



Energy: An Analysis of State Expenditures



**Senate Finance Committee
Retreat
November 21, 2008
Fredericksburg, VA**



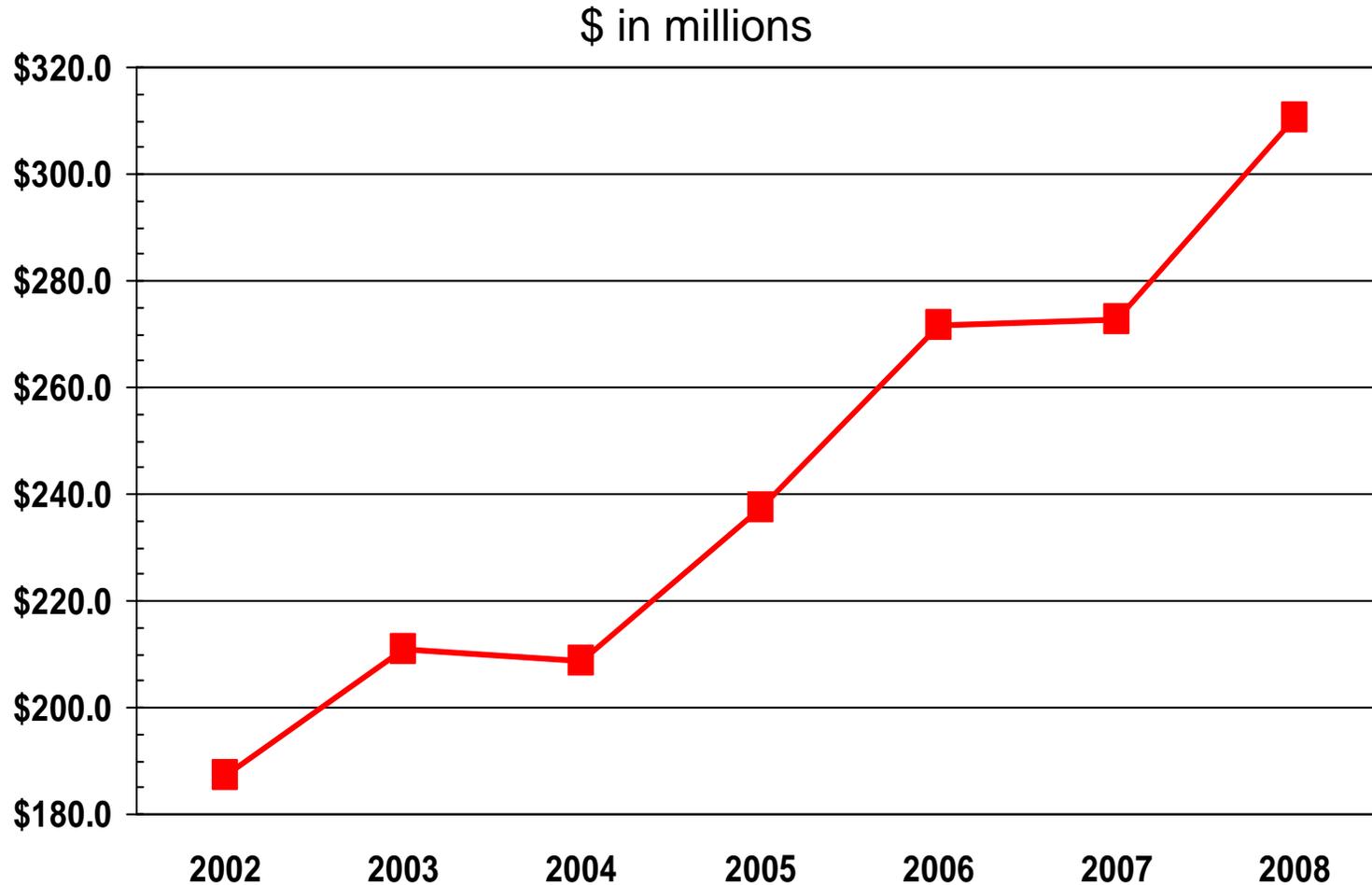
State Agency Energy Use Facts

- According to *APA Commonwealth Data Point*, state agencies' direct costs for energy/utilities and transportation fuels for FY 2008 exceeded \$375 million
 - This does not include costs imbedded in full-service leases or indirect costs to maintain systems
- State energy/utility expenditures have increased by more than 60% since FY 2002
- Expenditures for gasoline and diesel fuel have nearly tripled since FY 2003

Challenges to Analyzing State Energy Consumption

- The Commonwealth does not have a centralized database to track energy/utility consumption
 - Agencies only report by expenditures and that data is incomplete and unreliable for tracking consumption
 - It is not clear how much of recent cost increases are based on usage and program expansion versus commodity prices
- Some state agencies have taken the lead in energy data gathering and conservation efforts while others appear to have done little or nothing

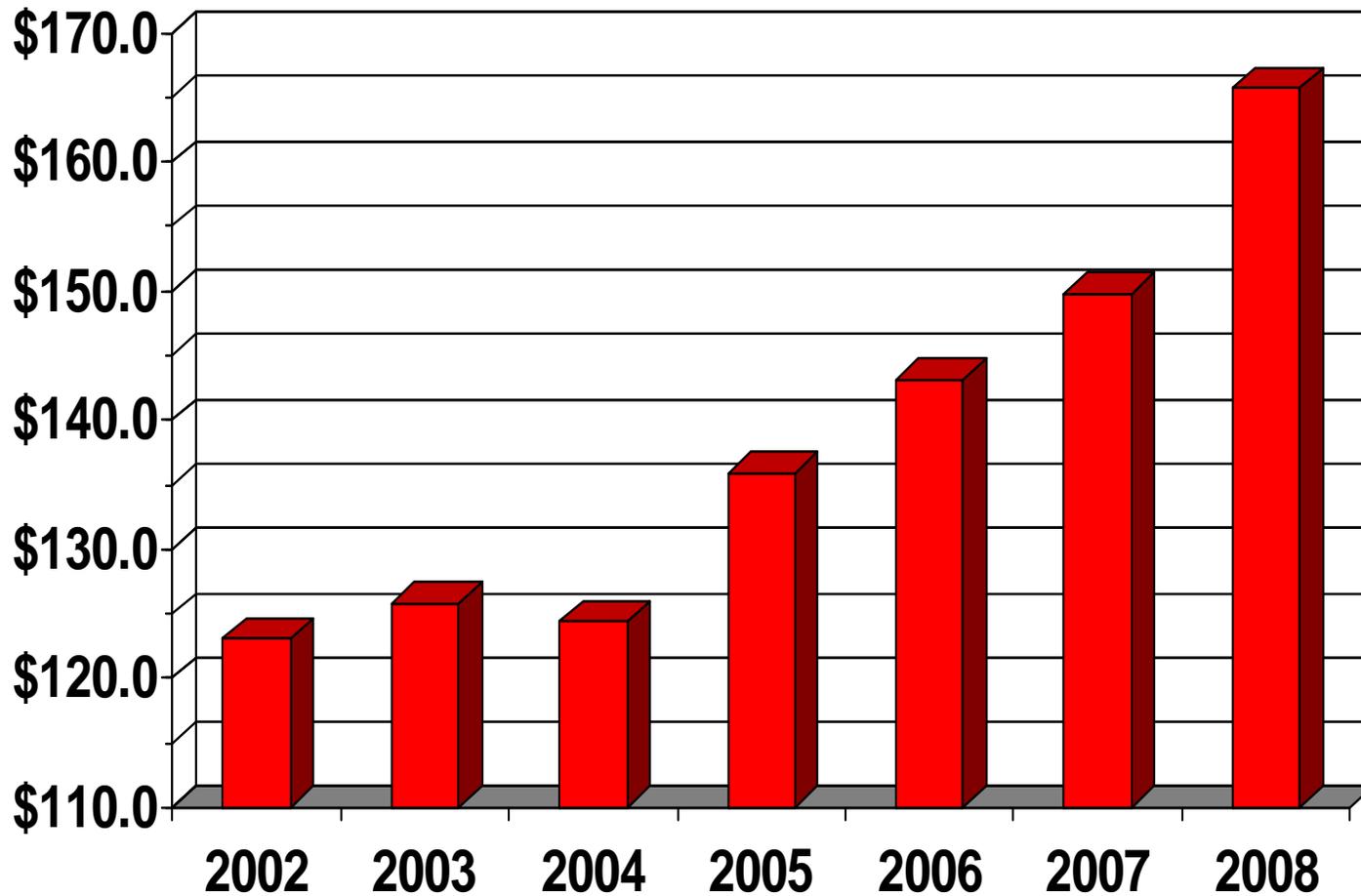
State Agency Energy/Utility* Expenditures by Fiscal Year



*Does not include transportation fuels

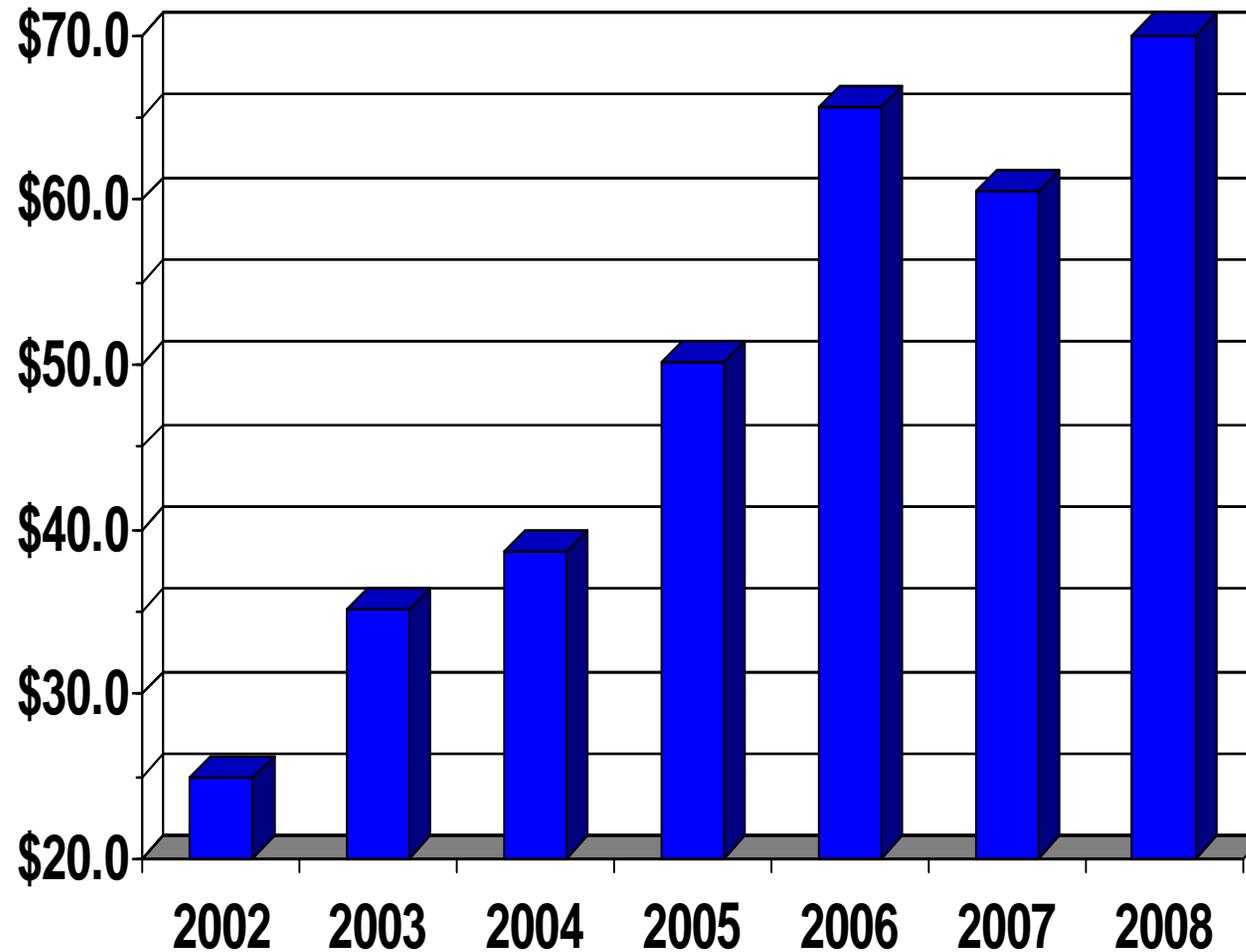
State Agency Expenditures for Electricity

\$ in millions



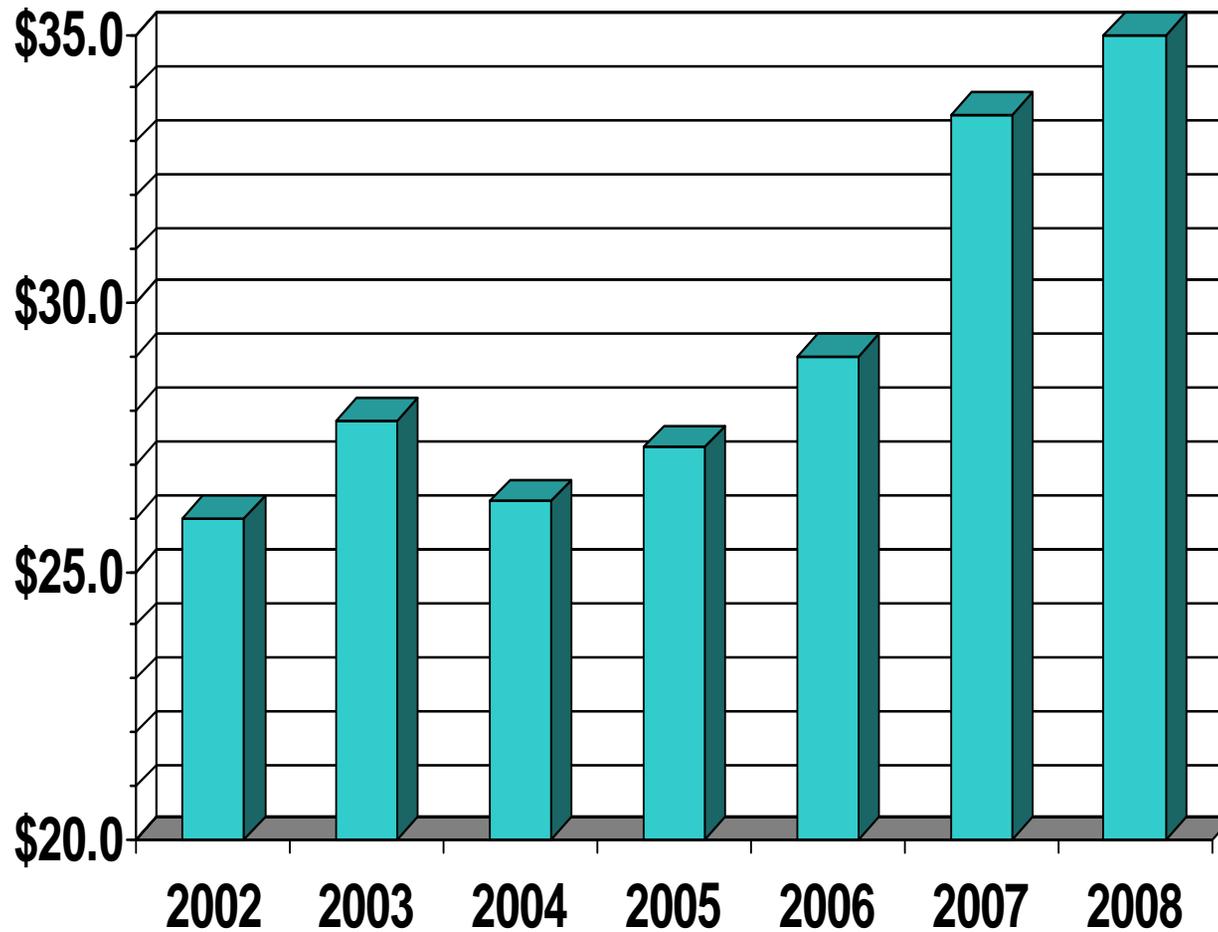
State Agency Expenditures for Natural Gas

\$ in millions



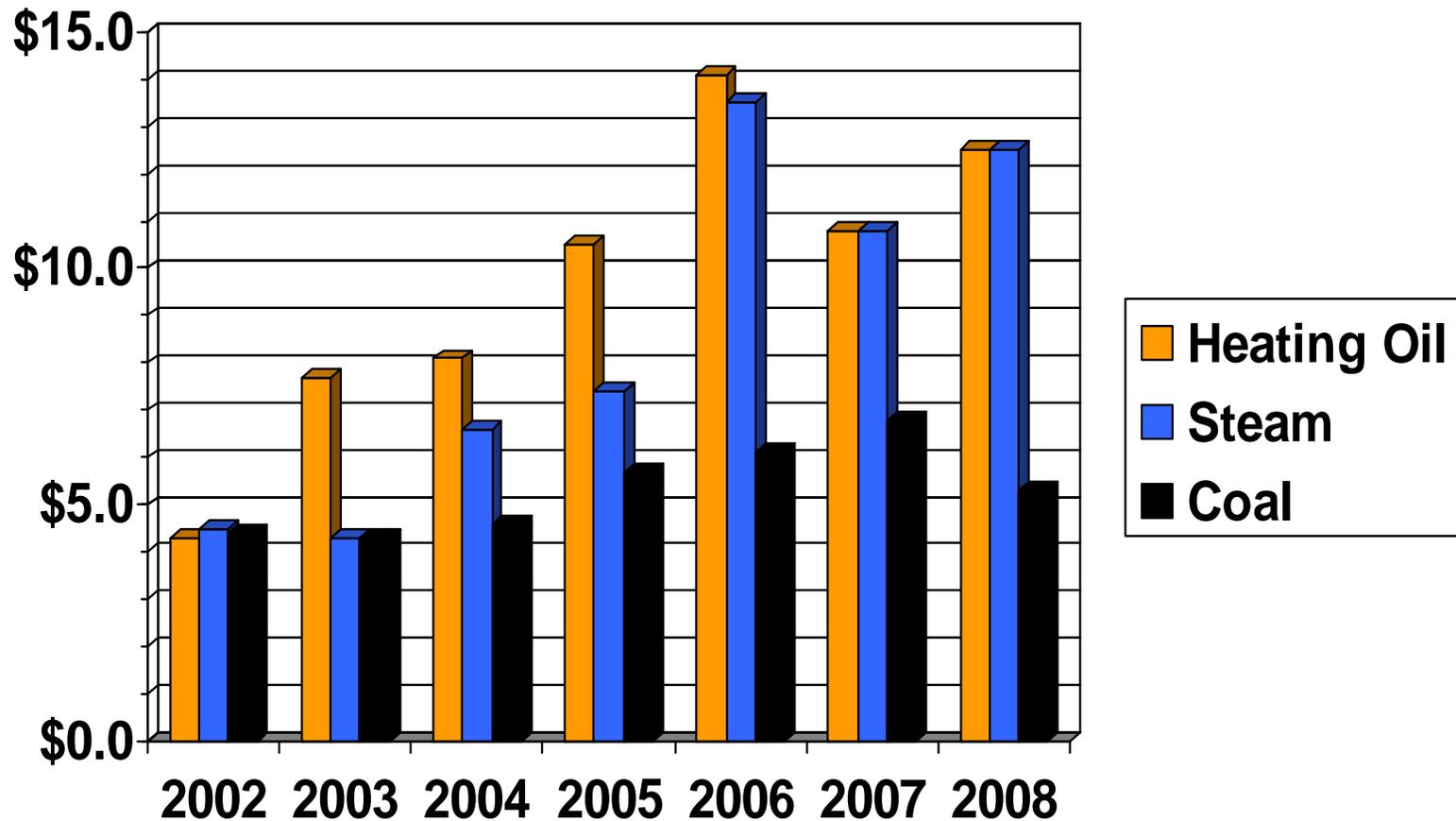
State Agency Expenditures for Water/Sewer

\$ in millions



State Agency Expenditures for Heating Oil, Steam & Coal

\$ in millions



Dept. of Mines Minerals and Energy Projections for FY 2009 and FY 2010:

- Natural gas costs should be fairly stable due to DMME efforts to implement central procurement
- Electricity costs are projected to increase by 33% in FY 2009 and an additional 20% in FY 2010 due to anticipated rate increases
 - Resulting in potential increased costs to agencies of over \$50 million in FY 2009 and over \$95 million in FY 2010
- Recent decreases in oil and gasoline prices may help offset some of these unbudgeted cost increases

Top 10 State Energy/Utility Consumers

FY 2008 \$ in millions

Agency	Electricity	Natural Gas	Water & Sewer	Heating Oil, Coal, Steam	FY 2008 Total
DOC	\$13.6	\$6.3	\$9.8	\$6.5	\$36.2
UVA	\$16.7	\$12.8	\$2.6	\$1.5	\$33.6
VPI	\$12.5	\$4.1	\$1.3	\$3.8	\$21.7
VCU	\$6.9	\$8.3	\$1.9	\$1.1	\$18.2
VDOT	\$12.1	\$1.4	\$2.5	\$0.4	\$16.4
JMU	\$5.6	\$2.1	\$0.8	\$7.8	\$16.3
MHMRSAS	\$4.4	\$4.6	\$1.4	\$1.1	\$11.5
GMU	\$5.2	\$3.7	\$0.7	\$0.1	\$9.7
DGS	\$5.7	\$1.1	\$0.9	\$1.5	\$9.2
ODU	\$4.2	\$1.2	\$1.3	\$0.02	\$6.7

Department of Corrections

Comparison of Adult Institution Energy Costs

Facility	Green Rock	Fluvanna	Coffee-wood	Greens-ville	Red Onion	Sussex I & II	Pow-hatan	FY 2008 Average
2008 ADP	881	1,199	1,195	3,055	791	2,425	813	28,986
Security Level	3	3 female	2	3	Max	5/4	3	N/A
Year Built	2007	1998	1994	1990	1998	1998/ 1999	1952 (1926)	N/A
Cost Per Inmate	\$627	\$741	\$797	\$1,256	\$1,411	\$2,396	\$2,441	\$1,311

- **Factors affecting overall costs**
 - Age of facility
 - Security level
 - Water/sewer plants vs. paying municipal rates

Department of Mental Health, Mental Retardation and Substance Abuse Services

Comparison of Residential Facilities Energy Costs

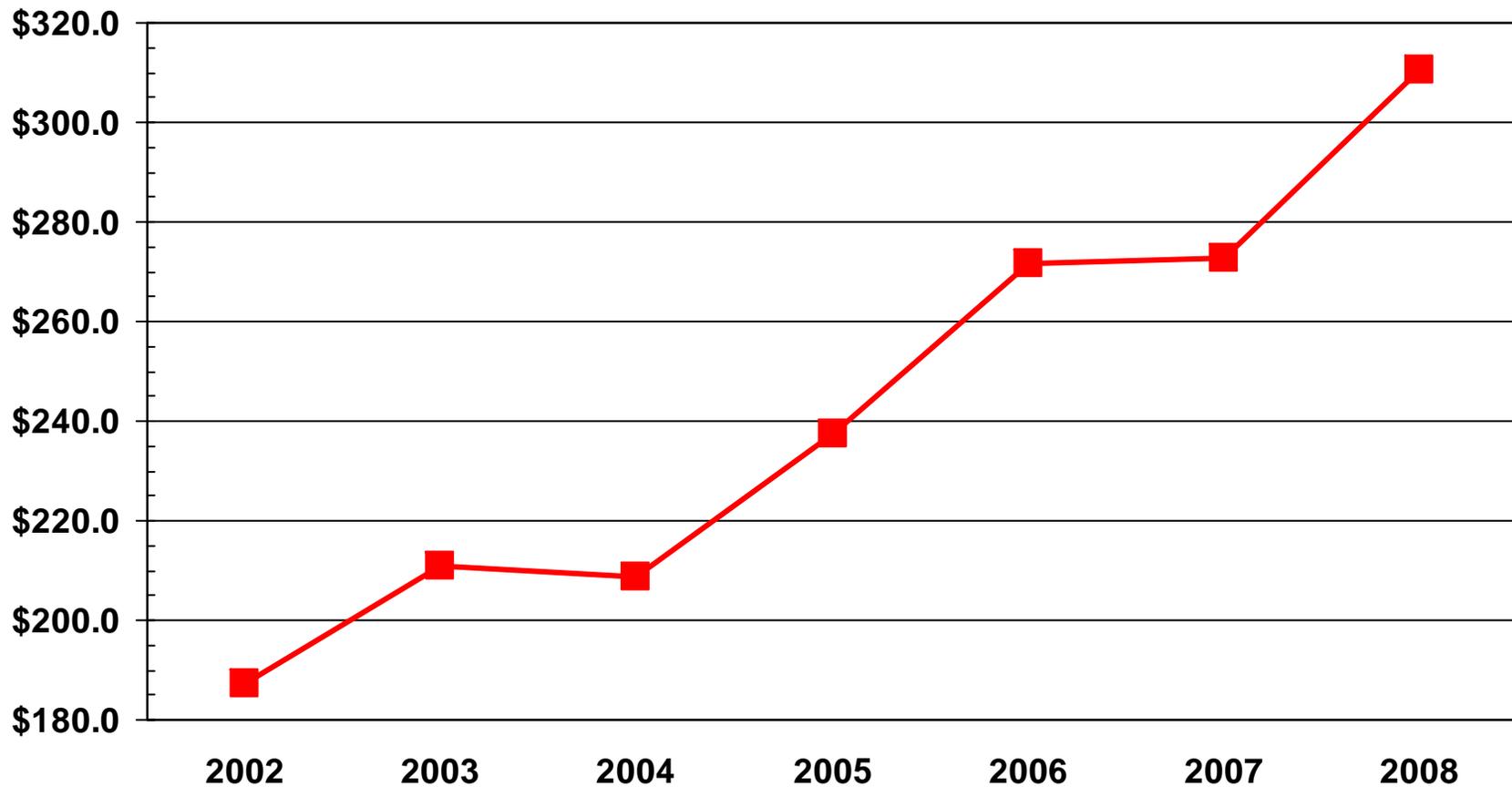
Facility	Western State	SWVMHI	Eastern State	Piedmont Geriatric	NVTC	SWVTC	FY 2008 Average
2008 Census	231	231	400	119	171	301	2,919
Year Built	1950 to 1960	1976	1954 to 2008	1920 to 1958	1973	1976	N/A
Cost Per Resident	\$4,703	\$4,389	\$4,361	\$4,174	\$3,368	\$2,792	\$3,940

Comparison of Higher Education FY 2008 Energy/Utility Costs

University	UVA	VPI	VCU	JMU	GMU	ODU
Total Costs (\$ in millions)	\$33.6*	\$21.7*	\$18.2	\$16.3	\$9.7	\$6.7
Total Sq. Feet (millions)	10.4	7.6	4.7	3.9	4.0	4.3
Average Cost Per Sq. Foot	\$3.23	\$2.86	\$3.87	\$4.18	\$2.43	\$1.56

* UVA and VPI data has been adjusted from the Data Point report to remove indirect cost recovery from divisions and purchases for resale

What is the Commonwealth Doing to Contain Growing Costs?



Energy Efficiency in State Government Executive Order #48 (2007)

- Requires that by FY 2010, all state agencies and institutions shall reduce their annual cost of non-renewable energy purchases by 20% based on FY 2006 expenditures
- Requires new construction/renovation to meet USGBC-LEED ratings or “Energy Star” ratings
- Mandates purchase of fuel-efficient, low-emission state vehicles and maximizing biodiesel and ethanol fuel use

E.O. # 48 Progress Report

April 2008

- Of the 90 agencies located in state-owned facilities, only 38 agencies reported progress towards their energy cost reduction goals
 - Additional 64 agencies in leased space are not required to report
- These 38 agencies reported \$7.5 million in cumulative energy cost-avoidance, about 23% of the 2010 goal of \$32 million per year
- DMME calculated that state agencies avoided 192 million pounds of greenhouse gas emissions per year as a result of these energy efficiency improvements

Factors Limiting Progress on E.O. #48

- Lack of adequate staffing
 - Two staff primarily responsible for statewide implementation (a third hired 10/08)
- Lack of funding for initiatives with up-front costs but long-term savings
 - 10/08 budget cuts delay hiring another energy manager and cut funds for energy revolving loan fund
- Limited buy-in by state agencies, possibly due to lack of incentives
- Lack of baseline consumption data makes it difficult to measure success
 - The progress report notes that electric rate increases “overwhelmed the avoided cost for electricity in FY 07”

Demonstration Building Energy



Audits



- National Governor's Association and Wal-Mart Corp. teamed up to conduct demonstration energy audits at selected state capitols
- State-owned buildings selected in Richmond:
 - General Assembly Building
 - Old City Hall
 - Powers Taylor Building (DOLI offices)

Results of NGA/Wal-Mart Energy Audits

- Audits are complete and findings should be available soon
- Many opportunities for savings will be identified



One example of the audit findings:

On two floors of the GAB, nobody was there but all the lights were on

Why Wal-Mart?

- Wal-Mart has implemented a sustainability campaign to improve their environmental image and bottom line at the same time through the following goals:
 - Make existing stores 25% more energy efficient by 2014 and new stores 30% by 2011
 - Increase truck fleet efficiency by 25% by 2010 and 50% by 2017



Could Energy Audits of Other State Office Buildings Find Potential Savings?



Monroe Building



<Monroe Parking Deck



Madison, Jefferson, Washington, Oliver Hill



VDOT "Old Tower"

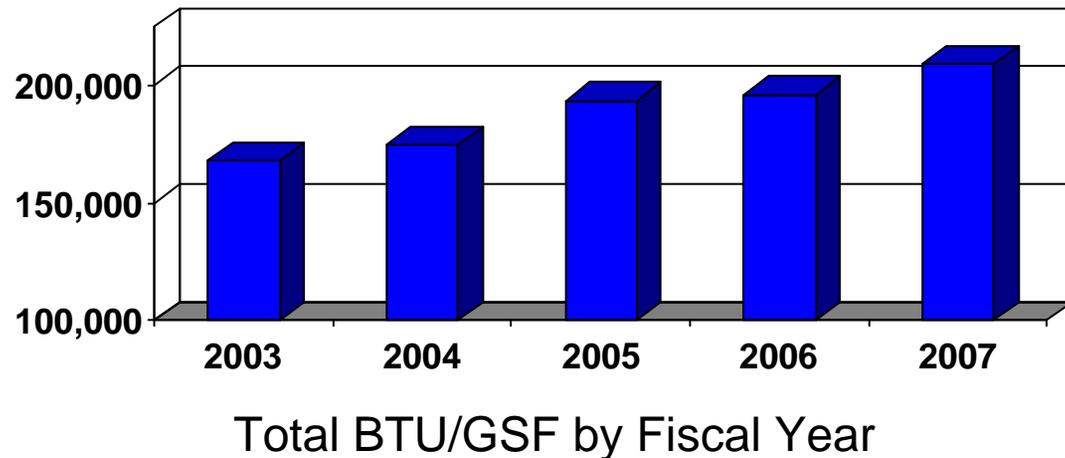
Sightlines VCU Analysis

- Sightlines, a facilities asset advisory firm, conducted an in-depth assessment of all Virginia Commonwealth University facilities, including an analysis of energy use
 - The analysis found that VCU consumes more energy than similarly situated peer institutions
 - However, due to lower commodity prices, VCU's overall costs are lower than average
 - VCU's operating budget is “far lower than peers”



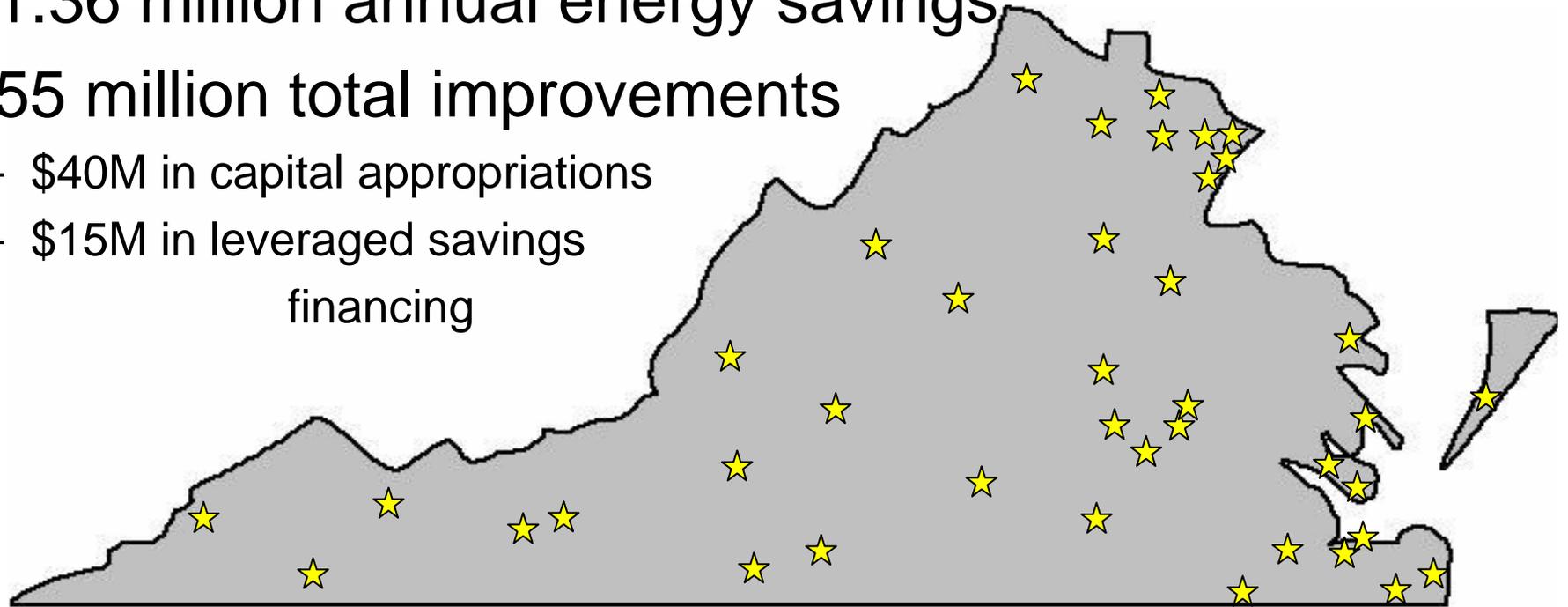
Results of Sightlines VCU Analysis

- VCU now has accurate historical and current data on energy consumption using industry standard BTU/GSF
- VCU energy consumption has increased by 24% from FY 2003 to FY 2007
- “The VCU energy profile highlights an area of operations that could provide savings opportunities”
- VCU is using the Sightlines data to help drive decisions during the current budget situation



The Virginia Community College System Leads the State in Energy Saving Performance Contracting

- 5th year of performance contracting
- 20 projects completed
- \$1.36 million annual energy savings
- \$55 million total improvements
 - \$40M in capital appropriations
 - \$15M in leveraged savings financing



VCCS Case Study #1

Wytheville Community College

\$3.5 million GOB Funding + \$1.3 million leveraged savings = \$4.8 million total

- Replace aged chillers and boilers
- Replace aged air-delivery system
- Update from pneumatic controls to direct digital controls

SOLUTION

- Central Plant
- Eliminate 6 major pieces of equipment
- New fan coil units
- Advanced Digital Controls



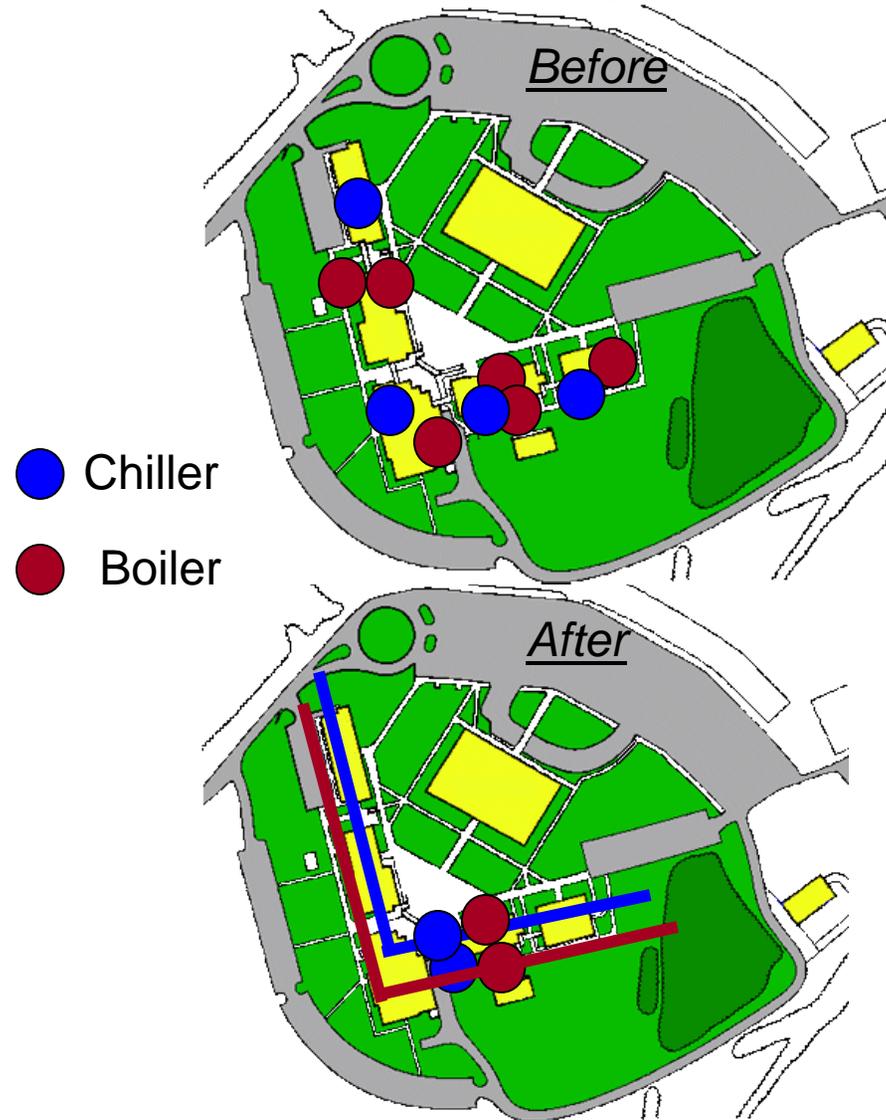
VCCS Case Study #1 (cont.)

Wytheville Community College

BENEFITS

- Major impact on indoor air quality
- Improved classroom comfort
- Reduced maintenance burden

Guaranteed energy savings of
\$136,000 per year
(47%)



VCCS Case Study #2

Northern Virginia Community College, Annandale

\$7.5 million GOB funding + \$3.5 million leverage savings = \$10.5 million total

- Replace chilled water/hot water plant in one building that now serves three
- Another new plant connects two buildings
- New air handler units in all buildings
- Campus-wide direct digital controls
 - **Proper operation of new controls provides greatest energy saving: staff training is critical**



BENEFITS

- Improved comfort in all campus buildings
- Reduced maintenance with single control system platform
- Standardization on equipment eases burden on operations staff

Guaranteed energy savings of \$270,000 per year (38%)

VCCS Next Steps

- VCCS is implementing the Energy Demand Response program through DMME, which will generate revenue at qualifying campuses
 - Demand Response is an agreement with utility provider to reduce draw during peak demand times
- Upcoming Performance Contracting project at Virginia Western Community College will involve a solar project initiative
- Develop HVAC Master plan for the VCCS

Department of Corrections Performance Contracts

- Three phased performance contracts with **guaranteed energy savings of over \$3.1 million/year**
 - Phase I: Buckingham, Dillwyn, Fluvanna, Nottoway (complete)
 - Phase II: Augusta, Botetourt, Pulaski, Indian Creek, Haynesville, Baskerville, Deep Meadow (complete)
 - Phase III: Greenville and Sussex II (just starting)



Department of Corrections Performance Contracts (cont.)

- Examples of DOC performance contracts
 - Energy efficient lamps, ballasts and occupancy sensors
 - Low flow plumbing fixtures and electronic water controls
 - Mechanical upgrades, high efficiency coils, variable speed drives
 - Automated temperature control systems
- DOC future opportunities
 - Additional site surveys
 - Substituting biomass for conventional fuels
 - Solar and wind power generation
 - Installing geothermal systems
- DOC indicates lack of dedicated funds and budget cuts prevent them from doing more



Virginia Commonwealth University

Walter L. Rice Education Building

- 4,900 square foot VCU Rice Center for Environmental Education opening this fall
 - First State building to meet USGBC-Platinum LEED Certification (the highest national level)



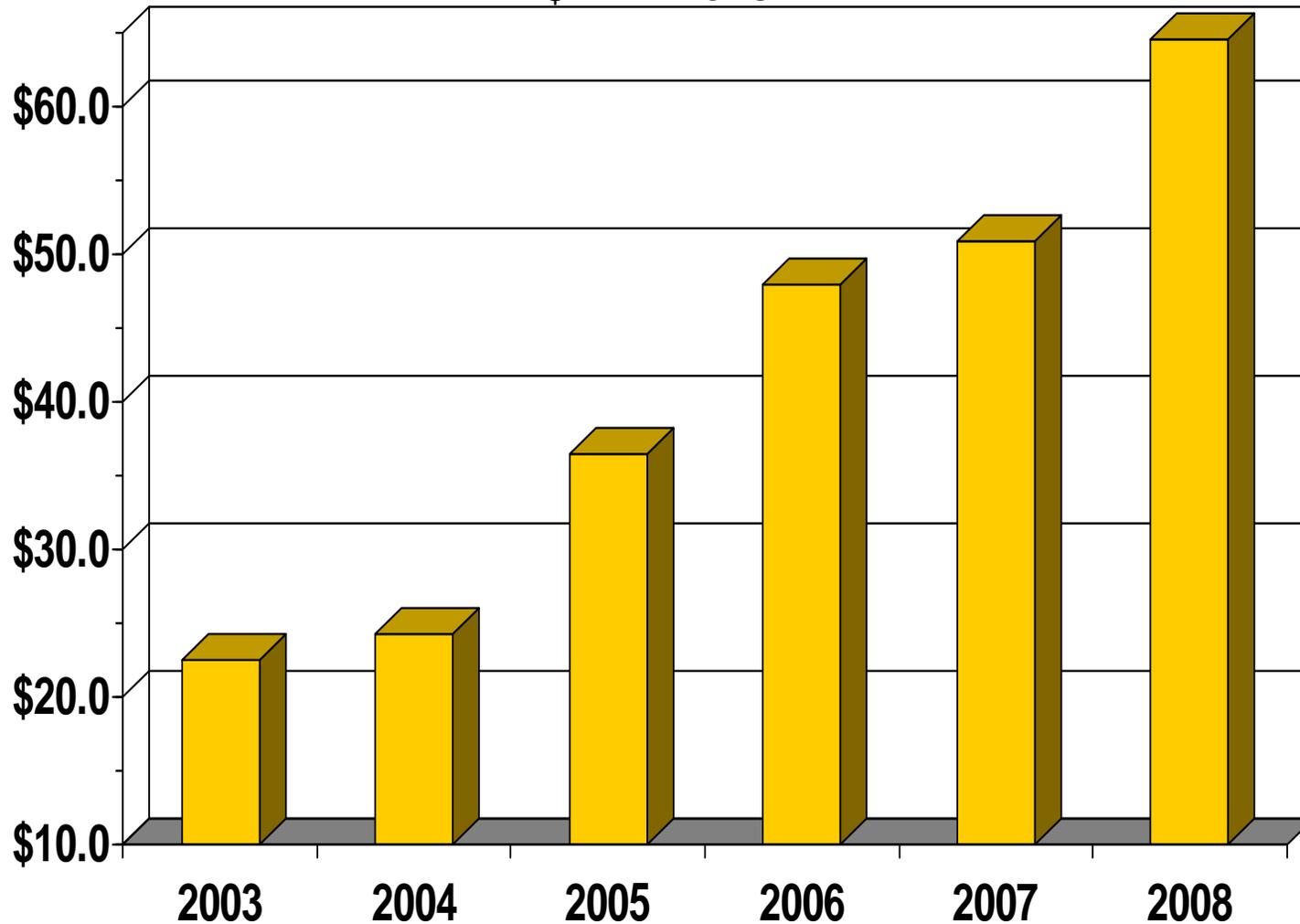
VCU Rice Center Education Building Design Features

- Solar Photovoltaic panels will generate 7 Kw
 - Estimated to generate nearly 20% of annual energy used in the building
 - Net-Metering agreement with Dominion Power
- High efficiency geothermal heating and cooling systems
- Ventilation via operable windows
- Access to natural daylight in 100% of occupied spaces
- High efficiency plumbing fixtures
 - Collected rainwater to flush toilets
- Vegetated roofing reduces heat and stormwater runoff



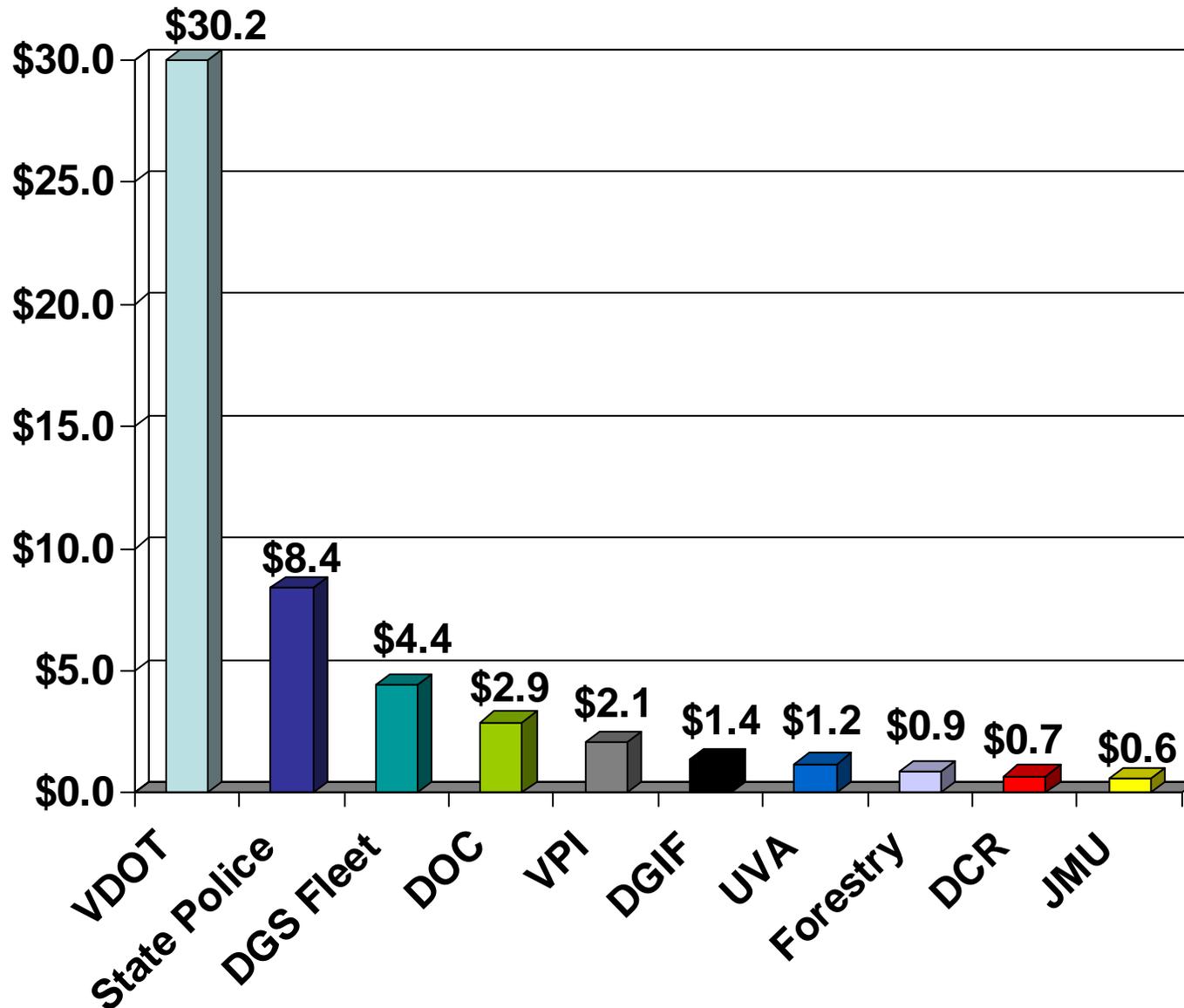
State Agency Expenditures for Gasoline/Diesel Fuels

\$ in Millions



Top 10 State Gasoline/Diesel Consumers

FY 2008 \$ in millions



Fuel Efficiency of State Vehicles

- The FY 08 DGS Fleet average was 27 MPG
 - 1st year of baseline data, not previously tracked
- The fleet now includes 872 Flex fuel vehicles and 287 CNG vehicles
 - For FY 08, 6,527 gallons of E-85 were used, an average of only 7.5 gallons per vehicle
 - No CNG was consumed since fueling sites no longer available
- The fleet has no hybrid vehicles
 - DGS analysis concludes total cost-of-ownership is higher
- Short term rental car program saved the Commonwealth \$594,002 in FY 2008



Conclusions and Recommendations

- Energy conservation should be given a higher priority by state government
 - Minimal investment in additional staff and proven strategies can have significant payback
- No-cost and low-cost strategies should be expanded immediately
- The Commonwealth should have a centralized database of energy/utility units consumed to measure progress
 - “Lack of complete energy consumption data continues to be the largest obstacle in determining where energy is being used in the Commonwealth” DMME 2006 Report on Energy Conservation by State Agencies

Conservation Measures Can Be Implemented Immediately

- Building/Facility specific energy audits can identify wasted energy/utility use
 - Existing staff can be trained in a standardized assessment method
- State employees can be trained to be more cognizant of their energy use
 - Work units should have a designated “energy miser”
- Low cost energy-saving devices that will pay for themselves can be installed
 - Compact fluorescent bulbs, occupancy sensors
- Some budget reductions can be off-set by energy/utility conservation to avoid further program cuts



Policies Could Mandate Energy Efficiency in Renovation and New Construction

- Major renovation and upgrades to HVAC, mechanical, plumbing systems could be mandated to include guaranteed energy-saving performance contracting
- New construction should always meet LEED, Energy Star and/or Green Globe standards
- Performance contracting could be expanded to include wind, solar and geothermal applications
- General Assembly could consider authorizing bonds to provide funding for qualified energy saving projects that would be paid for through guaranteed energy savings