilities. The intent is to provide functional facilities that are cost effective to operate and maintain over the life of the facility.

Tennessee Sustainable Design Guidelines

The State of Tennessee and the Tennessee Board of Regents require all capital projects be designed in accordance with the Tennessee Sustainable Design Guidelines (TNSDG). The TNSDG outlines applicable codes and design parameters intended to produce a building that is appropriately efficient to operate. The TNSDG addresses the following areas:

1. Land Management
2. Water Efficiency
3. Energy Efficiency and Atmosphere Protection
4. Material and Resource Use
5. Indoor Environmental Quality
6. Tennessee Advancement

MTSU will comply with the requirement to design new facilities in accordance with the TNSDG.

Campus Specific Design Considerations

When designing new facilities, MTSU will give due consideration to energy management and conservation opportunities that are specific to the campus operations. This includes, but is not limited to:

- Availability of utilities
- Central systems vs. stand-alone energy systems
- Operations and Maintenance requirements and costs
- Utility metering – revenue and submetering

Employee Involvement

Employee involvement in energy management is essential for effectiveness. Please note the following responsibilities and opportunities:

Lighting

- Turn lights off during unoccupied hours and when not needed during occupied hours (if you leave the room for 20 minutes or more)
- Make use of day-lighting when possible
- Make use of efficient task lighting when possible
- Incandescent bulbs should not be used for individual or task lighting
- Report occupancy sensor failures and lighting override switch failures to Facilities Services Work Orders.

Heating and Cooling

- Adhere to the temperature set point guidelines for manually operated space thermostats
- Report heating and cooling problems to Facilities Services Work Orders
- Space heaters should not be used except when the space HVAC system does not maintain a minimum of 65°F.

Appliances (refrigerators, coffee makers, microwave ovens, toasters, etc.)

- Use appliances in break rooms where available.
- Appliances should not be used in individual offices and other spaces except where required for academic or university business.

Office Equipment (computers, printers, copiers, etc.)

- Adjust the power settings on computers and other electronic office equipment to maximize energy savings unless research or instructional requirements call for full power.
 - ◆ CPUs – set to enter system standby or hibernate mode after 30-60 minutes of inactivity
 - ◆ Monitors and hard disks – set to enter sleep mode after 5-20 minutes of inactivity
- Turn off printers, copiers, and other appliances during unoccupied hours

University Travel

When using State vehicles for business travel:

- Select the appropriate vehicle that maximizes occupancy and fuel economy for the trip
- Car pool when possible