

# Sustainable Building Operations and Maintenance at Elon University

## Preface

The University has 607 acres of land with a substantial portion that is undeveloped. There are 118 owned buildings, 13 leased buildings and 7 managed buildings (Oaks complex) totaling more than 2,000,000 square feet. The gross value of all owned buildings is \$205,745,873 and the average age of all buildings is thirty years.

The watchful stewardship of these physical resources is heavily influenced by Elon University's commitment to sustainability. Members of the Physical Plant are attentive to implementing practices in their operations and maintenance activities that support and advance the preservation of the campus grounds and the reduction of greenhouse gases. These measures are undertaken in order to provide attractive, safe and healthy teaching, learning and work environments. The guidelines that follow summarize the practical steps taken by the Elon University Physical Plant, as well as the campus community, to demonstrate and practice our ethos of sustainability in everyday living.

### Sustainable Sites

Elon University is fortunate to have ample land which has enabled it to minimize its impact on its environs while continuing to grow responsibly. Over the last 20 years, the campus has seen its enrollment increase by 89 percent. To accommodate this growth, the campus infrastructure and facilities have grown in accordance with the campus master plan. Planners have recognized the importance of open green space and mature trees in their capital planning and have preserved and incorporated these natural features into the current campus landscape.

Stormwater collection and management is highlighted by the three man-made lakes on campus. In addition to mitigating erosion runoff, these lakes are further utilized as sources of irrigation for our landscaping and grounds activities. They additionally provide a natural gathering point for native wildlife such as Canada geese, ducks, herons, muskrats and turtles. Eighty-five percent of the campus irrigation needs are satisfied through these lakes. Two of the larger lakes are also inter-connected which allows for the transfer of water from one lake source to the other. These lakes are fed primarily by stormwater runoff. The use of synthetic fertilizer is kept to a minimum through the use of frequent soil and tissue tests and custom blended fertilizer to provide only the nutrients found to be deficient. Further, the use of slow release nitrogen components (polymer coated, sulfur coated urea's) are primarily used as they require both moisture and high soil temperatures to become available, virtually eliminating leaching or run-off concerns and provide a slow nutrient release.

Around each campus building, landscaping is provided to enhance and soften the stark features of brick and mortar. Shrubs and flower beds are created to be low in maintenance with a preference for perennials where possible and in accordance with sound horticultural designs. Other landscaping design considerations include the use of drought tolerant species, inclusion of convenient sidewalks to encourage walking, sidewalk recycling containers and wide sidewalks which facilitates physical removal of snow and ice with equipment, thereby minimizing the use of deicing materials.

New parking lots are constructed on the campus perimeter and bicycle racks are conveniently provided at most buildings to discourage driving and promote biking and walking as the preferred mode of transportation.

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In 2005, the Elon University campus was designated a botanical garden to serve as a model for stewardship of the environment and conservation of plants. Moreover, the campus landscape has been and continues to be used as an educational resource with an expanded diversity of plants and interactive displays. Elon University is also a member of the American Association of Botanical Gardens and Arboreta (AABGA).

### Water Usage

Throughout the campus, toilet and shower fixtures are fitted with low flow water devices. In newer buildings, water closets are specified with dual flush valves for solid (high flush) or liquid (low flush) wastes. Shower heads are rated at 1.6 gallons per minute (gpm); residential lavatories at 1.5 gpm and lavatories in office/classroom buildings are rated at 1.0 gpm. Commercial or residential kitchen sinks are rated at 2.2 gpm.

Water utility billings are closely monitored and any anomalies in water consumption are immediately referred to the Plumbing Shop for investigation and or correction.

In order to minimize the purchase of plastic bottled water, Elon encourages the refilling of reusable water bottles by specifying water coolers with bottle filler features such as the Elkay Model EZSTL8WSLK or “gooseneck” units. These units are installed in high traffic areas for accessibility and as a visual reminder to make sustainable choices in our everyday lives.

### Energy Usage

Since 2005, Elon University has reduced its energy consumption by 18 percent. This has been accomplished in the following ways:

- As newer facilities are constructed and added to the physical plant, their building systems are designed to be more energy efficient. This results in lower consumption rates of energy per square foot.
- Direct digital control of heating, ventilating and air conditioning (HVAC) systems provides more discrete and stricter control of system operating parameters.

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- Variable frequency and variable speed drives allow motors to be more closely matched to the actual loads.
- An integrated energy control and management system enables our HVAC technicians to centrally monitor building environments and make corrective adjustments.
- Each building has a developed operating schedule that permits setback temperatures and scheduling of pump and fan operating hours.
- In 2008, Elon University implemented a web-based, visual building dashboard <http://www.buildingdashboard.net/elon> (from Lucid Design Group) that affords the campus community, and others, observation of their energy consumption in real-time. The dashboard currently monitors 53 buildings and includes residential buildings as well as academic/administrative facilities.
- POWERLESS energy competitions are held twice yearly to generate interest and participation in energy conservation habits among residence hall occupants. These competitions are part of an overall strategy to remind students that we are all contributors to Elon's carbon footprint and to affect their lifestyles in ways that will serve to promote sustainable habits.
- Energy consumption is monitored minimally on a monthly basis with progress charted throughout the fiscal year. Comparisons to a base year, as well as to the previous year, provide an indication of whether or not conservation goals are being achieved. With Dashboard and our meters, electricity can be monitored or checked more often.
- A facility energy conservation policy has been adopted that outlines heating and cooling set point temperatures (68°F winter heating/74°F - 76°F summer cooling), lighting guidelines, computer power management, fume hoods, office equipment and appliances. The policy specifics may be reviewed at <http://www.elon.edu/docs/e-web/bft/physicalplant/EnergyPolicyWebsite.pdf>
- The institution has established a goal to reduce energy usage annually by 6% as measured by BTU/sqft/degree-day.
- Incandescent lighting is being replaced with compact fluorescents, T5's and T8's, or LED's.
- Solar thermal hot water systems have been installed on five campus buildings; the Colonnades Dining Hall, and the Story, Moffitt, Danieleley I and Danieleley K residence halls. By passively capturing solar heat, water is heated or preheated, thus eliminating, or mitigating the consumption of

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natural gas for domestic hot water production and use. Solar collector panels are visually inspected daily to insure they're not obscured in order to maximize solar heat capture. The solar heat exchanger is also monitored to detect any decrease in efficiency.

- Geothermal heating and cooling has been retrofitted to Story and Moffitt residence halls thereby eliminating the need to operate a 125 Ton chiller as well as reducing our natural gas consumption. The assessment of existing facilities for renewable energy opportunities is an on-going, collaborative effort between the Physical Plant staff and the Director of Sustainability.

### Material and Resource Usage

Elon has a green cleaning program that covers all normal cleaning activities undertaken in the course of managing University facilities and addresses the following: Cleaning Chemicals, Janitorial Products and Equipment, Entryway Systems Maintenance, Waste and Education.

Non-toxic and bio-based cleaning products are beta tested in our efforts to develop our "green" cleaning protocols. The initiative for green cleaning provides considerable benefits to the health of building occupants as well as our custodial staff. In our testing, product effectiveness is the primary criterion.

Low moisture carpet cleaning agents and protocols are used. Typically, less than five gallons of water are utilized when cleaning +/- 2,000sf of carpeting compared to an average hot water extraction method that can consume over 150 gallons. This same area will hold over 10 gallons of water following extraction cleaning which contributes to long dry times, and even the potential formation of mold/mildew. Cleaning agents are effective when mixed with cold water, eliminating the need to waste energy and water heating them. Our dry compounds are completely bio-degradable and contain no harmful solvents. In most cases, carpets are 95%, if not completely, dry when we the job is completed.

Paint and adhesive products are reviewed and chosen based on their VOC levels, with the goal of using the products with the lowest VOC possible.

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Carpeting that is removed is recycled and new carpeting is required to have a minimum of 10 percent recycled content.

Campus recycling is an on-going activity and is introduced to all students during New Student Orientation. Annual participation in RecycleMania further cements the practice for the first-year and other students. Recycling stations are conveniently located throughout all residence halls, classrooms, offices and around the campus grounds. Waste reduction and recycling is further promoted as convenient with the single-stream concept, thereby eliminating the need for sorting glass, metal and plastic products. Since 2005, over 400 tons of materials have been recycled.

Composting organic waste products also serves to maximize our operational sustainability. Through partnership with our food service provider (Aramark), waste food is collected and composted through a third party. In this process, pre and post consumer food waste is collected. As a pilot program (with hopes of expanding it to all food service locations), retail or “front of the house” composting bins are placed in locations that encourage the student, or other patrons, to sort their waste into the proper receptacles. Additionally, composting is also accomplished by Landscaping and Grounds utilizing leaves, grass clippings and wood chips. Yard compost is used in flower and shrub beds throughout campus.

### Indoor Environmental Quality

As an institution of higher education, it is critical that the classrooms, labs and offices facilitate and enhance the processes of teaching and learning. Additionally, daily operations and maintenance activities are evaluated to ensure that the buildings, building occupants and the environment are safeguarded.

All heating, ventilation and air conditioning systems are routinely maintained to provide environmentally controlled conditions for occupant comfort and health. Outside air intakes provide fresh air and are located away from harmful emission sources including building exhausts. Temperature and relative humidity levels are monitored and set to inhibit the formation and presence of mold and mildew. In the event that mold or mildew is detected in a building, the HVAC

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shop and Environmental Services will be notified and the incident will be investigated to determine and eliminate the causative factor(s).

New vacuums procured must now meet the CRI's Green Label vacuum certification program for cleaning effectiveness and indoor air quality.

To the maximum extent possible, natural day-lighting will be used before artificial lighting is turned on. Window treatments shall also be utilized to minimize glare as well as heat gain.

Noise levels inside classrooms and offices can be adversely affected by outdoor ground maintenance equipment. In order to minimize this impact, leaf blowers, lawn edgers, mowers, chain saws, etc. shall not be operated in proximity to classroom or administrative buildings when classes are in session or during the normal business hours.

Only paints with low VOC levels are to be used for maintenance. Environmental Services, to the extent possible, will use green cleaning products. Food wastes and other odor producing wastes are to be removed daily. Soap and paper products shall be supplied in every public restroom; each building will have hand sanitizer available as well. Our soap is a type of foam that supports using less water and less waste. In addition, the paper towels used on campus are made from recycled paper.