

The Governor's Conference on Energy  
Richmond, VA  
October 13, 2010



Energy Efficiency Performance Contracting  
for the  
Virginia Department of Corrections





# Agenda

- Benefits of Energy Performance Contracting
- Major Institutions Projects
- Energy Efficiency and Infrastructure Improvements
- Utility Cost Avoidance



# What is Energy Performance Contracting?

- Energy Performance Contracting (EPC) is a financing vehicle that uses cost savings from reduced energy consumption to repay the cost of installing energy conservation measures and other facility improvements.



# Benefits of EPC

- **Institutional improvements**
- **Limit exposure to future utility rate increases**
- **ESPC Master Lease funding source**
- **Annual guarantee, JCI accountable for results**
- **Supports energy efficiency goals of Executive Order 19**



# Benefits of EPC

As outlined in Governor McDonnell's Executive Order 19, it is

“expected that state agencies and institutions, offices and organizations, will lead in adopting practices and policies that maximize efficiency and conservation, and minimize waste and the impact of operations on the environment”.



# DOC Major Institutions Projects

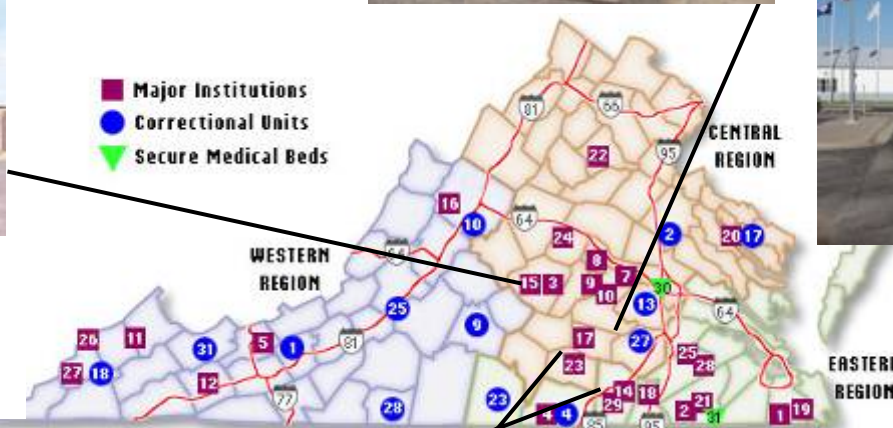
Sussex I State Prison



Buckingham Correctional Center



Sussex II State Prison



Greenville Correctional Center



Nottoway Correctional Center







# Lighting System Upgrades

- **F32 T8 Lamps and electronic ballast**
- **T-5 High output fixtures**
- **LED Exit sign**
- **Lighting occupancy sensors**
  - *Energy Efficiency*
  - *Enhanced Lighting Levels*
  - *Reduced Maintenance Costs*
  - *Extended Lamp Life*





# Lighting System Upgrades







# Lighting Occupancy Sensors

- **Wall and Ceiling Mounted**
- **Sound Activated**
- **Infrared Energy Activated**



**1,800 Occupancy Sensors Installed**



# Completed Lighting Project

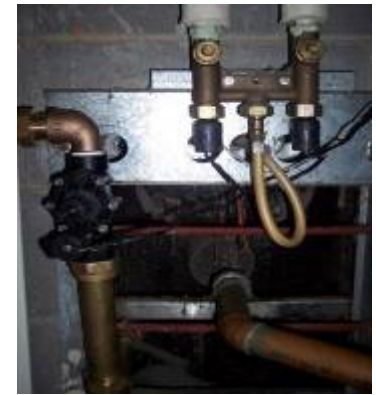
<u>Totals</u>	<u>Existing</u>	<u>Retrofit</u>
6,900	T-12/682,000 Watts	T-8/369,000 Watts
5,700	T-8/ 460,000 Watts	T-8/ 301,000 Watts
2094	Metal Halide/695,000 Watts	T-5/401,000 Watts
801	Incandescent/30,360 Watts	CF/11,264 Watts
81	Exit Signs/1,134 Watts	LED/156 Watts

**Total Project; 784,000 Watts Reduced**



# Water System Upgrades

- Water and energy cost savings
- Significant reductions in maintenance costs
- Vandal resistant/enhanced security
- Contraband-automated shutdown procedure





# Completed Water Project

- **3,392 flush valves 3.5 to 1.6 gpf**
- **424 shower valves 3 to 2 gpm**
- **132 toilets 3.5 to 1.6 gpf low flow toilets**
- **162 faucets 3 to .5 gpm low flow faucets**
- **24 urinals 1.5 to 1.0 gpf low flow urinals**
- **41 shower heads 3.5 to 2.0 gpm shower heads**



# Sussex 1 & 2 Water & Sewer Results

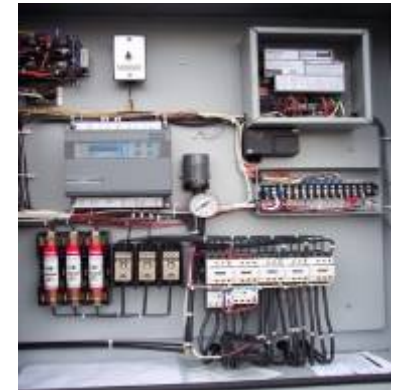
- **Saved 56 million gallons of water saved**
- **Water consumption reduced by 40%**
- **Annual variable overage charges avoided \$273,000**
  - (No overage charges since May 2009)





# Facility Automation and Control System

- Energy savings
- Improved environmental conditions
- Reliability and lower operational costs
- Feed back, troubleshooting, facility management tool
- Integration with old or new systems





## Control Strategy to Reduce Energy

- **Occupied/Unoccupied Control**
- **Economizer Control (Free Cooling)**
- **Consistent Temperature Control**



# Completed Facility Automation/Control System

- **5,675 Temperature, Humidity, Refrigeration, Freezer and Indoor Air Quality Sensors**
- **2,000 Heating/Cooling Valves and Outside Air Damper Control Points**
- **1,980 Fan, Pump, Compressor, Variable Speed Drive and Filter Status Points**
- **1,150 Fan, Pump, Chiller and Compressor Control Points**



# Steam Trap Replacement Program

- **Survey/Inventory Steam Traps**
- **Replaced with the thermostatic steam trap products**
- **Energy Savings**
- **Reliability and lower operational cost**





## Completed Steam Trap Project

***Allows steam to reach its destination in as dry a state/condition as possible to perform its task efficiently and economically.***

212 steam traps replaced





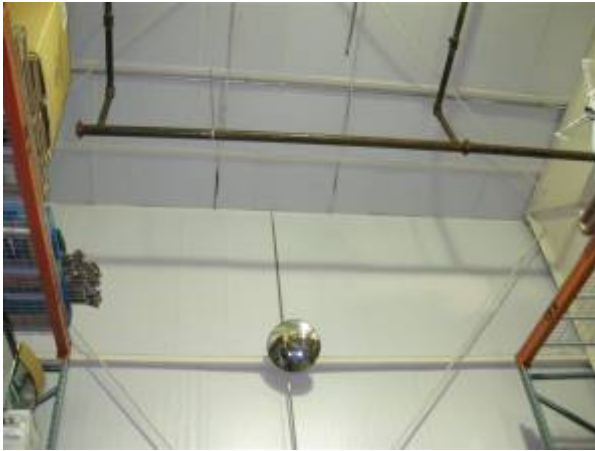
# Building Envelope Upgrades

- **Inspect, repair, replace weather stripping**
  - Exterior, Garage, Interior
- **Re-caulk expansion joint**
- **Roof penetration**
- **Sealed wall sections**
- **Install R-19 ceiling**

*Decrease air infiltration, prevent heat loss and gain, significantly reduce energy consumption*



# Building Envelope Upgrades





# Building Envelope Upgrades





# Completed Building Envelope Project

- Inspect, adjust weather-strip and/or replace **(293 doors)**
- Re-caulk expansion joints, exterior walls **(4,420 ft)**
- Seal passive penetrations around roof vents **(95)**
- Seal open areas in roof/wall intersections **(14,000 ft)**
- Mechanical rooms seal penetrations **(1,060 ft )**
- Seal wall sections between conditions zones **(2,486 Ft.)**
- R-19 Installation of drop ceiling approx **11,200 (sq. ft.)**
- Thermax panels **(69,900 sq. ft.)** or 2187 panels



# Mechanical Infrastructure Upgrades

- Nottoway Correctional Center – Rooftop Units
  - Reduced maintenance activities
  - Lower operational costs
  - Multi-zone control flexibility
  - Energy efficient







# Mechanical Infrastructure Upgrades

- Greenville Correctional Center
  - Administration 50 Ton HVAC Unit Replacement
    - DDC control system
    - Air balance
    - Repair/replace ( 23) VAV boxes





# Mechanical Infrastructure Upgrades

## Greensville

- Support Building 1 – (2) 50 ton rooftop unit
- Support Building 2 –(2) 50 ton rooftop unit
- Support Building 3- (2) 50 ton rooftop unit
  - DDC control system
  - Outdoor air economizer
  - Variable speed drives
- Air Balance system, (150) VAV Boxes





# Mechanical Infrastructure Upgrades

Replaced 5 deficient water heaters storing 820 gal of water with 16 Instantaneous Hot Water Heaters with a 960 gal per hour capacity.





# Mechanical Infrastructure Upgrades

Replaced three 3,000 gallon DHW tanks with (3) heat exchangers with 120 gpm rating.

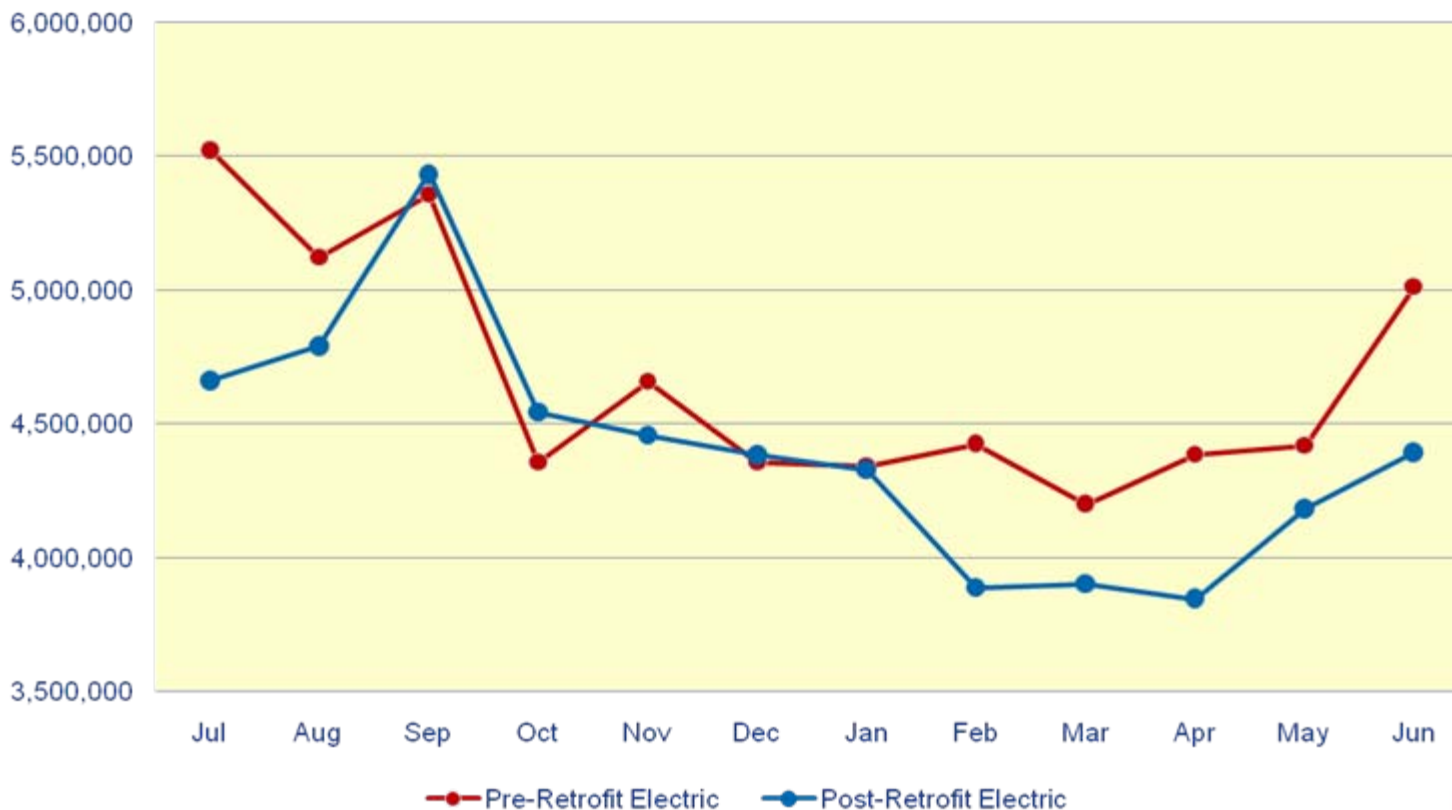






# Reduction in Utility Consumption

**Electricity (5 major institutions)**  
**3, 348,350 kWh Saved**

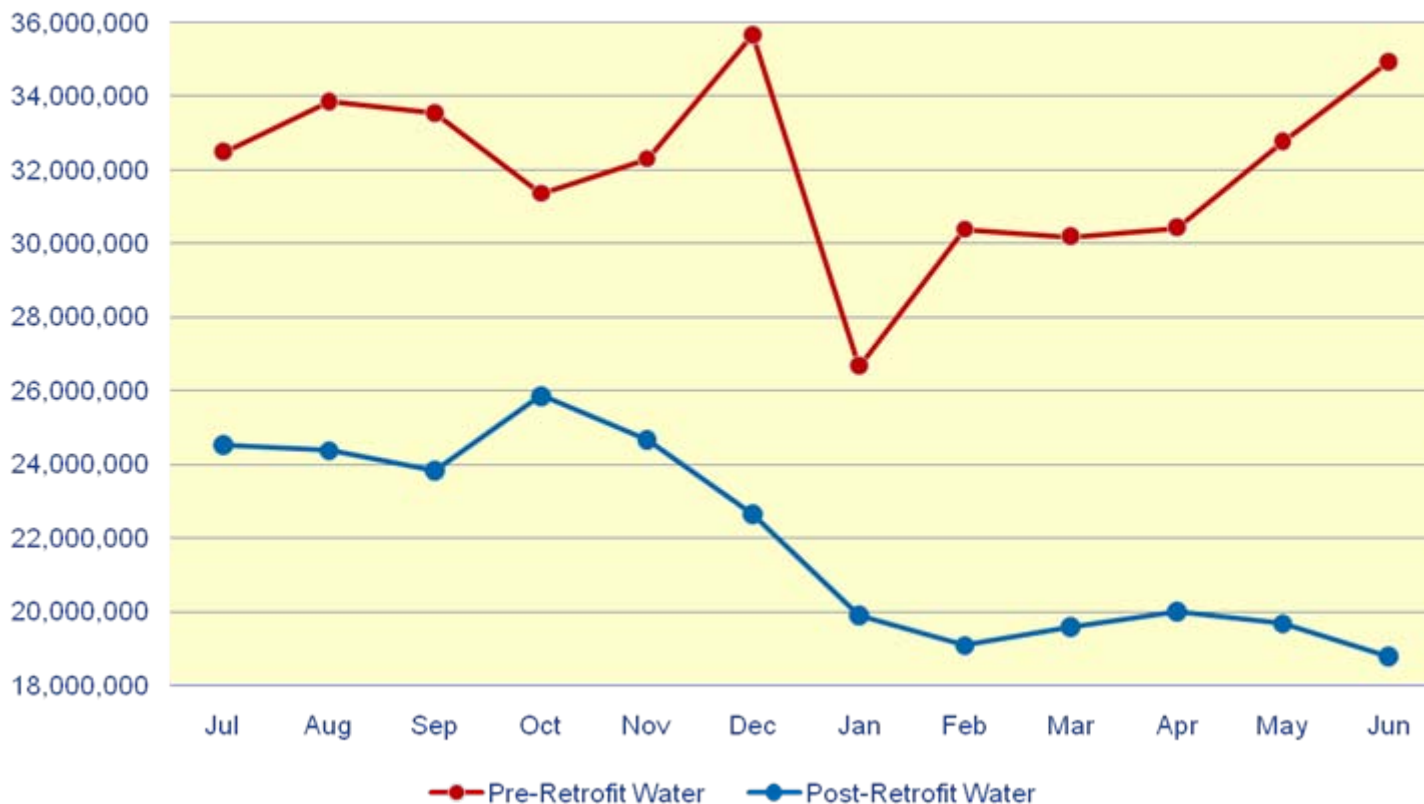






# Reduction in Utility Consumption

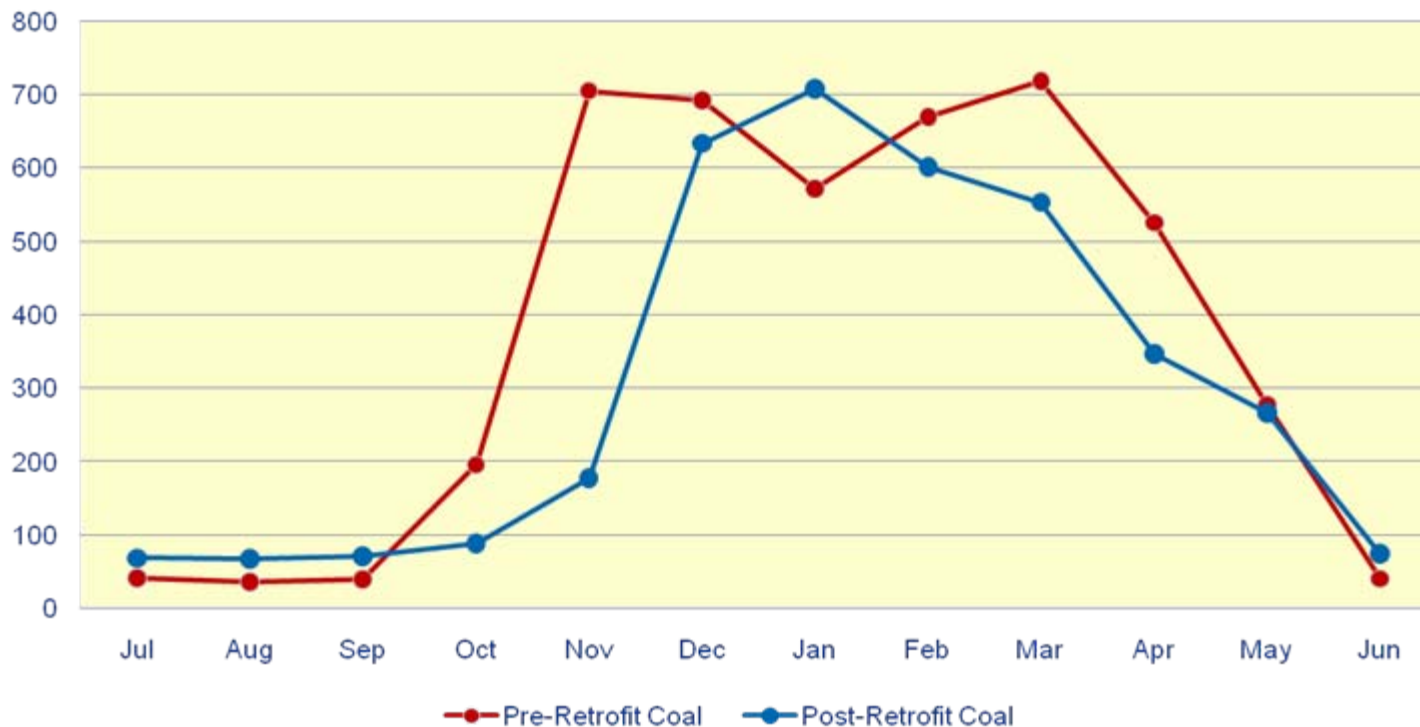
**Water (5 major institutions)**  
**121,757,096 Gallons Saved**





# Reduction in Utility Consumption

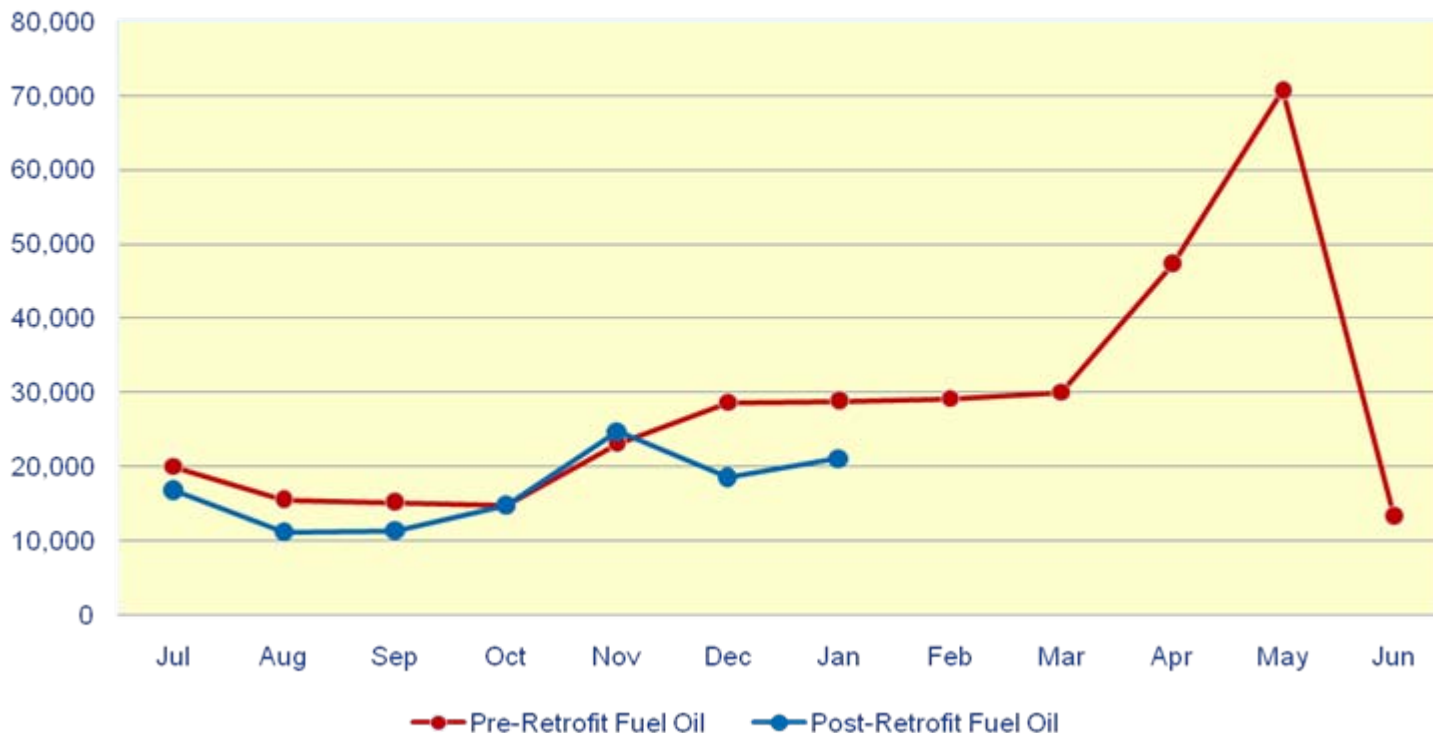
**Coal (3 Major Institutions)**  
**850 Tons Saved**





# Reduction in Utility Consumption

**Fuel Oil ( 1 Major Institution)**  
**27,301 Gallons Saved (7 months)**





# Bottom Line

- Total project savings are \$3.1 mil each year. Guaranteed!
- VA Department of Corrections received over \$33 mil worth of improvements to their facilities paid for by savings.