LOB #19:

UTILITIES

Purpose

Energy management is of great importance to all Fairfax County residents. The energy used by buildings is mostly generated by burning fossil fuels, which releases greenhouse gas emissions that contribute to climate change. Efforts made to reduce energy consumption help to preserve resources for the future, reduce environmental pollution and provide for decreased utility costs. The Facilities Management Department's (FMD) efforts result in reduced greenhouse gas emissions and carbon footprint. FMD has established an internal goal to reduce energy consumption by a minimum of 1 percent per year (measured in kBtu/square foot, Kilo British Thermal Units, a measure of energy) for the buildings in FMD's inventory.

Description

Energy Management Services performs the following tasks: managing and updating the facility energy policy; monitoring of utility consumption and costs partnering in coordination with Capital Renewal projects to improve energy efficiency of facility systems; and controlling building energy usage through Building Energy Management Systems

FMD's Energy Strategies currently include:

- Building Energy Management Systems (BEMS) - Install and maintain remote computer control of lighting, heating, ventilating and air conditioning (HVAC) systems in buildings.
- Utility Contracts – In December 2012, the Facilities Management Department (FMD) negotiated a 6 month natural gas contract extension with a utility rate of $4.86 per 1,000 cubic feet of natural gas (to burner tip) for County facilities; the previous rate was $10.15 per 1,000 cubic feet of natural gas. In June 2013, FMD negotiated a new 3-year contract for natural gas. Under the old contract, the FY 2012 FMD cost for natural gas was $2.053 million and the highest year cost (2010) was $2.542 million. Under the new contract, the annual estimated cost for natural gas is $1.7 million (adjusted for 2010 actual), which represents a contract savings of $1.038 million for the first year or $3.115 million over the three year period of the contract.
- "Energy Cap" Energy Tracking Software - This is a computer software package that provides FMD with a comprehensive database of building utility information. This database is used for analyzing the energy consumption for our buildings. Each utility bill, for each building, is uploaded into the program each month where the data is then manipulated in various ways by using the reporting features of the program. This information allows us to identify high energy use buildings, track changes in a building energy use from year to year, and forecast energy usage for each utility.
- Temperature Set-point in County buildings – Establish and regulate temperature set points in County buildings to maintain comfort and to balance energy consumption. The current office indoor summer temperature range is 74 - 76° F and the indoor winter temperature range is 70 - 72° F.
- Review New Building Designs – FMD reviews all new building designs prior to construction to ensure they are highly efficient once built. This includes review of architectural systems (window types, insulation and passive solar designs), mechanical systems (chillers, boilers, controls, etc.) and electrical systems (lights, occupancy sensors, day light harvesting and generators).
- System Replacement - When implementing capital renewal projects, FMD routinely incorporates high efficiency equipment (motors, chillers, boilers and packaged cooling equipment) to replace old inefficient systems. The energy savings are sometimes difficult to quantify, but this strategy keeps us moving forward with energy conservation as part of our daily work.

Energy savings are primarily realized through Capital Renewal projects. Examples of recent projects (FY 2012 – FY 2013):

- Federal Energy Efficiency and Conservation Block Grant projects were completed at seven facilities. The projects included heating, ventilating and air conditioning (HVAC) system upgrades, installation of Building Energy Management Systems (BEMS) and installation of lighting controls.
- Completed Energy Performance projects to replace HVAC components such as air handlers, boilers, pumps, chillers, motors, variable air volume boxes, air handling units, split systems, furnaces, AC units, rooftop units fans and clean duct work at 16 facilities. These projects combined capital renewal requirements with energy saving strategies.
- Completed Energy Performance projects to install and upgrade and/or replace BEMS at 6 facilities. The BEMS are computerized systems which monitor and control the mechanical and/or lighting systems in facilities. Specifically the BEMS control building climate within a specified range, provides lighting based on occupancy schedules and monitors system performance.
- Completed Energy Performance projects to improve building envelopes at 4 sites. The projects included the replacement of skylights, caulking of windows and expansion joints, window replacement and replacement of wall flashing. These projects combined capital renewal requirements with energy saving strategies.
- Completed construction to install interlocking of bay doors at fire stations. When the bay doors open the HVAC system in the bay shuts off so as not to condition outside space. A computerized tracking system to monitor bay doors was implemented as part of this project.

There are 96 buildings in the inventory that have real-time Building Energy Management Systems (BEMS). As the County replaces an existing building with new construction or replaces a building's HVAC system (end of lifecycle replacement), a BEMS is specified for installation. All buildings without a BEMS are monitored through a building utility bill review process (monthly). All utility bills are tracked through "EnergyCap" Energy Tracking Software; this is a computer software package that provides FMD with a comprehensive database of building utility information. All gas and electric utility bills are directly uploaded monthly, by the providers, into EnergyCap. There are 188 water accounts and 1,457 water bills (multiple meters at various addresses and each meter is billed separately) that are manually entered into EnergyCap. In FY 2015, FMD implemented a new module of EnergyCap that allowed the water utility provider to automatically upload the water bills.

Benefits

The benefits associated with this line of business include:

- Provides oversight of utility consumption
- Energy efficiency saves money and reduces financial risk from rising energy costs
- Energy conservation is good for the environment. Increased efficiency can lower greenhouse gas emissions and other pollutants as well as decrease water use
- Energy conservation enhances quality of life
- Energy efficiency retrofits in buildings (e.g. insulation retrofits) create conditions that support improved occupant health and well-being
- Promotes energy efficiency and conservation in County buildings, facilities, and operations

Mandates

This line of business complies with the following mandates:

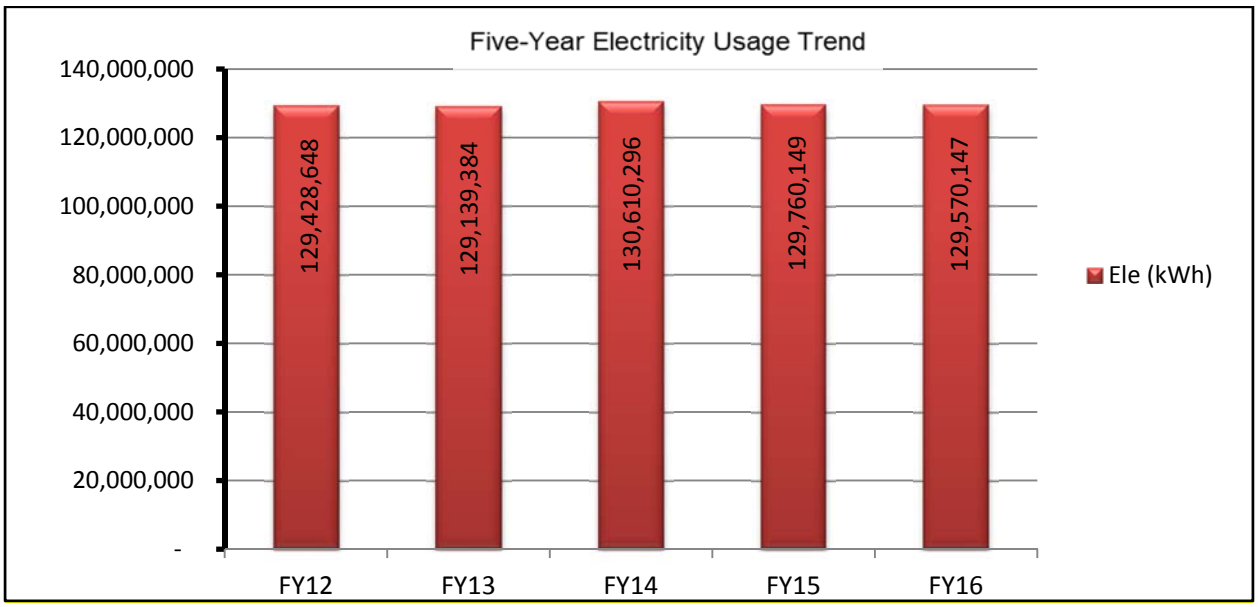
- Procedural Memorandum No. 25-29: The purpose of this County policy is to assist the goal of reducing energy consumption in County facilities while providing a comfortable working environment for building occupants.
- Voluntary standards are established by The Association for Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE), American Society for Testing and Materials (ASTM) and other technical standards setting groups.

It is the policy of Fairfax County government (County Board of Supervisors adopted Energy Policy http://www.fairfaxcounty.gov/living/environment/county-energy-policy.htm) to promote the following measures in order to conserve and manage energy resources in a pragmatic way based on a review of the costs and benefits that is consistent with the Board of Supervisors' Environmental Agenda and the Cool Counties Climate Stabilization Initiative:

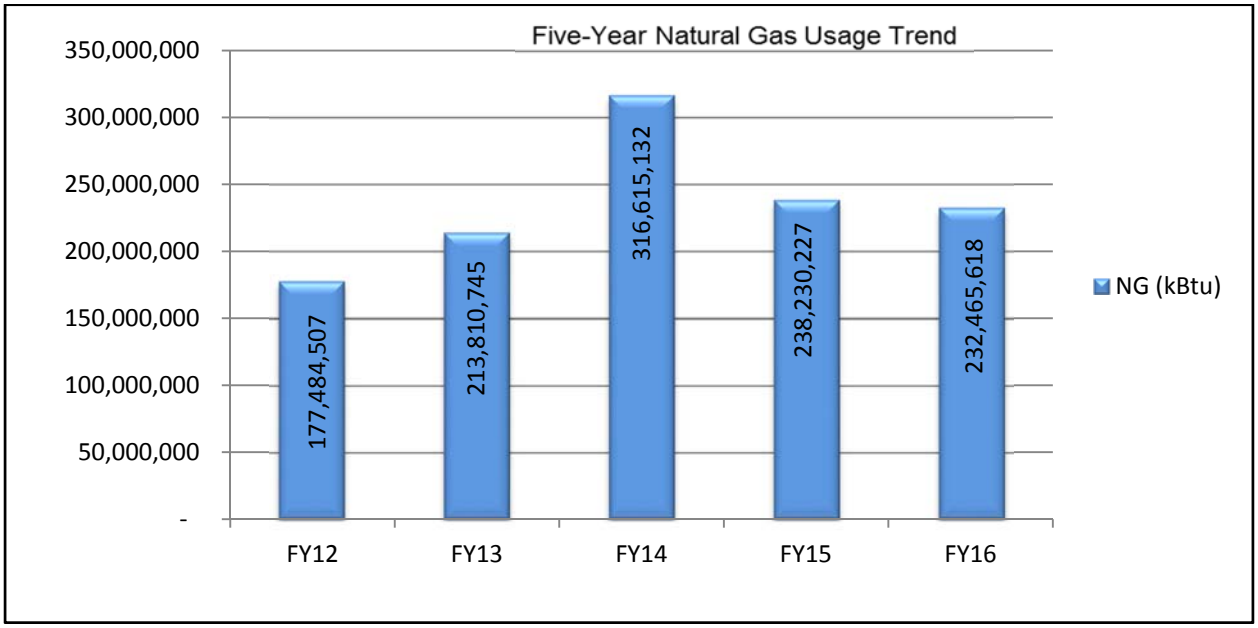
- Energy efficiency and conservation in buildings, facilities, operations and vehicles
- The use of alternative and sustainable energy options
- Waste reduction and recycling
- The use of more fuel efficient and alternative fuel vehicles in an appropriately-sized county transportation fleet
- Implementation of energy efficiency and conservation projects that have a return on investment which includes short- or long-term tangible or intangible benefits, and support environmental goals
- Distributed energy projects in which energy is generated on-site, rather than transmitted
- Land use patterns and transportation systems that serve to reduce energy usage
- Intergovernmental energy efficiency efforts
- Energy efficiency and conservation efforts by County employees, employers, and residents

Trends and Challenges

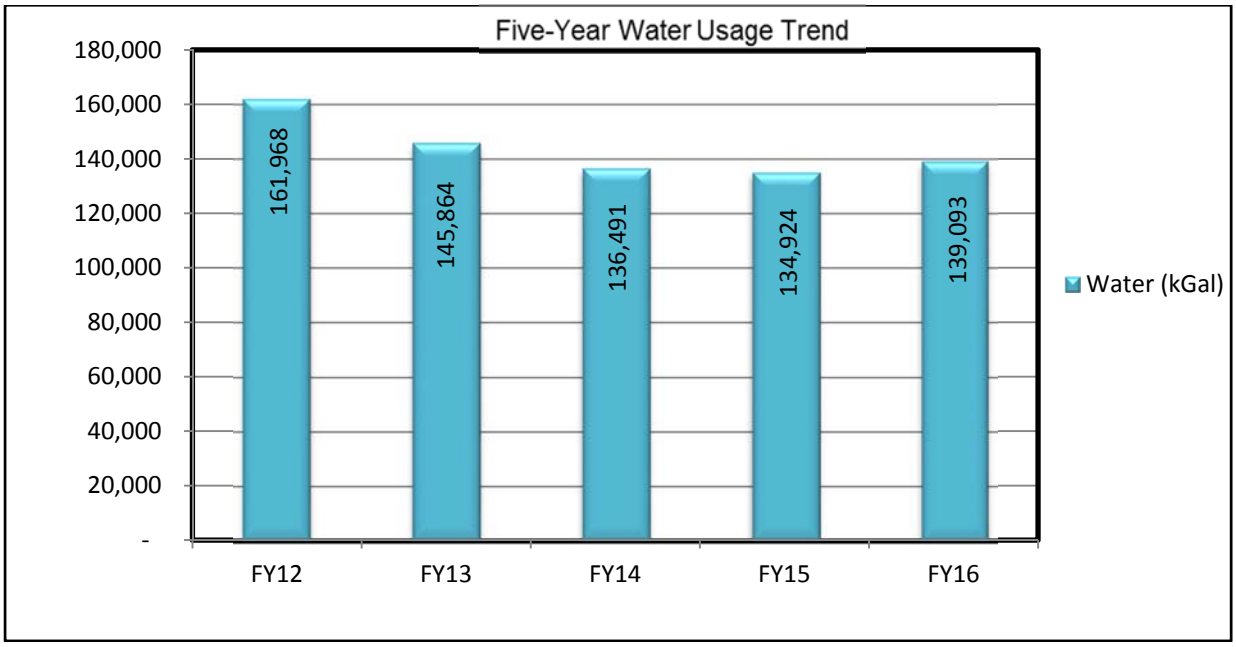
The main trends associated with this line of business are related to electricity and natural gas usage, water consumption, and total energy cost. Electricity usage has been constant, notwithstanding the unusually warm summers experienced over the past two years. Although June 2015 is considered the hottest month on record, energy conservation methods in place have resulted in a marginal 0.65 percent decrease from FY 2014.



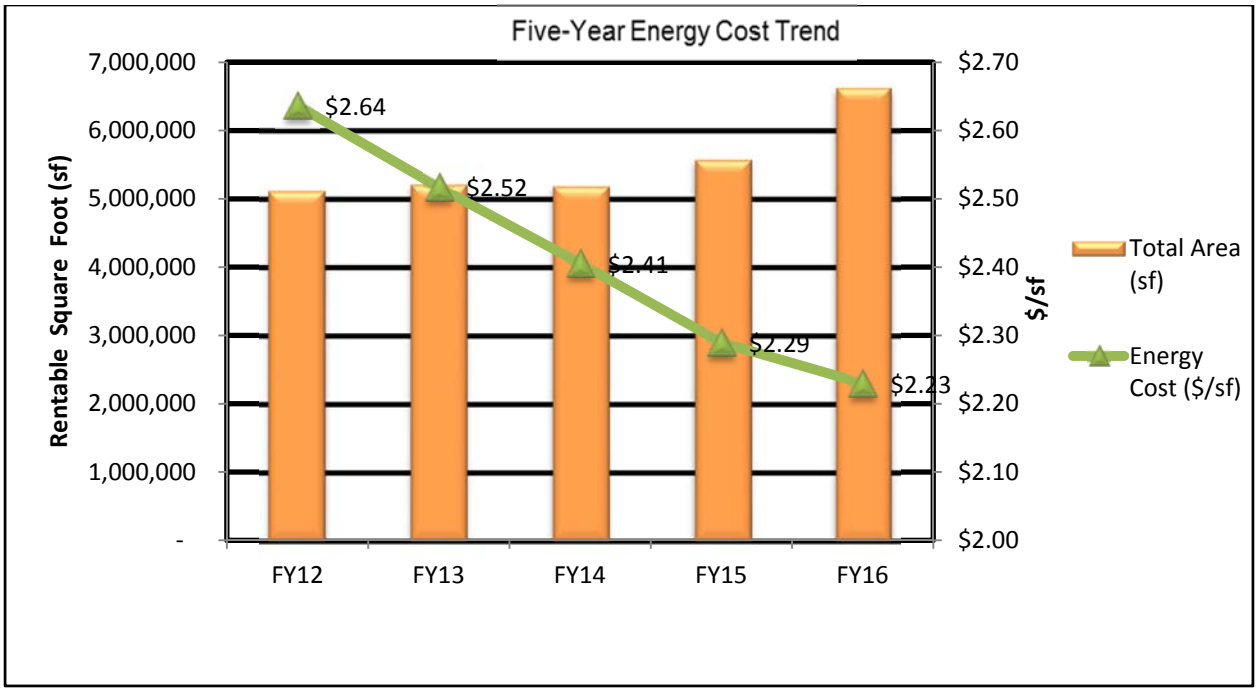
Natural gas has the highest sensitivity to weather changes and the region has experienced in excess of six Polar Vortices during the winters of FY 2014 and FY 2015. FY 2014 registered 48 percent more thermal energy use over FY 2013, while it decreased in FY 2015, again due to energy conservation methods, approximately 25 percent below the FY 2014 record usage.



The trends in water consumption reduction continue based on conservation measures deployed by FMD, such as low-flow and dual flush toilets. FY 2016 will show a slight (approximately 3 percent) upward movement in demand due to the additional 424,500 square foot increase to the building inventory in FY 2015 that was primarily due to the addition of the Merrifield Center.



When looking at the total energy cost on a "gross square-footage" basis for Fairfax County Government, there continues to be a decreasing trend in costs, despite the increases in square-footage, since FY 2012. Fairfax County Government has experienced a total reduction of $0.27/SF of total energy consumption, which is a 5-year reduction of 13.7 percent or an annual decrease of 2.7 percent.



Challenges

Many of the County's existing buildings are poor performers when it comes to energy efficiency primarily due to aging building systems, general operational inefficiency and heat loss through the building envelope. Other utility/energy challenges include:

- Identifying, developing and implementing solutions to consume less energy and to consume energy smarter, particularly in ways that will not compromise building systems operations.
- The typical approach to building retrofits is to "pick the low-hanging fruit," a process that involves doing the most cost effective, minimally invasive measures that tend to have quick payback periods. These renovations, which typically consist of lighting retrofits or simple boiler replacements, tend to yield savings of up to 20 percent. However, in order to see savings as high as 50 percent that have higher potential for reducing carbon emissions, a wide range of integrated energy efficiency measures must be implemented that address multiple factors impacting energy use in a building. These measures include upgrades to the building envelope, mechanical systems, lighting and electrical systems, system controls and changes in tenant/end user behavior. Rather than being considered individually, these measures must be integrated into a comprehensive package in which each measure is evaluated in conjunction with other proposed measures to achieve the most effective overall approach to energy efficiency. This type of energy retrofit approach requires substantial capital investment.
- Building Automation Systems (BAS) play a key role in managing energy usage. These systems are technologically advanced and require ongoing, systematic technical expertise, management, maintenance and training.
- Engaging end users to reduce plug load by replacing inefficient equipment and eliminating use of space heaters and other unauthorized equipment (behavioral changes).
- There has been a steady increase in the quantity of specialized areas that are energy intensive such as labs, evidence storage, data centers, etc.

Resources

Category	FY 2014 Actual	FY 2015 Actual	FY 2016 Adopted
LOB #19: Utilities			
FUNDING			
Expenditures:			
Compensation	$177,383	$162,714	$164,504
Operating Expenses	13,077,686	13,267,037	13,817,396
Work Performed for Others	(643,837)	(620,339)	(867,770)
Total Expenditures	$12,611,232	$12,809,412	$13,114,130
General Fund Revenue	$0	$0	$0
Net Cost/(Savings) to General Fund	$12,611,232	$12,809,412	$13,114,130
POSITIONS			
Authorized Positions/Full-Time Equivalents (FTEs)			
Positions:			
Regular	2 / 2	2 / 2	2 / 2
Total Positions	2 / 2	2 / 2	2 / 2

Metrics

Metric Indicator	FY 2013 Actual	FY 2014 Actual	FY 2015 Actual	FY 2016 Estimate	FY 2017 Estimate
Utility Rentable Square Feet	5,215,481	5,187,483	5,573,987	5,588,349	5,819,523
Utility Cost per Square Foot	$2.52	$2.41	$2.29	$2.38	$2.29
BOMA Benchmark (utility)	$1.66~$2.34	$1.92~$2.63	NA	NA	NA

BOMA = Building Owners and Managers Association (Washington DC/VA Market); Rentable = Occupied/Usable space; NA = BOMA Benchmark not available; the BOMA Benchmark is based on calendar years, therefore, the FY 2015 Actual is not available.

The metrics provided illustrate the amount of rentable square feet for utilities. Despite the increase in square footage, this LOB continues to be slightly higher or within industry standards.