



SUSTAINABILITY

Energy Management Program

PHYSICAL ENVIRONMENT



- Residential College
- 1250 acres; 425 developed
- 80 of the 425 are turf area
- 195 buildings; approximately 3.4 million sq.ft.
- 4962 parking spaces

POPULATION



- 5700 Undergraduates; 75% housed on campus
- 2000 Graduates; 12% housed on campus
- 2800 faculty and staff
- Hundreds of daily visitors

ENERGY CONSUMPTION



FY2007

Typical Home

Electricity	70,800,000 kwh	15,000 kwh
Natural Gas	219,000 mcf	120 mcf
Fuel Oil	29,000 gallons	900 gallons

ENERGY DISTRIBUTION



FY2007 (Estimated)

○ Academic	39%
○ Residential	33%
○ Dining/Student Services	10%
○ Administration	9%
○ Athletics	7%
○ Other (i.e. Alumni House)	2%

SUSTAINABILITY COMPONENTS



- Energy Management
- Land Use
- Water Use
- Waste Management
- Transportation
- Procurement
- Education

SUSTAINABILITY



ENERGY

- Implement operational procedures, standards, and goals to improve energy efficiency.
- Pursue LEED certification standards for new construction and major renovations.
- Encourage individual students, faculty, and staff to think about energy use in their daily lives.

SUSTAINABILITY



LAND USE

- Preserve land cover and minimize impervious surface when constructing new and renovating existing facilities.
- Consistent with overall program objectives, site facilities and structures in a way that promotes sustainable practices, including the preservation of green space, the minimization of the loss of other land cover, and the maintenance of a low ratio of impervious to natural surfaces.

SUSTAINABILITY



WATER USE

- Implement operational procedures, standards, and goals to decrease water use.

WASTE MANAGEMENT

- Promote a comprehensive and effective waste recycling program.

TRANSPORTATION

- Promote transportation choices that minimize use of fossil fuels.

SUSTAINABILITY



PURCHASING

- Consider the sustainable impacts and life-cycle costs of materials and equipment when making purchasing decisions.
- Pursue renewable sources of energy for the campus.

EDUCATION

- Educate the campus community regarding sustainable energy, land and water use, waste management practices, transportation choices, and materials purchasing choices.

ENERGY MANAGEMENT



Conservation

- Energy Manager
- Small renovation and replacement projects
- Education/Behavioral change

Facilities Design, Construction and Major Renovation

- Standards and Guidelines
- Storm Water Management Master Plan

COMPLETED PROJECTS



- W&M Hall (ESCO-New Chiller, Building Envelope, Controls)
- Removal of the High Temp HW Loop
- Swem Plant Expansion
 - ✦ Centralized Chilled and Hot Water Loops

ONGOING PROJECTS



- Lighting Upgrades
 - ✦ Occupancy sensors
 - ✦ Electronic ballasts and T8 lamps
 - ✦ Term contractor for lighting projects
- Steam Trap Program
 - ✦ Survey and Replacement Program
- Thermal Insulation Repairs
- Small Boiler Replacements
- Programmable Thermostats
 - ✦ Residential sized buildings
- Grounds Equip. bio-diesel fueled
- Water Treatment Contractor
 - ✦ Reduction in scale and corrosion
 - ✦ Increased heat transfer efficiency

CAPITAL PROJECTS



- Energy Efficiency Review
 - ✦ New construction
 - ✦ Renovations
- LEED Standards (Leadership in Energy and Env. Design)
 - ✦ Recreational Sports - certified
 - ✦ Jamestown Residence Halls - certified
 - ✦ Mason Business School – seeking Silver
 - ✦ School of Education – seeking Silver
 - ✦ Small Hall Addition/Renovation

CAPITAL PROJECTS



- Power Plant Boiler Replacements
 - ✦ New Efficient Boilers
- North Boundary Heating Replacement
 - ✦ Replacement of obsolete steam system
- Centralized Chilled Water Loop (Old Campus)
 - ✦ Replacement of less efficient distributed chillers

Mason School of Business

Green Building Facts



- 20% energy savings over ASHRAE standard 90.1 (i.e. code) compliant building
- Projected water savings exceeds 40% (as compared to code compliant building)
- All building lighting is controllable; automatic shut off
- 50% of all the rainwater will be collected, stored underground, and used for irrigation. Additionally, condensate from mechanical equipment will be collected and used irrigation.
- Native and drought resistant plant species to reduce irrigation requirements.
- CO₂ monitoring in high volume spaces to provide adequate outside air to ensure optimal indoor air quality.
- Meets ASHRAE 62.1, providing for improved indoor air quality as compared to a building that just meets code.
- Design provides for increased thermal comfort for occupants through use of individual controls in rooms.
- Building will be part of the College's Green Housekeeping initiative to reduce exposure to cleaning chemicals and practices that are potentially harmful to people and the environment.

Demolition of Williamsburg Community Hospital LEED Recycling Facts



Material Type

- Trees and Shrubs to Mulch
- Dirt
- Asphalt Paving
- Concrete
- Steel
- Aluminum
- Copper

Amount Recycled

1,218 cubic yards
6,596 cubic yards
640 tons
22,160 tons
2,011 tons
16 tons
40 tons

PROCUREMENT STRATEGIES



Purchasing/Specifications

- Natural Gas Purchasing Strategies
- Energy Star Appliances
- Efficient Motor Replacements/Procurement
- Lighting Fixture and Lamp Standards
- Technical Design Standards
- Grounds Equipment/bio-diesel fuel use
- Green Cleaning Products

RESULTS



Energy Consumption

	<u>FY06</u>	<u>FY07</u>
Cost	\$6.2mm	\$5.6mm (-10%)
MMBTU (million BTU)	509,700	478,100(-6%)
BTU/GSF(BTU/Gross Sq. Foot)	170,300	150,600 (-12%)

RESULTS



Utility Carbon Emissions

	<u>FY06</u>	<u>FY07</u>
CO ₂ (Tons)	62,200	61,300 (-1%)
Lbs CO ₂ /GSF	40.6	38.4 (-5%)

BEHAVIORAL CHANGE



- Education Programs
- Student and Employee Orientation
- Recycling
- Waste Reduction
- Water Reduction

DINING SERVICES



- Sustainable Food
- Sustainable Waste
- Responsible Procurement
- Energy and Water Conservation

FUTURE INITIATIVES



- LEE Committee - Committee on Sustainability
- Low Hanging Fruit
- Green Fee

FUTURE INITIATIVES



Creation of a Carbon Reduction Plan

- 12 year time horizon
- Plan will take into account:
 - ✦ Campus growth and building efficiencies
 - ✦ Proposed renovations
 - ✦ Utility upgrades
 - ✦ Dominion Power initiatives to promote renewables
 - ✦ Subject to availability of funding
- 27% reduction in carbon output

PROPOSED PROJECTS



- College Green Housekeeping Initiative
- Web Based Building Controls Upgrade
- Campus Wide Lighting Upgrades
- Building Upgrades
 - ✦ Mechanical and Electrical Systems
 - ✦ Windows, Doors, Insulation
- Individual Building Meters
- Continue to add buildings to central heating and cooling plants
- Web Site

CHALLENGES



- Campus Growth (FY06 vs FY08 +13% GSF)
- Construction of Energy Intensive Buildings(ISC)
- Building Age, Condition and Architectural Restrictions
- Funding
 - ✦ Targeted paybacks of 10 years or less
 - ✦ Sources
 - Operating Budget (Repairs)
 - Maintenance Reserve