

# ENERGY MANAGEMENT & CONSERVATION ACTION PLAN



*Together We Can Make A Difference*

**Prepared on Behalf of the  
Board of County Commissioners for St. Mary's County**

*by*

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## **Energy Conservation Resolution and Mission**

*This Energy Management and Conservation Action Plan is a direct response to the adoption of **Joint Resolution No. 08-49** between the Board of County Commissioners for St. Mary's County and Board of Education of St. Mary's County (Page 23). The Board of County Commissioners is committed to collaboratively maintaining the county's extraordinary environmental and natural resources, historical identity and quality of life through education and the effective use of resources.*

*The DPW&T intends to encourage and support an energy conservation program to actively conserve consumption of electricity, fuel, oil, gasoline, and water. It is the responsibility of the Director of the Department of Public Works & Transportation to recommend, implement, direct, monitor, evaluate and report the County Government's energy conservation efforts.*

### **Energy Conservation Commitment**

*"Energy Efficiency Through Education"*

The St. Mary's County Government is committed to the environment through the efficient use of energy, recycling and use of environmentally friendly chemicals in the maintenance of its facilities and roadways. This will be accomplished by a comprehensive approach to education of energy conservation and recycling that modifies behaviors, incorporates efficient operations and maintenance practices including new designs and technologies. A vital link to facilitate the smooth interaction of this charge is the Director of Public Works & Transportation will serve as the Energy Manager, effective October 7, 2008. This position is responsible for managing the program for effectiveness and providing a constant flow of information for our employees, staff and community regarding data, plans, strategies and initiatives to support conservation efforts that are sustainable and enduring. Working together, we will reduce energy consumption and improve the environment. Public and staff awareness and continued energy conversation planning are needed to help offset public utility costs due to rising rates and usage.

### **Executive Order**

In an effort to strengthen the environmental, energy and transportation management of Federal agencies, President George W. Bush enacted Executive Order 13423 mandating that government agencies carry out their missions "in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient and sustainable manner."

### **Governor's Initiative**

In 2007, Governor Martin O'Malley announced new energy efficiency goals intended to save taxpayers money and reduce pollution. The EmPOWER Maryland initiative aims to reduce state government energy consumption by 15 percent by 2015. The initiative is composed of seven steps; Improve Building Operations by reducing energy use by 5 percent; Expand Use of Energy Performance Contracting (ESPC); Increase the State Agency Loan Program; Require Energy Efficient Buildings; Purchase ENERGY STAR® Products; Expand Community Energy Loan Program; Ensure Accountability.

## Introduction

The ever-increasing consumption of energy required to provide County government services gives rise to the Department of Public Works & Transportation's operating budget to keep pace with increased demand. Historically, the combined annual maintenance expenditures for this Division are approximately 2% of the annual general fund expenditures for St. Mary's County Government. The Building Services Division strives to meet the increasing demands of aging facilities, more in-house renovations, greater building inventory, increasingly more complex building systems, and higher utility costs through rigorous planning and operational efficiency. As a result, conserving energy is a practice that must be uppermost in the minds of all staff. Methods for conserving energy not only should be practiced, but must be re-evaluated from time to time to be sure the practice is in step with the demands and use of facilities as well as changes in technology that occur. Sometimes this will require change in the way we operate.

The DPW&T Division of Building Services proposes a proactive daily approach to energy conservation. We contend that through better management and education of employees, a reduction in energy consumption and saving will be achieved. The desire and level of commitment from the Board of County Commissioners and its employees and the energy usage of its facilities will determine the level of success of this Action Plan.



The effective management of energy is based on three (3) principles:

1. Changing the philosophy about energy usage within County Government;
2. Initiating changes within the building and working environment; and
3. Promoting awareness for energy conservation success, system wide, through education.

As a part of our energy conservation efforts, goals and practices were developed and a program established to help guide our efforts. Since a comprehensive energy conservation program includes the review of new methods and technology to increase energy conservation, input from a wide range of areas within County Government was / is utilized (i.e. Board of Education, Building Services, Vehicle Maintenance, Office of the Sheriff, Information Technology, etc.) to obtain an array of points of view and to help advance the technology of our systems and equipment. This plan identifies an approach that utilizes opportunities for **immediate** (within the first year), **medium range** (within two years), and **long range** (two or more years) opportunities and savings and identifies possible operating and capital budget requirements for implementation.

Staff will be utilized within individual facilities to help identify additional measures that could be undertaken to reduce energy consumption. Updates regarding the progress made during implementation of the plan will be provided to help ensure focus is maintained. In 2008, an improved Building Safety & Inspection Program (BSIP) for intensive site visits, reviews, and inspections was established. The goals for this program were to develop a systematic approach to the assessment of maintenance needs, prioritize maintenance requirements, and provide better coordination in the scheduling of work and to ensure equity of effort throughout the system. Data relative to energy consumption is continuously collected by the DPW&T Division of Building Services. Although desirable, competition between user groups and facilities may not be practical at this time, due to the age differences between facilities and wide variety of in-place systems. However, presentations are planned to raise awareness of employees and valuable suggestions for improved conservation should be recognized. Our motto for this initiative which we hope will help change employee behavior is:

***“Together We Can Make a Difference”***

## Goals of the Energy Conservation Action Plan

- ⌘ Lighting accounts for about **1/3** of the electric energy use and **25-40%** of electricity costs. It is estimated that between **8 to 20%** of lighting costs can be reduced by simply turning off lighting when rooms are vacant.

**This could save the County between \$40,000 - \$60,000 per year.**

- ⌘ Electrical loads from plug-in equipment can account for between **20 - 25%** of a building's total energy usage in office spaces or about **\$100** per employee per year (NYSERDA). Directors, managers and staff will be held accountable for the way energy is consumed.

**Reducing electrical plug-in loads 10% by 2010 and 20% by 2020 could save the County between \$6,000 – 12,000 per year.**

- ⌘ PCs account for the majority (more than half) of the plug load electrical use in an office environment. An estimated **\$40** per PC per year can be saved if computers are turned off when not in use. Screen savers don't save energy; complex screen savers actually increase energy use.

**With monitor and computer power management for over 700 PC's, the County could save \$28,000 per year.**

- ⌘ Heating and cooling accounts for **30-50%** of our energy costs, even buildings heated with natural gas rely on electricity. Raising and lowering thermostats by as little as *one degree* can result in energy savings of up to **6%** for facilities that use electricity as the primary energy source and up to **4 %** for those that utilize fuel / heating oil. *For each degree a system is reduced, an estimated 1-3% energy savings is realized for that time period.*

**That's an estimated savings of \$20,000 - \$30,000 per year.**

- ⌘ Refrigerated vending machines operate 24 hours per day, seven days a week. In addition to consuming 2,500 to 4,400 kilowatt-hours (kWh) of energy per year, they add to cooling loads in the spaces they occupy. Annual operating costs can range from \$200 to \$350. Efficient vending equipment can save 30-50% over older equipment.

**Turning off vending machine lighting will conserve energy and could save between \$50 and \$110 per year, depending on the cost of electricity (assumed: \$0.08/kwh).**

- ⌘ Between FY 07 and FY 08 electric energy consumption (kWh) was **reduced by 6.3%**.

**However, in order to reach our GOAL of reducing energy consumption 10% by 2010 (1,000,000 Kilowatt hours) an additional 2% per year reduction is needed (or 195,000 kWh per year).**

- ⌘ Adopt "Green Fleet" and fleet management policies. For every two minutes a car is idling, it uses about the same amount of fuel it takes to go about one mile (1 cup assuming 20 mpg). Research indicates that the average person will idle their car 5 to 10 minutes a day.

**Reducing the average idling time to 3 minutes per vehicle per day could save \$250-\$500 per vehicle per year or approximately \$100,000 worth of wasted fuel. We would also propose to reduce fuel consumption by at least 1 % per year.**

- ⌘ Introduce "Green" building, design, technology and procurement strategies. ⌘

## Energy Conservation Opportunities

### Initial Focus

Our immediate efforts will be focused on existing systems and practices that will have the greatest conservation impact with minimal expense such as space temperatures, accurate monitoring of systems, use of personal plug-in and heating devices, computers, lighting in all spaces, domestic hot water supply (boiler and hot water settings), outside lighting levels, alterations to buildings, vending machine use, water conservation, changing behavior and educating employees about the importance of energy conservation and management.

### Action Plan I: Immediate Energy Conservation Opportunities

Immediate measures are those which can be performed in the current fiscal year. Such measures may include increased senior management involvement, behavior modification of employees, or awareness/training, such as, turning off lights when leaving a room or turning down heaters when closing for the night; the elimination of unneeded appliances, such as hot plates or duplicate coffee pots; and keeping lighting fixtures, filters, and heating and cooling coils clean. A more detailed list of possible immediate conservation measures that should have the greatest effect in work environments is shown below:



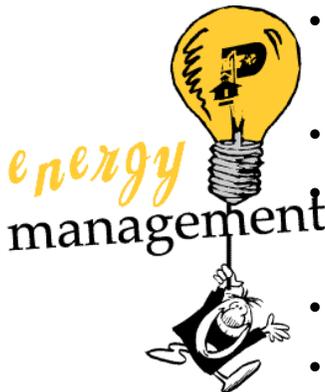
#### Lighting

- De-lamp” common use (offices) and corridor (hallways) spaces by 30 /40%, respectively, wherever possible.
- Recommend Lighting Standards should not be exceeded, wherever possible.
- Turn off all lights at night, including task, office and restroom lights, when they are not in use.
- Replace incandescent light bulbs with fluorescent to reduce energy use by up to 75%.
- Turn off lights in unused common areas such as copy rooms, break rooms, conference rooms and rest rooms. The effect on lamp life and energy use when turning the lamp back on is negligible.
- Make sure photocells (light sensors that turn on electric lights after dark) are clean.
- **“When not in use, turn off the juice.”**
- Have vending machine operator(s) turn off the advertising lighting in the machine or utilize power management software.
- Classroom and general workspace lighting levels shall be 30 – 50 foot candles. Corridors shall be between 10 – 30 foot-candles. As recommended by Illuminating Engineering Society of North America.
- Eliminate interior incandescent bulbs and replace with fluorescent or LED bulbs, where possible. Update fire alarm systems with LED exit signage.
- Begin fluorescent bulb and ballast recycling program.
- Replace exterior sodium / mercury vapor bulbs & ballasts with fluorescent bulbs.

## Immediate Energy Conservation Opportunities (Con't.)

### Electricity

- Use the automatic setting on thermostats so the fans turn on only when you need heating or cooling. On the manual setting, the fan operates continuously and can increase your energy usage.
- Turn off your computer monitor when you are away from your desk for more than **15 minutes** and at the end of the day. Most monitors now come with power management, standby and shut down features which the Information Technology Department should activate. *Note: Screen savers don't save energy; complex screen savers actually increase energy use*
- Lower heating settings to **69** degrees F. (76 degrees for seniors) with a set back at night, weekends, holidays or when unoccupied to 60- 65 degrees.
- Raise cooling settings no lower than **76** degrees F. (76 degrees for seniors).
- Set the temperature of un-occupied spaces to 85 degrees, where possible.
- Heating and cooling should start no sooner than 1-2 hours before you begin the day. Currently starts at 3 AM (Monday) and 5 AM (Tuesday-Friday).
- Heating and cooling may be set back 2 hours before the end of the day. Setback temperatures are to be set at 80 degrees in the summer and 65 degrees in the winter. Not being performed where after-hour use is anticipated / programmed.
- Print double-sided per page to conserve resources. Use default settings.
- Reduce hot water heater from 120 to 105 degrees, wherever practical (i.e., Not food service).
- Do not reset breakers – call Building Services. This may be an indicator of a more serious problem.
- Eliminate unnecessary hot plates, foot / cup warmers, coffee pots, microwaves and other small appliances in your area and turn off all tools, office machines and portable appliances when not in use. Turn off the photocopiers and other office equipment, and use one coffee pot to cover the whole office.
- Avoid outlet and extension cord overload. Underwriters Laboratory (UL) compliance is required.
- Reduce boiler settings from **180 to 150** degrees, whenever possible. Alternatively, consider setting boiler temperatures to match the ambient air temperature for individual buildings. Note: Depending on the outside temperature less heat may be needed.
- Order laptops instead of desktop computers to cut electrical use by **50%**. Estimated savings per year is \$25-40 per unit.
- Less frequently used equipment with remote controls such as televisions and VCRs should be unplugged when not in use because they still use some power even when turned off.
- Install motion sensors, timers on light switches and/or use photocells to automatically switch lights on and off in little used areas (i.e., emergency stairwells).



### Building Envelope

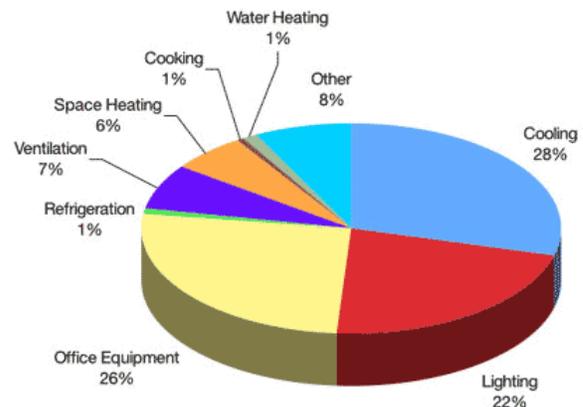
- In the winter, close blinds / window coverings at the end of the day to cut down on heat loss. In the summer, close window coverings during the day to avoid the heat gain of direct sunlight. Utilize direct sunlight during winter for heat gain by raising blinds. Do not change thermostat or equipment settings established by Building Services.
- Continue to clean or replace filters regularly. Keep outside units free of leaves or debris that may clog vents.
- Use natural light whenever possible. Turn off lights near windows when daylight is adequate. Open blinds to take advantage of natural lighting and turn off all non-essential lighting in work areas when possible.
- The use of outside consultants and/or energy performance contracting firms should be considered to analyze conservation measures and perform energy audits.

## Immediate Energy Conservation Opportunities (Con't.)

- Replacing old windows with non-operable commercial grade double pane insulated Low E glass windows can help reduce electricity and oil costs. Loss from older windows is estimated to be **10-25%** of heating and cooling costs.
- Make sure all windows and doors are closed during the heating and cooling seasons.
- Restructure janitorial and custodial services to implement Team Cleaning approach.

### Heating, Cooling, Ventilation

- Do not use space heaters if your building has centralized heating.
- Verify that the manual / computerized outside air (OSA) dampers are closed during unoccupied hours, including during morning warm-up periods. Fresh air is critical while the building is occupied, but heating OSA when it is not needed increases energy costs. The Adult Detention Center must remain at 15%.
- Be sure motor-operated dampers are operating properly.
- Confirm that your adjustable speed drives (ASDs) are running properly. If they are operated constantly at 100% ("high") speed, they use more energy than the directly connected motor. Most ASDs have an output monitor to report percentage of operation. A motor running at 50% ("medium / low") speed uses 1/8 the energy of a motor running at 100% speed.
- Close off unoccupied areas and shut their heat or air conditioning vents; or turn down / off room air conditioners where possible. This does not apply if you have a heat pump or central air conditioning system.
- Close off spaces designed to be segregated for heating and cooling where possible (i.e., 911 Center).
- Do not run an air conditioner and dehumidifier at the same time. An air conditioner removes moisture from the air, while a cooler adds moisture to reduce room temperature. Since they use opposite methods for cooling, running both at the same time will increase your energy bill.
- Check that dampers on exhaust fans close when the fan is not operating. Adjust fan belt tension.
- Purchase energy efficient office equipment and computer electronics to reduce heat output.
- Repair faulty insulation - furnaces, boilers and hot water heaters.
- Set back temperatures at night, weekends and holidays to 65 degrees in winter and 80 degrees (° F) in summer.
- For unoccupied spaces, maintain **60** and **85° F** during heating and cooling seasons, respectively
- Stabilize libraries and archival material sites at temperatures no higher than **70° F** and **≤60%** humidity
- Verify the amount of outside air introduced into facilities through ventilation systems is not excessive. Amounts vary depending on ambient temperature and use of facility.
- Inspect control schedules and zones so that you heat and cool only the occupied sections of the building.
- Make sure that air vent grills are not blocked by plants, books or furnishings.
- Keep drafts away from thermostats to prevent inaccurate readings and do not place heat generating office equipment under thermostats.



## **Immediate Energy Conservation Opportunities (Con't.)**

- Dust or vacuum radiator surfaces frequently to insure a free flow of heat.
- Don't set a higher temperature to "warm up faster," or a lower temperature to cool quickly. It only wastes energy.
- Check to make sure that exhaust fans operate only during occupied periods unless required to operate continuously.
- If you only have electric space or baseboard heating as the primary source of heat supply, stagger the start times to help reduce demand, especially during peak demand times.

## **Water Conservation**

- Watering your landscape wastes electricity along with water. The water in your home or office gets there with the use of large electric pumps. Make sure you follow local watering guidelines for proper landscape care.
- Use only the amount of water necessary to perform a task.
- Replace older, larger (3 gallon) flush valves with smaller capacity (1.5 gallon) valves in restroom facilities during scheduled replacement, except high capacity needs (i.e., Adult Detention Center).
- Use cold water when possible except where hot water is required by state codes.
- Develop landscaping plans that do not require additional water consumption or sprinkler systems.
- Use cold water when possible except where hot water is required by state codes.
- Develop landscaping plans that do not require additional water consumption or sprinkler systems.
- Reduce water consumption by **2%** per year over the next five (5) years.
- Consider budgeting and a pilot program for installing instant (on-demand) water heaters under sinks.
- Initiate a waterless urinal pilot project(s).



## **Fleet Management**

- Re-evaluate vehicle take-home home and mileage reimbursement policies.
- Establish "Green Fleet" minimum emission or miles per gallon (mpg) standards for replacement vehicles.
- Evaluate school bus routes and service methods to ensure efficiency
- Reduce idling time to the extent that is practical. Turn off all office vehicles when not in operation.
- In 2007, the use of ultra-low sulfur diesel fuel (ULSD) which costs more per gallon than regular diesel was federally mandated.
- Improve routing with software, reduce the fleet size (**10%** max motor pool)
- Begin and sustain a B5 bio-diesel fuel pilot program.
- Implement "right sizing" vehicles in fleet replacement program to match needs.
- Tighten vehicle replacement eligibility and disposal requirements to minimize the number of vehicles in the fleet.
- Change driver habits by establishing more convenient motor pool vehicles.
- Implement "Take 10" initiative-shut vehicles off 10 minutes/hour (Office of the Sheriff).

## **General**

- Restructure janitorial and custodial service contracts to a 2-3 day service in lieu of 5-7 day cleaning, depending on facility needs and performance standards.
- Sitting close to a window during the cloudy winter can make you feel cold; if so, close window coverings or move further from the window.

## Immediate Energy Conservation Opportunities (Con't.)

- Hire a Certified Electrician to perform in-house maintenance.
- Develop a programmatic / systemic six (6) Year Capital Improvement Program that includes energy conservation improvements.
- Revisit and update prior approved "Buy Recycled" Policy.
- Provide safety and energy conservation awareness to employees and include on web site.
- Try to schedule group activities in the area with the least energy use, and schedule evening meetings in areas that can be heated and cooled individually.
- Celebrate Energy Conservation Week annually (around **May 25-31**)

## Daily Energy Conservation Guide



### Lighting

- Utilize task lighting rather than overhead lighting when possible.
- Turn off all lights and unused equipment in unoccupied spaces and when leaving an unoccupied room. Lights shall only be on in rooms in use.
- "Del-amp" common use (offices) and corridor (hallways) spaces by 30 -40%, respectively, wherever possible.
- Have vending machine operator(s) turn off the advertising lighting in the machine or utilize power management software.
- General workspace lighting levels shall be 30 - 50 foot candles. Corridors shall be between 10 - 30 foot candles, as recommended by Illuminating Engineering Society of North America.
- Eliminate interior incandescent bulbs and replace with fluorescent or LED bulbs, where possible.
- Replace exterior sodium / mercury vapor bulbs & ballasts with fluorescent bulbs.
- Install motion sensors and use photocells to automatically switch lights on and off.



### Electricity

- Reduce hot water heaters from 120 to 105 degrees, wherever practical (i.e., Not food service)
- Reduce boiler settings from 180 to 150 degrees, whenever possible.
- Reduce the size of hot water heaters during scheduled replacement, if possible.
- Remove from work spaces all unneeded personal electrical plug-in appliances, such as: fans, space heaters, hot pads, refrigerators, clocks, radios, etc.
- Print double-sided per page to conserve resources. Use default settings.
- Activate power management, standby and shut down features on PC's.
- The use of personal electric heaters and air conditioners are not permitted. All floor fans must have proper blade covers. Ceiling fans are not permitted.



### Building Envelope

- Make sure all windows are closed and locked and doors are closed during the heating and cooling seasons.
- Open blinds to take advantage of natural lighting and turn off all non-essential lighting in work areas when possible.
- Restructure janitorial and custodial services to implement Team Cleaning approach.
- Utilize direct sunlight during winter for heat gain by raising blinds.
- Close blinds when direct sunlight enters rooms during the summer.



### Heating, Cooling, Ventilation

- Make sure heating and cooling is not running in unoccupied areas.
- Maintain 69 degrees and ≤68% humidity during the heating season. 76 degrees for seniors.
- Maintain 76 degrees and ≤68% humidity during the cooling season. 76 degrees for seniors.
- Purchase energy efficient office equipment and computer electronics to reduce heat output.
- Set back temperatures at night, weekends and holidays to 60-65 degrees in winter and 85 degrees in summer.
- For unoccupied spaces, maintain 60 and 85 degrees during heating and cooling seasons, respectively
- Stabilize libraries and archival material sites at temperatures no higher than 70 degrees and ≤60% humidity
- Verify the amount of outside air introduced into facilities through ventilation systems is not excessive.

## Immediate Energy Conservation Opportunities (Con't.)



### Water Conservation

- Use only the amount of water necessary to perform a task.
- Replace older larger (3 gallon) flush valves with smaller capacity (1.5 gallon) valves in restroom facilities.
- Use cold water when possible except where hot water is required by state codes.
- Develop landscaping plans that do not require additional water consumption or sprinkler systems.



### Fleet Management

- Re-evaluate vehicle take-home home and mileage reimbursement policies.
- Establish "Green Fleet" minimum emission or miles per gallon (mpg) standards for replacement vehicles.
- Evaluate school bus routes and service methods to ensure efficiency
- Reduce idling time to the extent that is practical. Anti-idling programs for trucks and heavy equipment are very effective
- Improve routing with software, reduce the fleet size (10% motor pool)
- Begin and sustain a B5 bio-diesel fuel pilot program.

## Action Plan II: Medium Range Energy Conservation Opportunities

Medium Range measures are those which can be performed within two (2) fiscal years requiring no significant funding beyond the current programmatic / critical programs or additional legislative support. These measures may require more preparation than the immediate measures and may require the acquisition of energy efficient materials to replace existing items. Examples of these items may include replacing incandescent light bulbs with compact florescent lamps or reducing the wattage on bulbs when possible. Other possibilities include acquiring photocells to have lights turn on and off automatically; cleaning and providing for the periodic maintenance of filters, coils, and vents; and arranging for the recycling of reusable materials. A more detailed list of possible medium range conservation measures that should have the greatest effect in work environments is shown below:

### Lighting

- Have vending machine operator(s) turn off the advertising lighting in the machine or utilize power management software.
- Use photocells to automatically switch lights on at night or use motion sensors to increase safety. Photocells are controls that make lights "smart". They sense whether available surrounding light is present to determine whether a light should be lit or not. The light turns on and off automatically.
- Use lower wattage bulbs in both critical and non-critical areas.
- Avoid using incandescent task light (desk lamps). Use a compact fluorescent lamp to replace the incandescent lamp in your task light.
- Use one large bulb instead of several small bulbs that add up to higher wattage.
- Eliminate interior incandescent bulbs and replace with fluorescent or LED bulbs, where possible.
- Replace exterior sodium / mercury vapor bulbs & ballasts with fluorescent bulbs (Wall packs, field and parking lot lighting).
- Many areas have more lighting than is required for current tasks. Measure current lighting levels and reduce excess lighting by using power reducers, multi-level switching, or simple removal of lamps and ballasts. Note that some ballast continue to use some energy even when lamps are not operating.
- A 50-watt reflector floodlight provides the same amount of light as a standard 100-watt bulb.

## Medium Range Energy Conservation Opportunities (Con't.)

### Electricity

- Note: For every degree below 78 you set your thermostat during the summer, your cooling costs could increase by up to **9 percent**.
- Require janitorial services to only light one area of the building at a time rather than having the entire building brightly lit until midnight.
- Install additional motion sensitive lighting. Note: Restrooms in most facilities have already been affixed with timed sensor devices.
- Ask janitorial services to take advantage of partial switching (such as turning on only one lamp of a three-lamp fixture that is wired to allow this) to further reduce energy use during building cleaning.
- Purchase energy efficient office equipment and computer electronics to reduce heat output that needs to be vented or cooled.
- Turn off circulation pumps during unoccupied times if no freeze conditions exist.
- Replace all electric hot water heaters with boiler/coil combination to take advantage of heated exhaust and avoid additional electric costs.
- Install plug load controllers in cubicles to control multiple loads like monitors, task lights and fans. These devices use a motion sensor that is incorporated with a plug load surge suppressor. Inactive equipment can be shut down when the cubicle is unoccupied.
- Reduce perimeter lighting, shut off unnecessary exterior, decorative lighting and on-premises signage lighting.

### Building Envelope

- Confirm that OSA (Outside Air) economizers are functioning properly to take advantage of free cooling. Most office buildings are in cooling mode when the outside air temperature is above 55 degrees F. The core of buildings over 20,000 square feet are almost always in cooling, even during the winter months.
- Confirm that the amount of outside air matches the occupant load. One improvement to consider is adding carbon dioxide monitors or controls that will automatically bring in as much OSA as necessary for the current occupant load.
- Blocking the sunlight from entering reduces heat gain. Sunlight can increase the demand on the air conditioner by as much as **30 percent**.
- Increase light reflectance of walls and ceilings.
- Feel for air drafts around electrical outlets. Inexpensive pads are available, as are plugs for unused sockets.

### Heating, Cooling, Ventilation

- Make sure simultaneous heating and cooling does not occur. Verify proper operation of valves, dampers and controls. Keep your systems well tuned with periodic maintenance.
- At least once a month have a service technician measure the carbon dioxide in your gas burner / chimney. The higher the carbon dioxide / monoxide the greater the efficiency of the unit. **9 percent** is a good level.
- For commercial and industrial applications, monitor stack temperatures on fossil fuel boilers. If the stack temperature is more than 400 degrees above the boiler room temperature, schedule the boiler for a tune-up, unless stack temperatures are designed for alternative operating levels.
- Check the duct work for air leaks about once a year if you have a forced-air heating system. To do this, feel around the duct joints for escaping air when the fan is on. Small leaks can be repaired with metal duct tape. Larger leaks may require duct sealant.
- Make sure that air handling unit filters are changed every 2 - 3 months, and that coils on the outdoor condensing unit and indoor heating and cooling units are kept clean. Switch to filters with lower airflow resistance.
- Clean air conditioning refrigerant condensers to reduce compressor horsepower.



## Medium Range Energy Conservation Opportunities (Con't.)



- Check control sequencing for multiple chillers and boilers. For light load operation, use the smallest and most efficient chiller or boiler available and avoid frequent equipment cycling.
- Implement training for mechanical system operations that includes required air quality, boiler and pressure vessel certification(s).
- All new equipment specifications should include ABS (Automatic Balancing System) drives.
- Avoid introducing high moisture exhaust air into air conditioning system. Periodically calibrate the sensors that control louvers and dampers.
- Establish and utilize Occupant Comfort Zones and Recommended Lighting Standards for use in facilities.
- Verify that the building control system is going into the night setback mode during unoccupied hours. Time clocks may require adjustments after daylight savings switch-over or after power outages. Even computer control systems may need updating after equipment modifications.
- Install locking devices on thermostats to maintain desired temperature settings.
- Install programmable thermostats and automatic settings, when possible.

### Water Conservation

- Consider auto-flush technologies. Implement a pilot program for the use and evaluation of waterless urinals at DPW&T.
- Install water flow meters in facilities to monitor gallons per minute usage or balancing valves to set a standard flow (non-domestic).
- Convert the DPWT vehicle wash rack to utilize recycled water and/or install rainwater storage tanks.
- Begin installing water saving devices and ultra water efficient plumbing fixtures (i.e., water efficient faucets, low-flow shower heads, etc.).

### Fleet Management

- Include a **B5** bio-diesel fuel option in the tri-county fuel and heating oil contract solicitation.
- Re-evaluate vehicle take-home home and mileage reimbursement policies.
- Teleconferencing can reduce energy use and save travel costs.
- Evaluate gas-electric, alternative fuel, hybrid and flex fuel vehicles as replacement platform options.
- Evaluate cost of retrofitting diesel fuel bus engines with pollution control equipment to reduce emissions.
- Purchase smaller 4 cylinder in lieu of 6 or 8 cylinder passenger vehicles, if possible.
- Consider investing in hybrids despite higher acquisition costs.
- Try to decrease fuel expenditure or consumption by **1% per year**.
- Install hibernation mode in heavy equipment, which is designed to provide lower fuel consumption, especially in applications where machines have high idle time. Fuel consumption savings in hibernation mode of **45%** and **16%** at working low idle could be achieved.
- Consider use of synthetic oils for vehicle maintenance.
- Reduce delivery schedules (i.e., Metro Mail) and consolidate deliveries.
- Limit authorization and off duty use of agency and department vehicles.
- Use GPS tracking and routing software to optimize routes, save fuel and improve response times (STS, Non-Public Schools, County Highways, and Office of the Sheriff).
- Encourage carpooling whenever possible.



## Medium Range Energy Conservation Opportunities (Con't.)

### General

- Evaluate the efficiency of increasing in-house staffing levels for "Team Cleaning" single sections of facilities at one time in lieu of outsourcing janitorial services to improve efficiency, conserve resources and increase quality of service.
- Using flexible and compressed work schedules / shifts are suggested to empty offices during energy peaks.
- Evaluate the programmatic use of buildings after normal hours of operation and on weekends. Increasing the amount of program charges to keep pace with the rising costs of utilities (i.e. enterprise funded programs) should be considered.
- Building Services staff will receive regular training, certification(s), and in-service training regarding the operation and maintenance of mechanical equipment and systems.
- Establish a rating for the overall condition of facilities via an Inventory and Facility Condition Index (FCI).
- Increase use of recycled plastic lumber (decks, benches, tables, etc.)
- Recognize that in-house janitorial staff is needed to supplement building services mechanics, improve control, reduce costs and after-hour energy consumption.

### Action Plan III:

## Long Range Energy Conservation Opportunities

Long Range measures are those which require more than two (2) fiscal years to initiate or complete and may require additional funding or legislative support. These measures may require the acquisition of energy efficient materials; contracts for retrofitting; replacement of older or inefficient products; supplements to existing budgets; or additions or changes to statutes, regulations, policies, etc. Examples of these items may include: providing training for personnel in energy efficiency, the upgrade of computers and monitors to more recent energy efficient models, and upgrades to internal networks to allow for the reduction in the number of printers used within the office. A more detailed list of possible long range conservation measures that should have the greatest effect in work environments is shown below:

### Lighting

- We can eliminate bulbs in fixtures as an initial conservation measure, but the long-term fix is to replace the T-12 bulbs with T-8 bulbs with electronic ballasts or better. In doing this, lighting would also be re-evaluated to avoid over-lighting with the new bulbs since they are more energy efficient & produce more light.
- Investigate advancements in solar technology for exterior and parking light lighting.

### Electricity

- Purchase only "Energy Star" qualified products or high energy efficient systems and equipment.
- Re-evaluate Occupancy Comfort Zones.
- Continue to purchase high efficiency motors on electrical equipment.
- Install a photovoltaic system to help generate some of the maintenance yard electricity.
- Expand pilot program for alternative energy and reduced energy consumption.



## Long Range Energy Conservation Opportunities (Con't.)

### Building Envelope

- Perform energy audits or thermal imaging on all buildings. Obtain **Building Energy Rating (BER)** certificates which are valid for 10 years. A-G rating in kWh/m<sup>2</sup>/yr)
- Incorporate energy efficiency guidelines for all building retrofits and new construction.
- Consider new construction technologies: i.e., Dupont Energrain or equivalent interior rigid 5mm aluminum laminated panels (paraffin filled) mounted behind drywall and ceilings to reduce temperature peaks by up to 12%. Stabilizing temperature will reduce system demands.
- Increase light reflectance of walls and ceilings.
- In climate controlled facilities, install replacement windows with non-operable commercial grade double pane insulated windows which can help reduce electricity and oil costs. Note: Loss from older windows is estimated to be **10-25 percent** of heating and cooling costs.

### Heating, Cooling, Ventilation

- Continue to install variable speed drives and variable air volume (VAV) systems in lieu of constant volume HVAC systems as we replace, re-order or build new facilities.
- A central heating and cooling system will use less energy than individual heat-cool units for most work environments.
- Make use of technology and modernize facilities with direct digital HVAC controls by replacing pneumatic & time clock controls.
- Install smart climate control technology and consider centralized energy management systems.

### Water Conservation

- Explore use of landfill gas for electric power generation.
- Water conservation needs to be addressed. Low-flow faucets, low-flow toilets and an evaluation of hand drying methods should be evaluated.
- Reduce the size of hot water heaters during scheduled replacement, if possible, based on historical use.
- Develop landscaping plans that do not require additional water consumption or sprinkler systems.
- Evaluate the use of grey-water and reclaimed wastewater for irrigation purposes

### Fleet Management

- Embrace "Green Fleet" policies and the use of alternative fuel / propulsion, gas-electric hybrids, (i.e., solar panel work vehicles and gas powered transit buses), reduce idling time, establish minimum emission or miles per gallon (mpg) standards for the purchase of replacement equipment and vehicles.
- Evaluate possible consolidation of non-public and public school bus transportation systems to increase route efficiencies and decrease fuel consumption.
- Begin pilot project(s) to retrofit diesel fuel bus engines with pollution control equipment to reduce emissions.
- In heavy equipment, a hibernate mode can be installed and is designed to provide lower fuel consumption, especially in applications where machines have high idle time. Fuel consumption savings in hibernation mode of **45%** and **16%** at working low idle.



## Long Range Energy Conservation Opportunities (Con't.)

- Office of the Sheriff may consider doubling up officers in one patrol vehicle.
- Replace **1/3** of existing motor pool fleet with hybrid vehicles over the next **10** years.

### General

- Utilize performance contracting to limit economic impact on building retrofits.
- Retrofit most energy inefficient buildings first (i.e. Health Department).
- Evaluate state processes to eliminate or reduce energy resources needed for the process such as eliminating or reducing the forms needed to get permission for an activity, simplify approval chains or modify reporting requirements, etc.
- Expand support / maintenance division in conjunction with the added square footage due to continued construction.
- Implement ownership accountability by providing each mechanic with an area(s) of responsibility.
- Develop recognition programs for buildings that demonstrate the best environmental stewardship...i.e., Public School recycling tonnage contests etc.
- Implement a work management program. This will support safety, security, warehousing, maintenance responsibilities and trending history.
- Continue updating and replacing of aging equipment with more efficient systems.
- Use technology to ensure consistent and accurate utility consumption reporting through auditing, control and monitoring of energy consuming processes.
- Skill enhancements and cross training of personnel are essential components for meeting high expectations for both quantity and quality of work performed.
- In cold weather, dress warmly and in layers that can be adjusted for optimal comfort. Loosen clothing and dress casually during the warmest hours.
- Wearing closely woven fabrics adds at least a half-degree in warmth. For women, slacks are at least a degree warmer than skirts. For men and women, a light long-sleeved sweater equals 2 degrees in added warmth. A heavy long-sleeved sweater adds about 4 degrees, and 2 light weight sweaters add about 5 degrees of warmth because the air between insulates and keeps in more body heat.

## Energy Analysis and Energy Audit

Good energy management begins with the ability to produce and analyze energy consumption data, and demonstrate energy savings. This data will provide us the ability to make comparisons and support forecasts. Embracing technology with data collection and monitoring devices is a key part of the overall Action Plan. Effective management of energy-consuming systems can lead to significant cost and energy savings, as well as increased comfort, lower maintenance costs, and extended equipment life. A successful energy management program begins with a thorough energy audit.



An energy audit evaluates the efficiency of all building and process systems that use energy. Utilizing all of the resources that are available to assist in our efforts to develop a comprehensive program and reduce energy consumption should be taken advantage of. The use of outside consultants, our local utility provider(s) and private energy performance contracting firms (i.e. *Chevron, Vehicle First, Profit Line*) can be utilized oftentimes free of charge or under a shared cost reduction contract. The energy auditor starts at the utility meters, locating all energy sources coming into a facility. The auditor then identifies energy streams for each fuel, quantifies those energy streams into discrete functions, evaluates the efficiency of each of those functions, and identifies energy and cost savings opportunities. Audit activities, in general order, include: (a) Identifying all energy

## Energy Analysis and Energy Audit (Con't.)

systems; (b) Evaluating the condition of the systems; (c) Analyzing the impact of improvements to those systems; and (d) Writing up an energy audit report.

The report documents the use and occupancy of the building and the condition of the building and building systems equipment. The report evaluates load data, building profiles, energy use index by building type and also recommends ways to improve efficiency through improvements in operation and maintenance items, and through installation of energy conservation measures. Audit levels in order of increasing complexity are:

**Level 1** – The Walk-Through Audit is a tour of the facility to visually inspect each system. The walk-through includes an evaluation of energy consumption data to analyze energy use quantities and patterns, as well as to provide comparisons with industry averages, or benchmarks, of similar facilities. This is the least costly audit, but a Level 1 audit can yield a preliminary estimate of savings potential and a list of low-cost savings opportunities through improvements in operational and maintenance practices. The Level 1 audit information may be used for a more detailed audit later if the preliminary savings potential appears to warrant further auditing activity.

**Level 2** – The Standard Audit quantifies energy use and losses through a more detailed review and analysis of equipment, systems, operational characteristics, and on-site measurements and testing. Standard energy engineering calculations are used to analyze efficiencies and calculate energy and cost savings based on improvements and changes to each system. The standard audit will also include an economic analysis of recommended Energy Conservation Measures (ECMs).

**Level 3** – The Computer Simulation Audit is the most expensive level of energy audit and is most often warranted for complex facilities or systems. The audit includes more detailed energy use by function and a more comprehensive evaluation of energy use patterns. Computer simulation software is used to predict building system performance and accounts for changes in weather and other conditions. The goal is to build a base for comparison that is consistent with the actual energy use of the facility. The auditor will then make changes to improve the efficiency of various systems and measure the effects compared to the baseline. This method also accounts for interactions between systems to help prevent overestimation of savings.

## Occupant Comfort Zone(s)

To have "thermal comfort" means that a person wearing a normal amount of clothing feels neither too cold nor too warm. Thermal comfort is important both for one's well-being and for productivity. It can be achieved only when the air temperature, humidity and air movement are within the specified range often referred to as the "comfort zone". These values are shown in Table 1 55 - 2004 "Thermal Environmental Conditions for Human Occupancy". The recommended temperature ranges have been found to meet the needs of at least 80% of individuals. Some people may feel uncomfortable even if these values are met and therefore it is always a balance between optimizing building temperature to either minimize total cost (energy plus service call cost) or to minimize complaint frequency.

<b>Table 1 Temperature / Humidity Ranges for Comfort</b>			
<b>Conditions</b>	<b>Relative Humidity</b>	<b>Acceptable Operating Temperatures</b>	
		°C	°F
Summer (light clothing)	If 30%, then If 60%, then	24.5 - 28 23 - 25.5	76 - 82 74 - 78
Winter (warm clothing)	If 30%, then If 60%, then	20.5 - 25.5 20 - 24	69 - 78 68 - 75

*Source: Adapted from American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standard 55-2004*

- Because of high energy costs, Building Services has established **temperature** Comfort Zones for heating and cooling. In the winter, the set point for heating is **69** degrees (the standard acceptable temperature range is between 68 to 74 degrees). In the summer, the set point is **76** degrees (the standard acceptable temperature range is between 75 to 78 degrees). However, for facilities that provide services to seniors, the year-round set-point is 76 degrees.
- The typical cooling season begins on April 15 and ends October 15 each year. The heating system is deferred as long as is practical after October 15 and is terminated as soon as possible prior to April 15.
- In addition to thermal comfort, the **relative humidity**, for most applications, should be between 40% and 70%, with a 65% threshold to help prevent the growth of mold. Although ANSI / ASHRAE standards no longer recommend a lower humidity limit, the relative humidity Comfort Zone should not be lower than about **30%** (to prevent occupant discomforts such as dry eyes and throats, shrinking of wood flooring, and static electricity problems on carpet, and possible sick building syndrome symptoms) or higher than about **60%** in the center of the room.
- The 60% level is intended to keep the relative humidity from exceeding 70% at surfaces, such as walls and floors. The relative humidity at surfaces is typically higher than it is at the center of a room. When the relative humidity at surfaces is above 70%, mold growth can occur. To control microorganisms, it is best to keep relative humidity below 60% to control mold and 50% to control dust mites. The accuracy of the standard humidity range is 3/5<sup>th</sup> to 3% (say 2%) over the established comfort zone.
- For libraries and archival materials, a stable temperature of no higher than 70 degrees and a relative humidity of between 30% and 60% are recommended. For gymnasiums, a winter setting of 65 degrees is desirable.

## Recommended Lighting Standards



Because of increasing energy costs, Building Services has adopted the following lighting standards after review of the recommendations provided by the Illuminating Engineering Society of North America. The Building Services Division has purchased a heavy duty light meter to assist personnel in periodically checking to ensure that minimum lighting levels are maintained.

Type of Activity	Illuminance (fc)	Typical Applications
Public areas with dark surroundings	2 – 3 - 5	Unoccupied storage areas, night lighting of hallways
Simple orientation for short occupancy	5 – 7.5 – 10	Restaurant dining areas,, inactive storage rooms, service elevators, stairways
Occasional, simple visual tasks	10 – 15 – 20	Corridors, lobbies, auditoriums, passenger elevators, lobbies, pump island areas
Execution of visual tasks having high contrast or large size	20 – 30 – 50	Conference rooms, book stacks, active storage rooms, rough bench or machine work, simple inspections
Execution of visual tasks having medium contrast or small size	50 – 75 – 100	Mail sorting, reading poor copy, high contrast drafting, medium bench or machine work
Execution of visual tasks having low contrast or small size	100 – 150 – 200	Proofreading, low contrast drafting, difficult inspection
Execution of visual tasks having low contrast and small size for a long period of time	200 – 300 – 500	Very difficult assembly, inspection, or machine work
Execution of sustained and exacting visual tasks	500 – 750 – 1,000	Exacting assembly or inspection, extra-fine bench or machine work
Execution of special and exacting visual tasks having low contrast and small size	1,000 – 1,500 – 2,000	Surgical procedures

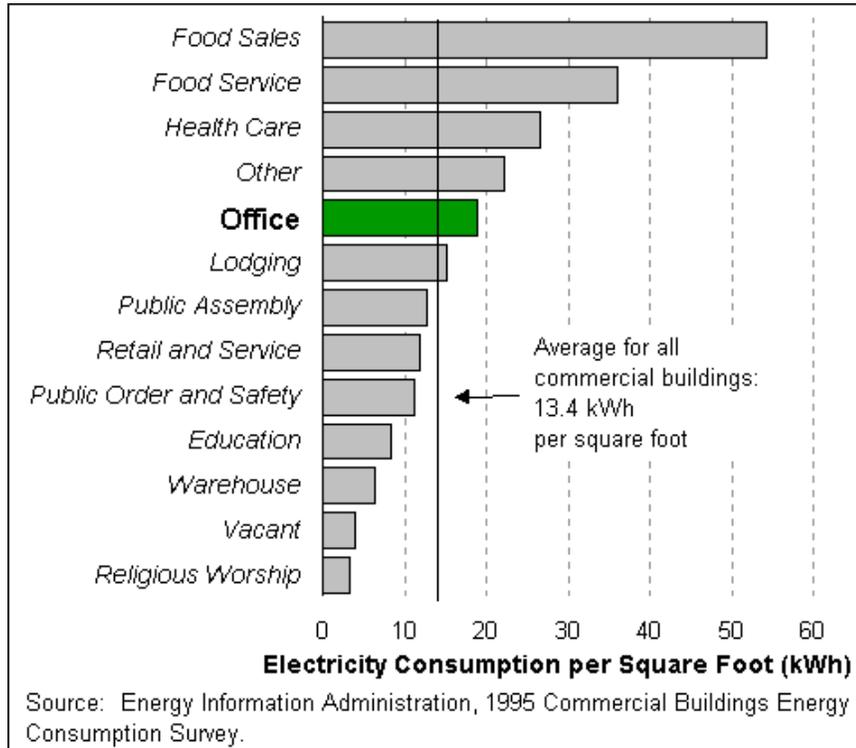
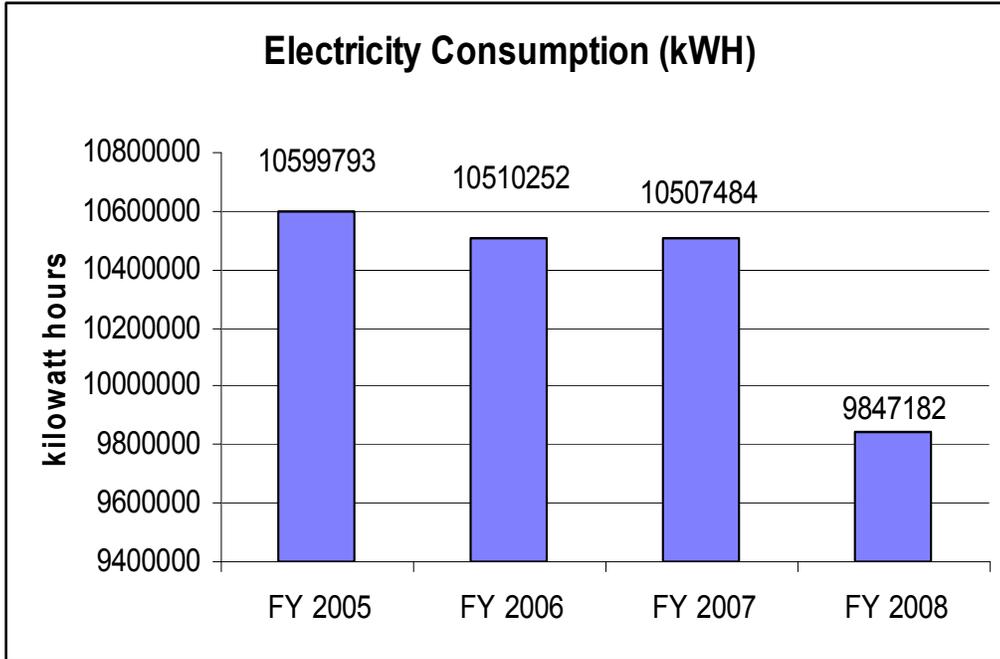
**Source: Illuminating Engineering Society of North America  
 Figure 10.25**

### Recommended Lighting Standards (Cont.d)

Application	Footcandles
Building Exteriors Entrances (active) Entrances (inactive) Critical Areas	5 1 5
Building & Monuments Bright Surroundings, Light Surfaces Bright Surroundings, Dark Surfaces Dark Surroundings, Light Surfaces Dark Surroundings, Dark Surfaces	15 50 5 20
Bulletin Boards & Signs Bright Surroundings, Light Surfaces Bright Surroundings, Dark Surfaces Dark Surroundings, Light Surfaces Dark Surroundings, Dark Surfaces Loading Docks	50 100 20 50 20
Parking Facilities Open, Low Activity Open, High Activity Covered, General Parking Covered Ramps Covered, Entrances	0.5 2 5 10 50
Roadways	1
Storage Yards Active Inactive	20 1
Walkways General Stairways	0.5 4.0

**Source: Illuminating Engineering Society of North America  
 Figure 10.27**

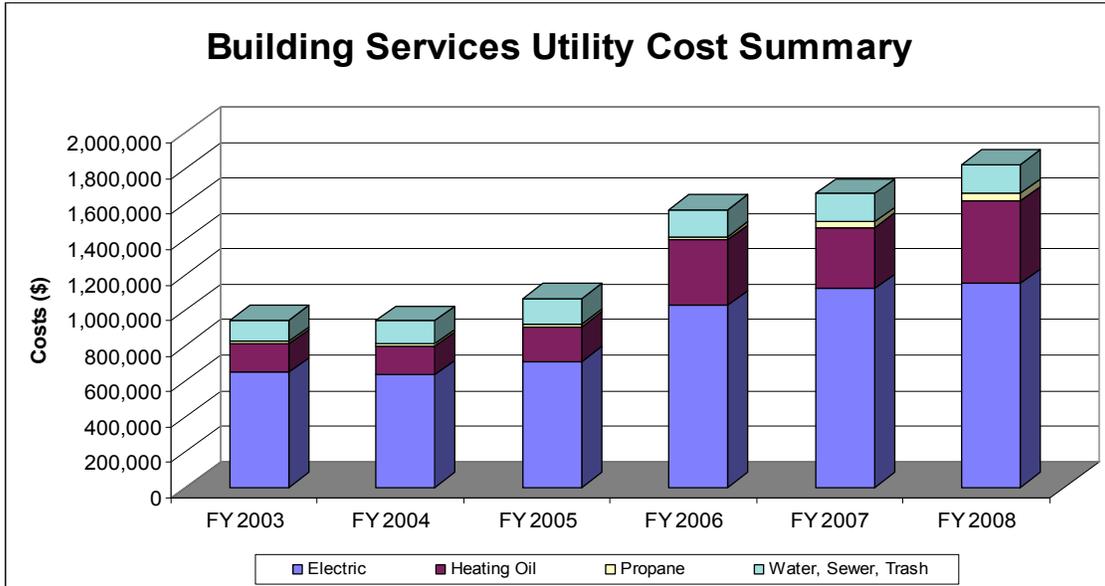
BUILDING SERVICES DIVISION  
 Department of Public Works & Transportation  
 ENERGY MANAGEMENT & CONSERVATION ACTION PLAN  
**Energy Consumption Information**



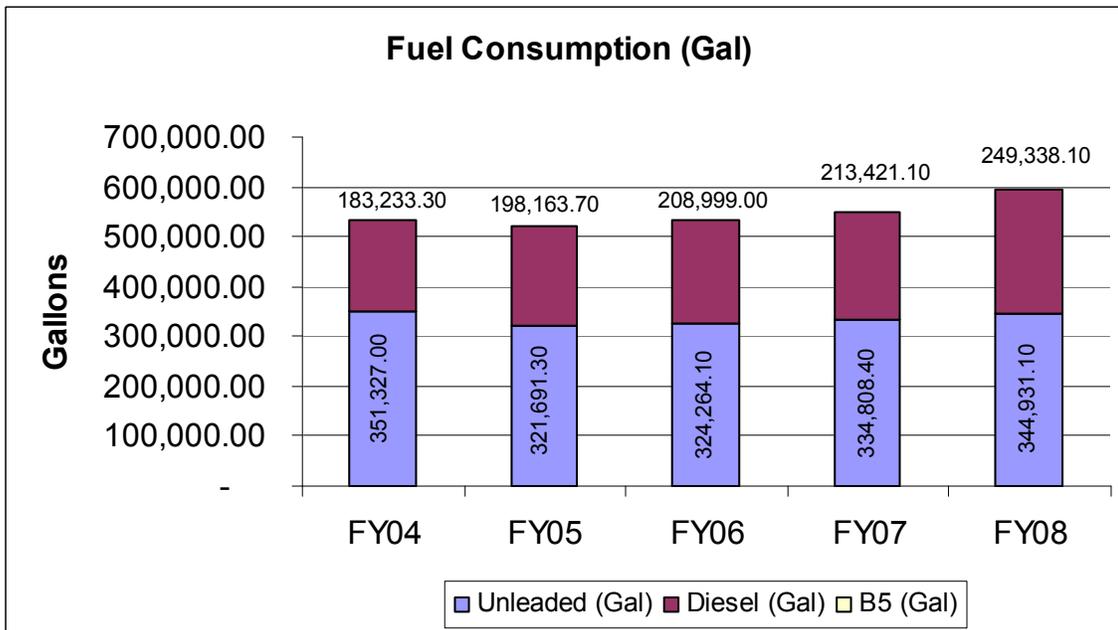
Note:

With the current square footage of approximately **838,500** square feet of County-maintained spaces, and utilizing an average factor of **13.4 kWh per square foot for Office**, it is reasonable to assume an electricity consumption of 11,235,900 kWh per year.

**Energy Cost Information**



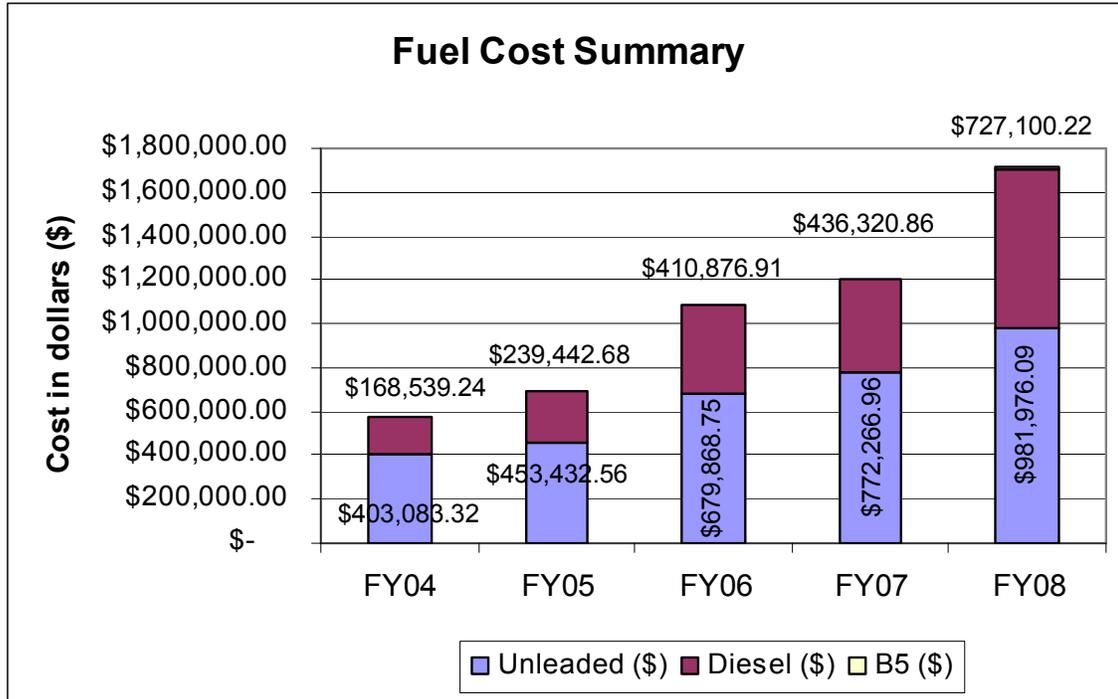
*Note:* A six percent (6%) reduction in electricity consumption was realized between FY 2007 and FY 2008. However, the overall cost of utilities continues to escalate at a more rapid rate than consumption can be reduced.



*Notes:* Between FY 05 and FY 07, **STS diesel** consumption increased from 111,661 to 119,237 gallons, less than 2% per year.

During that same time frame, the **Office of the Sheriff** use of **unleaded fuel** increased from 153,574 to 190,411 gallons, about 8 % per year.

### Energy Cost Information



Notes: Between FY 2004 and 2008 the average cost per gallon of regular unleaded gasoline and diesel fuel has risen by **148%** and **217%**, respectively.

During that same time period, the consumption (gallons used) of regular unleaded gasoline **decreased by 1.82%** and for diesel fuel, **increased by 36%**.

In FY 07, **St. Mary’s Transit** accounted for **56%** of the diesel fuel gallons used and **56%** of the total cost.

In FY 07, **the Office of the Sheriff** accounted for **53%** of the unleaded fuel gallons used and **53%** of the total cost.

BUILDING SERVICES DIVISION  
Department of Public Works & Transportation  
ENERGY MANAGEMENT & CONSERVATION ACTION PLAN

Resolution No. 08- 49  
Subj: Joint Resolution for Energy  
Management and Conservation

JOINT RESOLUTION  
BOARD OF COUNTY COMMISSIONERS FOR ST. MARY'S COUNTY  
BOARD OF EDUCATION OF ST. MARY'S COUNTY  
REGARDING ENERGY MANAGEMENT AND CONSERVATION

**WHEREAS**, the Board of County Commissioners for St. Mary's County (hereinafter known as the BOCC) and the Board of Education of St. Mary's County (hereinafter known as the BOE) are committed to collaboratively maintaining the county's extraordinary environmental and natural resources, historical identity, and quality of life through education and the effective use of resources; and,

**WHEREAS**, the BOCC and the BOE have determined that through management and education of employees, a reduction in energy consumption can be achieved; and

**WHEREAS**, in an effort to preserve the environment and resources of St. Mary's County for present and future generations, the BOCC and the BOE have established the following:

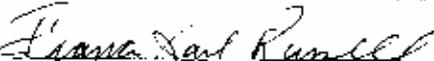
1. A comprehensive approach to the efficient use of energy through energy management and conservation plans with an emphasis on modifying behaviors through education; and,
2. A comprehensive plan for recycling that includes all facilities with a focus on maximizing the materials recycled; and,
3. A commitment to the environment through the procurement and efficient use of environmentally friendly and recycled products; and,
4. A commitment to seeking new and innovative technologies in building renovations, maintenance and new construction that support sustainable designs.

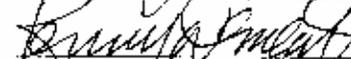
**NOW, THEREFORE, BE IT RESOLVED**, that the BOCC and the BOE each have designated an energy manager to serve as a vital link to facilitate the conservation and management of resources, and, in support of this initiative, encourage all citizens of St. Mary's County to find ways to implement conservation measures that support the future of St. Mary's County for our current and future citizens.

Date of Adoption: September 23, 2008

Effective Date: October 7, 2008

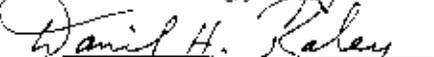
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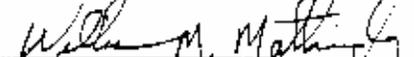
  
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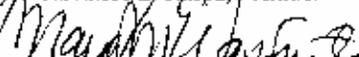
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