Energy Plan

The objective of this plan is to aggressively pursue energy-saving activities and to provide adequate support of these activities to consume energy in the most efficient manner possible. Virginia Executive Order’s 54 and 48 requires all state-owned facilities to monitor report and reduce energy costs and consumption through a comprehensive energy plan. This plan will give a snapshot of where George Mason University (Mason) stands as well as provides a roadmap for Mason to achieve additional energy savings and increase its overall energy efficiency. Although this plan provides both energy consumption and cost data, it will focus on energy consumption rather than energy cost. Fluctuating commodity prices make it difficult to measure short and long term progress by cost. Energy consumption (kBtus) per square foot sometimes referred to as energy intensity, will be the prevailing measurement by which progress is tracked.

Based on an analysis of energy consumption in fiscal year 2006, Mason’s energy mix is approximately 55% electricity and 45% natural gas. A breakdown of energy use and cost, per square foot, for fiscal years 2002 through 2007 is shown in the Energy Utilization Table of Appendix 1. Graphical presentations of this data can be found in Appendix 2.

Using FY 2004 as the baseline year, data shows that in FY 2006, electricity consumption per square foot was reduced by 9%. This reduction is a direct result of a performance contract with Siemens Building Technologies Group. Under the contract, lighting, scheduling and HVAC components were examined for energy savings opportunities. Existing light fixtures were replaced with energy efficient T8 lamps and electronic ballasts or compact fluorescent lamps and occupancy sensors were installed and automatically turned off the lights after a pre-determined period of non-use. In addition, all buildings were placed on occupancy schedules to automatically shut down HVAC components during evening and overnight hours. In FY 2004, we used 79.06 kBtu/sqft compared to 71.76 kBtu/sqft in FY 2006. Conservation efforts continue to be successful in FY07 when electric intensity drops further to 69.84 kBtu/sqft, or nearly a 12% reduction from FY04.

Again, using FY 2004 as the baseline year, data shows that in FY 2006, gas consumption per square foot increased by 33%. This increase may be attributed to the addition of Liberty Square and Potomac Heights, both of which are residential facilities that traditionally operate on a 24/7 basis unlike academic or administrative buildings that have limited weekday hours. In FY 2007, only one academic building, Research I, and an addition to Krasnow were brought on line. As a result, gas consumption remained flat from FY06 to FY07, 59.01 and 58.93 kBtu/sqft, respectively. In FY 2008, four new residence halls in the Northeast Sector became fully occupied. It is anticipated that gas intensity will rise again with the addition of these residential facilities. This increase in gas consumption associated with housing units is an area of concern that will be addressed through education and awareness campaigns.
Overall, Mason’s FY 2006 total energy consumption per square foot, combining electricity and gas, is 130.77 kBtu which is approximately 16% below the national average of 155.40 kBtu for colleges and universities. (Source: Energy Information Administration, Dept. of Energy)

In April, 2007, Governor Tim Kaine signed Executive Order 48 which set a goal for executive branch agencies and institutions to reduce the annual cost of non-renewable energy purchases by at least 20 percent of fiscal year 2006 expenditures by fiscal year 2010. In order to meet this goal, agencies and institutions shall aggressively pursue (i) all energy-savings activities whose costs are recoverable in one fiscal year, such as use of screw-in fluorescent and other high-efficiency lighting in place of incandescent bulbs and other less efficient lights; (ii) energy-savings performance contracts; (iii) other funded capital energy-savings improvements; (iv) alternate procurement techniques for energy; (v) renovations of existing buildings consistent with LEED (including the use of Virginia forest products with alternate certifications) or Energy Star requirements as provided for in this executive order; (vi) the transportation energy use requirements provided for in this executive order; or (vii) purchases of renewable energy.

As part of Executive Order 48, the Department of Mines, Mineral and Energy (DMME) has calculated Mason’s reduction goal to be $1,888,244. For compliance, Mason needs to reduce its expenditures on nonrenewable energy by $1,888,244 by 2010. This goal can be achieved through any combination of the above strategies as long as the savings can be shown. What has not been clarified by DMME is whether this goal is a cumulative number through 2010 or an annual reduction goal. While a cumulative reduction of $1,888,244 through 2010 is tangible, requiring an annual reduction of that amount would be difficult, particularly after all the ‘low hanging fruit’ has been harvested through the performance contract.

With the completion of the first full year of measurement and verification of savings under the Energy Savings Performance Contract, Mason not only met the energy savings projection of $997,071, but exceeded them by $873,640 using current utility rates. According to officials with DMME, this additional savings can be applied directly toward the goal for Executive Order 48 compliance. It is important to note, however, that these savings are avoided costs rather than a reduction at the utility meter but can still be applied toward our reduction goal.

As Mason moves forward, it will strive to increase energy efficiency and reduce energy consumption through implementation of programs in the following key areas:

I. Operations & Preventive Maintenance
   a. Maintain 76 degrees in summer and 70 degrees in winter for all conditioned spaces
   b. Maintain the use of occupancy sensors in designated areas
   c. Maintain SSTO (Start Stop Time Optimization) schedules for all public buildings

II. Benchmark Baseline Consumption
   a. EnergyCap Software
i. With the purchase and customization of EnergyCap software, Mason will be able to receive, audit and pay utility bills in a timely manner as well as produce detailed energy reports.

ii. Based on energy reports, identify energy conservation opportunities and rate them according to payback period

b. Upgrade Energy Management System Controls
   
   i. With upgraded controls, Mason will be able to manage equipment operation, monitor building conditions and implement peak demand limiting strategies

III. Energy Conservation Projects

   a. Continue measurement and verification of energy and cost savings associated with Energy Savings Performance Contract (ESPC)
      
      i. Lighting retrofit projects
      
      ii. Water conservation measures
      
      iii. Air Handler Unit Reconditioning
      
      iv. Peak demand limiting

   b. Increase the number of electric vehicles for use on campus
      
      i. As current service vehicles are replaced, electric vehicles will be considered where feasible

   c. Evaluate and identify existing buildings for LEED or Energy Star Certification
      
      i. With implementation of EnergyCap, energy data can be used to qualify for Energy Star Certification
      
      ii. Track Greenhouse Gas Emissions

   d. Evaluate and identify new buildings for LEED or Energy Star Certification

   e. Participate in PJM Load Response Program
      
      i. Work jointly with Energy Connect Mason’s Curtailment Service Provider
      
      ii. Determine load shedding capabilities
      
      iii. Any revenue generated from this program to be used toward implementing other energy conservation projects

IV. Monitor, Review and Report Energy Costs
a. Audit utility bills with EnergyCap to verify correct billing  
b. Review and audit energy consumption for unusual variations

V. Explore Renewable Energy Options  
a. Purchase of renewable energy credits (RECs)  
   i. Independently  
   ii. Through a state contract  
   iii. Through the Consortium  
b. Demonstration green roof and solar projects

VI. Education  
a. Website development with real time energy information  
b. Links with other energy websites for tips on conservation  
c. Energy articles posted on website periodically  
d. Engage service learners for credit hours associated with energy projects

With the implementation of these programs and procedures, Mason’s goal is to continue its reduction in energy intensity as well as slow the growth of overall energy consumption, particularly as related to natural gas. With operational changes and several completed conservation projects Mason has already begun to see significant positive results. Despite new buildings coming online annually and new construction projects occurring at a fast pace, our total energy consumption has remained relatively flat over the last two years, both in terms of electricity and natural gas. Having met 70% of the goal set forth in Executive Order 48 through excess savings realized in the Energy Savings Performance Contract, Mason’s near term goal will be to meet the additional 30% reduction as required by EO-48 and further reduce its energy intensity by 5% annually through 2010. Mason’s long term goals will be to add renewable energy to Mason’s energy portfolio. Mason will continue to use the performance contracting vehicle to help identify and implement additional facility improvement measures that reduce energy. Maintain accurate Greenhouse Gas Emission records. Through data collected by EnergyCap, obtain Energy Star Certification for Mason Buildings that meet the certification criteria. Mason will pursue LEED points from the Energy and Atmosphere section of LEED-NC in new buildings.