Sustainability Master Plan

Elon University

Developed during 2006-2007

Preamble

Elon University's mission statement says, in part, that "We integrate learning across the disciplines and put knowledge into practice, thus preparing students to be global citizens and informed leaders motivated by concern for the common good." Elon believes that one of the most pressing issues facing global citizens today is that of our planet's ecosystems and our human relationships to them. Clearly, it has been shown that human interference with the natural ecosystems of the earth can have effects, whether they are large or small might be debated for any one particular issue, but that there is an effect is not in question.

Further, the importance of clean air, clean water and arable land are of critical importance regardless of what part of the globe the issues arise from. Issues about the identification, extraction, production and consumption of energy producing materials is also of even more importance in that many third world countries are increasing their demand for and consumption of the energy resources of the planet. How and where new sources of energy are developed, how current energy resources are conserved and future energy resources are distributed will be a planetary agenda item for the next century, at least.

Scientific breakthroughs are notoriously unpredictable in terms of timing. Counting on a miracle rescue of our dilemma in the near future is, in the end, too risky and so more conventional solutions are needed to address these issues in the absence of radical new and exciting solutions.

In order to be true to our mission statement, it is incumbent on us to teach our students all that is known about what results might be obtained by human interactions with the earth's ecosystems so that our mission of producing "global citizens and informed leaders motivated by the common good" is accomplished.

Therefore, the overarching goal of this sustainability plan is to minimize our impact on the global environment by establishing a carbon neutral university. We have focused on developing campus strategies to accomplish at least three goals:

1. Elimination of net carbon emissions. The campus should have the goal of becoming carbon neutral within the next 30 years.

2. Inform the campus constituencies (faculty, students and staff) of the issues of sustainability from a variety of perspectives:
    a. Scientific information and implications
    b. Policy factors and implications
    c. Practical living accommodations and changes in behavior
    d. Economic costs and avoidances
3. Identify initiatives that can be undertaken to address the issues of sustainability on the campus

To that end, the President's Environmental Ad Hoc Advisory Council has undertaken the effort of producing the Sustainability Master Plan.

Members of the Environmental Council (2006-2007)
Art Fadde
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Brad Moore,
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Cassie Kircher,
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Thomas Flood
Superintendent of Landscaping and Grounds

Gerald Whittington
Vice President for Business, Finance and Technology
Chair of the Environmental Council

Executive Summary and Outline of the Plan

One of the first tasks of the Council was to agree on a broad definition of what "sustainability" was. Finding that there had long been agreement on a statement since 1987, the Council adopted the following definition:

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

(World Commission on Environment and Development (WCED). *Our common future*. Oxford: Oxford University Press, 1987 p. 43.)

With this as our guide, we proceeded to review many, many sustainability plans from a variety of places:

1. colleges and universities,
2. federal, state and local governments
3. corporations
4. special interest groups.

From these plans, it was clear that a common general template existed that would guide us in developing a comprehensive plan. It was also clear that Elon is behind the national curve in terms of implementing such a plan. According to one source, 40% of all American college and universities had such a plan in 1993. The elements of that common template addressed the following issues:

I. Carbon Neutrality
II. University Organizational Structures
III. University as a Teaching Tool
IV. Partnership with Others
V. Energy and Atmosphere
VI. Materials and Resources Conservation
VII. Indoor Environmental Quality
VIII. Site Protection
IX. Water Conservation
X. Green Purchasing
XI. Green Building
XII. Student Activities
XIII. Communication
XIV. Curriculum

Individual Council members investigated each of these areas and adopted position statements for each. The Council then discussed them and adopted recommendations while knowing that the recommendations were assertive/ambitious and, perhaps, in some instances, controversial. The council also recognized that cultural changes, funding priorities, future developments in technology, future developments in university mission statements and demographic challenges might influence the tempo, duration, intensity and the achievement of these goals.

The recommendations for each area follow. An overlap of recommendations exists at various points in the document. For more information on each recommendation, please refer to the detailed descriptions contained later in this report.

List of Recommendations:

<u>Concerning Carbon Neutrality</u>

- It is recommended that the University become carbon neutral within the next 30 years (which appears to be the nationally agreed upon average for this initiative).

<u>Concerning University Organizational Structures</u>

- It is recommended that the Environmental Council assess and report the results of initiatives undertaken during each academic year.
- It is recommended that a sustainability coordinator be appointed
- It is recommended that a Resources and Energy Officer be appointed
- It is recommended that the recycling program be expanded and strengthened by the appointment of a recycling coordinator, whose duties include a broader scope and over the long-term, a comprehensive approach to recycling—including waste reduction, procurement guidelines, and special materials recycling.
- It is recommended that an appropriate sustainability purchasing policy be established. Therefore, it is recommended that a "green" purchasing agent be named in order to investigate new products, to inform departments of environmentally desirable components of products, and to enforce the University's environmental/sustainable purchasing policy.

Concerning the University as Teaching Tool

- Application of sub-metering of buildings, especially residence halls, so students can monitor their energy, water use, and trash management.
- Creation of a Living-Learning Community based on environmental sustainability.
- Development of a managed public garden—the Public Garden and Environmental Education Center—showcasing native plants and Piedmont communities through the use of low-impact gardening techniques.
- Construction of an Environmental Center located centrally on campus for academic programs and community outreach.
- Incorporation of Energy Star appliances across the campus in residence halls, and academic and administrative spaces. A room fitted completely with Energy Star appliances should be showcased on Admissions tours to help promote a culture of sustainability with the incoming freshman class.
- Acquisition or designation of land as an ecological preserve which will be a natural area for environmental research, teaching, reflection, and low-impact recreation.
- Development of the Elon University Botanical Garden.
- Implementation of low impact practices that promote sustainability, such as the use of local, organic foods by Aramark, the purchase of "green" products by our purchasing office, the conversion of the university fleet to the least polluting vehicles available, etc.
- Implementation of The Elon University Center for Environmental Studies and the Kernodle Center for Service Learning which will work with both Elon and outside communities to find and develop opportunities for academic service learning and research which will benefit our region.

Concerning partnership with Others

- Join Energy Star as a higher education partner.
- Join USGBC at a cost of $750 annually.
- Join AASHE at a cost of $1000 annually.

Concerning Energy and Atmosphere

- Consider metering each building on campus, particularly the residence halls and other large energy consumers. Where appropriate, meters should be introduced.
- Implement an energy audit for each facility on campus, especially with an eye toward identifying systems that could be improved.
- Investigate and implement alternative fuels where appropriate. This initiative should include buildings and transportation systems.
- Establish a goal for energy consumption reduction. This goal should be a stretch goal and on the magnitude of a 50% reduction in energy per student per square foot (for example).
- Purchase Green Power through the electric or other utility on the order of magnitude of 30% of the energy purchased.
- Consider options for the generation of Green Power in facility design.
- Rigorously examine each new or renovated facility for energy reduction, using either LEED guidelines or HP Guidelines created by the Triangle J Council of Governments.
- Certify each architect engaged for new or renovated facilities with LEED or similar credentials.
- Join the Energy Star Program and use its online tools for building design and renovation.
- Use other Energy Star tools to improve energy monitoring and energy consumption.
- Expand the University's energy management system to include all buildings and all energy systems.
- Develop programming to educate our community about the importance of energy conservation and to change behaviors around this issue.
- Phase out all chillers with CFC refrigerants and replace them with non-CFC refrigerants.
- Develop a cost benefit analysis for all of the initiatives included in this plan. Estimates of future energy costs should be developed on at least three bases: low increase in costs, generally expected costs, and higher than anticipated costs.

Concerning Materials and Resources Conservation

- Establish a yard waste composting facility on a four acre site and begin composting 100% of all yard wastes. Use the material in campus

landscaping as a topdressing and soil conditioner in turf areas. This will also help reduce irrigation water consumption over the long term.

- Investigate cost and options of hiring a private contractor to collect and compost food waste.
- Conduct a waste audit of the entire campus waste stream and identify point sources of large volumes of recyclable materials and use as a basis for strategically designing an expanded recycling program.
- Increase the amount of material recycled by adding at least 100 classroom clusters in all campus classrooms. Place an additional 60 clusters in appropriate building locations throughout campus.
- Purchase and place at least 20 outdoor recycling containers in high use, high volume locations across campus.
- Add six large 'Igloo' style units for bulk materials in central outdoor areas such as the North Area and the Oaks.
- Create a recycling awareness campaign and establish consistency of colors, styles and labels in all recycling containers.
- Investigate opportunities to divert at least 50% of the construction and demolition waste from the landfill. This would be handled by separating recyclable materials into bins on site or taking all of the unsorted waste to a local recycling contractor who will sort and salvage materials off site.
- Establish design guidelines and verify during construction that at least 10% of the building materials will be produced from recycled content.
- Request that at least 10% of the materials be extracted, harvested, and manufactured within 500 miles of Elon University so that Elon can promote local economies and reduce the amount of fuel required to bring materials to construction sites.
- Require that at least 50% of the wood used in construction projects are from responsible wood supplies.
- Set up a trailer during renovation projects, where materials that are not being reused in the project can be stored until after the completion of the project and then donated to local non-profit agencies.

<u>Concerning Indoor Environmental Quality</u>

- Use low Volatile Organic Compounds (VOCs) materials for all new construction and remodeling projects on campus.
- Use environmentally friendly cleaning products in all campus buildings.
- Flush out new buildings with natural air prior to occupying and manage indoor air quality.

- Install heat recovery wheels on HVAC units to reduce power consumed to ventilate the buildings.
- Prohibit smoking in all Elon buildings, including those that are under construction.

Concerning Site Protection

- Develop a Land Use Master Plan that clearly protects environmentally significant areas.
- Require the following in campus construction documents to protect natural resources and systems during a period of building and campus expansion:
    - A site-specific tree protection plan,
    - A site-specific storm water mitigation plan,
    - A site-specific erosion and sediment control plan, and
    - A waste specification committing contractors to maximize recycling.
- Identify locations of natural habitats and wetlands on campus property.
- Consider locations for land conservancy, like an Elon Forest.
- Increase the campus reforestation plan in existence.
- Reduce vehicular traffic and congestion on the campus and surrounding areas.
- Promote alternative means of transportation such as walking, biking, ride share, mass transit, etc.
- Create more bike paths and bike parking pads around key areas of the campus.
- Create a master plan for better sidewalks, lighting, curb, and gutters with the Town of Elon.
- Line parking lots off with preference for compact cars in prime locations.
- Install better lighting where needed.
- Consider more remote mass parking and create pedestrian-only zones on the campus.
- Expand the bus/tram/shuttle system and convert all these vehicles to bio-diesel or other alternative fuels.
- Construct parking decks to reduce amount of land consumed and to reduce heat gain to campus.
- Convert university vehicles to electric or bio-diesel where feasible.

- Develop Soil Erosion and Sedimentation Plans during the design phase for all new construction projects.
- Require that all plans developed by architects minimize the disruption of the site in terms of water run off and erosion.
- Develop an outdoor lighting policy that addresses the needs of security, as well as the impact on the campus community.

Concerning Water Conservation

- Construct a new pond and pumping station connected to the current irrigation supply main.
- Install new main supply lines to Academic Village, Holland House, and the Oaks.
- Install efficient irrigation systems by converting all campus irrigation control systems to the Sentinel Irrigation System.
- Replace 261 tank type toilet with High efficiency 1.6 gpf models.
- Replace 489 flush valve toilet with high efficiency 1.6 gpf models.
- Install dual flush handles on Flush Valve Toilets.
- Install low flow sink aerators (1.0gpm office/classroom and 1.5gpm dorm lavatory).
- Change all showerheads to 1.6gpm.

Concerning Green Purchasing

- Use local and organic food in all dining halls.
- Use recycled paper at all locations on campus.
- Use Energy Star lights and appliances.
- Use environmentally friendly cleaning supplies.

Concerning Green Building

- Rigorously examine each new or renovated facility to include sustainable features using guidelines from LEED or Triangle J Council of Governments. Each project should obtain enough points, that if taken through the certification process, it would earn a Silver Certification or higher.

- Certify each architect engaged in new or renovated facilities with LEED credentials or a similar certification/experience with the design of sustainable projects.
- Track the sustainable features throughout the design of the project by having the design team submit a sustainable design checklist with each major submission.
- Certify each contractor engaged for new or renovated facilities with LEED or have a similar certification/experience constructing green buildings.
- Review the sustainable checklist on a monthly basis to track the sustainable features throughout the construction process and submit the certification to a third party.

Concerning Student Activities

- Develop sustainability programs and awareness in various departments within the Division of Student Life.
- Educate students about their efforts toward reducing the amount of natural resources used and sustainability efforts.
- Work with student groups on their responsibility and involvement concerning sustainability efforts.

Concerning Communication

- Create a "Green Calendar," a collection of environmental events on campus and in the Triad area.
- Review how sustainability is represented on the internet.
- Communicate environmental sustainability in Global Studies classes during a student's first year.
- Make our commitment to sustainability an important facet of admissions and global university publications.
- Send out periodic emails to staff, students, and faculty about campus energy use and little, easy ways they can help reduce it.
- Fund environmental projects that people come up with and publicize them.
- Utilize campus media to support sustainable practices and advertise "green activities."

Concerning Curriculum

- Enhance the theme of Sustainable Practice in the General Studies Program.
- Establish a Visiting Environmental Scholar-In-Residence.
- Include a sustainability focus in the Departmental and Program end-of-year reports.
- Develop an Environmental Scholars program (similar to the Periclean Scholars).

Elon University
Sustainability Plan
Detailed Descriptions

I. Carbon Neutrality

Being carbon neutral involves calculating your total climate-damaging carbon emissions, reducing them where possible, and then balancing your remaining emissions, often by investing in a carbon sink or purchasing a carbon offset such as; paying to plant new trees or investing in "green" technologies such as solar and wind power.

- **The goal of becoming carbon neutral within the next 30 years.** Students, faculty and staff will be given the tools to monitor the carbon emissions from all University practices, and to measure the rate of carbon sequestration from University owned/managed green spaces. This concept can be incorporated into many courses across the curriculum, and can be linked to topics in the natural sciences, social sciences, humanities, and business. Thirty years appears to be the nationally agreed upon average for this initiative.

II. University Structure

In order to successfully implement this sustainability plan, certain administrative structures should be addressed in order to bring focus to, and responsibility for, the plan. Since this plan deals with broad institutional initiatives as well as ones smaller in scope, the structures required vary from broad to small. The following structures/positions are recommended for adoption:

- **An Environmental Council.** The Council is already in existence. However, the charge of the Council should be amended to include a requirement to assess and report to the community the results of initiatives undertaken during each academic year. The current charge to the Council is to "raise awareness of the environmental issues of energy conservation, sustainable practices and other general environmentally friendly practices on the campus. The council may make recommendations to the President on new initiatives to undertake or improvements in current ones toward that goal.

The Council should take an inventory of the current practices and initiatives that the University has underway and may suggest improvements in them and propose new practices and initiatives.

The Council should promote environmental awareness involving faculty, students and staff. The Council would recommend initiatives such that the cost of the initiative would not exceed its benefit over a reasonable amount of time."

- **A Sustainability Coordinator.** As the initiative outlined in the plan will require monitoring on a more frequent basis than the Environmental Council can provide, it is recommended that a sustainability coordinator be appointed. The broad duties for such a coordinator are as follows (following the models of Duke University, Cornell University and others). The Sustainability Coordinator will develop, coordinate and administer programs and advise policies within the area of sustainability at Elon University. The sustainability coordinator will hold the following responsibilities:
    1. Develop, plan, coordinate and implement activities including, but not limited to, seminars, conferences, workshops, short courses, clubs, shows, public events and other programs related to sustainability at Elon. Both the manner in which these activities are organized and the nature of their content should be geared towards achieving buy-in and habit transformation from student, faculty and staff members.
    2. Encourage and facilitate sustainability programs initiated by student, faculty and staff members. Foster and coordinate new ideas and concepts for sustainability programming themes and identify materials and resources to supplement, expand or replace existing sustainability programming.
    3. Assist the Vice President for Business, Finance and Technology in defining goals, performance metrics and a long range plan for sustainability at Elon. Monitor and evaluate program effectiveness, document performance trends, and recommend and implement modifications to improve program effectiveness.
    4. Represent Elon's sustainability programs to the University; maintain liaison with groups, programs, offices and departments at Elon to achieve sustainability objectives.
    5. Represent Elon's sustainability programs to the public; attend professional meetings as appropriate; interface with external

organizations to ensure cooperative efforts are enhanced and available resources are utilized. These requirements necessitate the ability to travel and meet regularly outside of business hours.

6. Coordinate and/or participate in public relations activities to include preparing and supervising the production of a website, brochures, newsletters and other promotional materials and/or publications, preparing press releases, designing ads and fliers, and responding to inquiries; develop plans and schedules for release of publicity materials.
7. Research and maintain working knowledge of best practices at peer institutions with regards to sustainability.
8. Design and maintain a website for sustainability-related news at Elon.
9. Assist in the preparation of budgets and grant applications; monitor, verify and reconcile expenditure of budgeted funds as appropriate.
10. Recruit, interview, hire and manage student interns performing research or work on sustainability projects with well-defined deliverables.

- **A Resources and Energy Officer.** The resource and energy officer would hold the following responsibilities:
    1. Monitoring the gas, electric and other energy consumption levels, and making recommendations as to conservation and avoidance strategies for university consumption.
    2. Monitoring water and sewer consumption and making recommendations on conservation and avoidance strategies.
    3. Investigating and assessing new techniques and strategies for consideration. This assessment should be directed to the Vice President for Business, Finance and Technology and the department heads of those units responsible for those areas.

- **A Recycling Coordinator.** Elon's long history of having a recycling program is laudable, but improvements could still be achieved. Currently, the recycling program is overseen by the Manager of Environmental Services. The Manager of Environmental Services duties are principally in the area of recyclable materials and transport to the appropriate recycling center. There is no one whose duties include

programming for institutional awareness and strengthening of the program. Furthermore, student awareness is less than optimal and focus needs to be brought to the students of the campus. A recycling coordinator will hold the following responsibilities:

1. Approaching recycling with a broader scope and over the long term
2. Approaching recycling comprehensively to include waste reduction, procurement guidelines, and special materials recycling.

- **A "Green" Purchasing Agent.** Elon currently allows each of its departments great latitude in purchasing those items which best fit their needs. However, as more manufacturers gain greater awareness of and sensitivity to environmental issues, their products are becoming more and more environmentally friendly. These products may be overlooked by departments who have neither the resources nor the time to investigate these new products as they are created. Additionally, the University does not have a purchasing policy that outlines minimum sustainability purchasing requirements for goods and services purchased by the University. Elements of this policy might include recycled content, toxicity levels, whether the product is able to be recycled, etc. It is recommended that an appropriate sustainability purchasing policy be established. A "Green" Purchasing Agent will hold the following responsibilities:
    1. investigating new products
    2. informing departments of environmentally desirable components of products and
    3. enforcing the University's environmental/sustainable purchasing policy.

III. University as Teaching Tool

Our goal is to create vibrant, secure communities while preserving the life support system on which we all depend and without compromising the ability of future generations to meet their own needs.

Elon University will serve as a model of sustainable practice, for students, faculty, staff, and the community. Buildings, University management, and life choices should reflect a commitment to a sustainable future for the University and University community. The University will serve as a teaching tool by allowing students, faculty and staff to evaluate the impacts from University practice, and to explore alternative choices and the impacts from these alternatives as they relate to the future of Elon and our communities. The following teaching tools are recommended for adoption:

- **Application of sub-metering of buildings, especially residence halls, so students can monitor their energy, water use and trash management.** Sub-metering will allow comparison between buildings, so that impacts from specific practices can be monitored. In the residence halls, resource use awareness should become part of the social fabric of student life.

- **Creation of a Living-Learning Community based on environmental sustainability.** A new building will be designed and constructed, able to house 12 – 16 students, using state of the art "green" building techniques including monitoring of resource use and materials life-cycles. Design elements may include such features as a community garden, installation of renewable energy sources, waste management, water recycling and reuse, and low impact transportation. Students will have an opportunity to make intentional choices in building operation, and will be able to study the effects of specific management techniques.

- **Development of a managed public garden, showcasing native plants and Piedmont communities through use of low impact gardening techniques.** This garden will be used for education within Elon, as well as for community outreach celebrating our local environment and teaching about ecosystem function through low-impact landscape design. This space will also include a new "green" building for developing environmental education programs. This building may be used for community education, as well as by Elon faculty and students, providing facilities for a welcome center, community environmental exploration, academic spaces such as teaching and research labs, and faculty/staff offices. This will provide a living laboratory for focused

study of the garden area. Elon should also consider acquisition of adjoining lands to better buffer the garden area and expand land available for the garden. This facility may also become a focal point for the Elon Academy during summer months.

- **Establishment of an Environmental Center located centrally on campus which will be used both for academic programs, research and offices as well as community outreach/partnerships.** This will be a building where innovative "green" techniques can be tried, evaluated, and disseminated across campus when appropriate – a truly living laboratory. The building may be either new construction or a creative retrofitting of an already existing building. It will provide a focal point for resources related to sustainable practice for both the Elon community and the community outside Elon.

- **Incorporation of Energy Star appliances across the campus – in residence halls, as well as in academic and administrative spaces.** A room fitted completely with Energy Star appliances should be showcased on Admissions tours to help promote a culture of sustainability with the incoming first-year class.

- **Acquisition or designation of land which will be a natural area for environmental research, teaching, reflection, and low-impact recreation.** The property will be of sufficient size so that it will be protected from the impacts of adjacent development and will be large enough for the long-term study of the ecological systems and services. This parcel may either be adjacent to or within a reasonable drive of the main campus.

- **Development of the Elon University Botanical Garden.** The campus itself can become a landscape for learning and the plant collections and grounds teaching tools for students to learn about the diversity of life and the connections between organisms and their physical surroundings. We will use and demonstrate the best sustainable management practices for each garden, plant collection or site and use

our botanical and ecological resources for the purposes of education, research or display.

- **Implementation of low impact practices that promote sustainability, such as the use of local, organic foods by Aramark, purchase of "green" products by our purchasing office, conversion of the University fleet to the least polluting vehicles available, etc.** Student groups such as specific classes, the Sierra Club, and Students for Peace and Justice can be invited to participate in making decisions about specific university practice.

- **Development of partnerships which may explore such topics as organizing local, organic farmers, watershed protection, regional transportation, and regional planning.** The Elon University Center for Environmental Studies and the Kernodle Center for Service Learning will work with both the Elon and outside communities to find and develop opportunities for academic service learning and research which will benefit our region.

IV. Partnership with Others

Partnering with other high energy organizations offers numerable benefits. The following partnerships are recommended for adoption:

- **Energy Star.** A dynamic government/industry partnership that offers businesses and consumers energy-efficient solutions, Energy Star makes it easy to save money while protecting the environment for future generations. Energy Star works with more than 7,000 public and private sector organizations to improve the energy and financial performance of their business, manufacture products to meet Energy Star specifications, sell Energy Star labeled products to meet consumer demand for more environmentally friendly choices on store shelves, promote Energy Star qualified products or homes as a utility or state funds administrator, build Energy Star qualified homes that save homeowners 30% on their energy bills every year, and offer better comfort and health, increased

quality, and a return on investment. Currently, Duke, Wake and UNC-CH are the only universities in North Carolina to partner with Energy Star.

Cost: There is no cost to partner with Energy Star, only a form commitment letter signed by Elon's President or CFO.

For more details: http://www.energystar.gov/index.cfm?c=home.index

- **U.S. Green Building Council (USGBC).** The U.S. Green Building Council (USGBC) is the nation's foremost coalition of leaders from the building industry working to promote buildings that are environmentally responsible, profitable, and healthy places to live and work. USGBC has more than 6,400 member organizations and a network of more than 80 regional chapters. North Carolina universities in USGBC include Duke, NC A&T, NCSU, UNC-CH and Warren Wilson. Benefits of ULSF range from discounts on Leadership in Energy and Environmental Design (LEED) project certificates and registrations (which is the first step to having LEED certified buildings), attending workshops and conferences concerning LEED to having access to member's only events, directories and information related to the costs and benefits of building LEED certified projects.

  Cost: $750 annually for institutions with 1-2 campuses.

  For more details: http://www.usgbc.org/

- **AHSHE** (Association for the Advancement of Sustainability in Higher Education)**. AHSHE's mission is** to advance sustainability in higher education in the US and Canada**.** AHSHE has approximately 125 affiliate institutions ranging from large research universities (including many Ivy League institutions) to small private colleges, businesses, governmental and non-governmental organizations. Membership Benefits include the following**:**
  1. Discounts on registration for the annual conference, workshops (held at member institutions), and other AASHE-sponsored events and discounts on products and services offered though AASHE. Conference fees vary based on how much of the

conference one attends and the type of transportation used to get there (discounts for more environmental transportation). This year's conference in CT has fees ranging from $25 to $175 for one to three days of conference including snacks and excursions.

2. Professional awards, publicity and recognition. AASHE administers awards program to recognize outstanding efforts by institutions and individual students in advancing campus sustainability. (One award is given in each category annually). They also use their website to highlight the individual efforts of several campuses.
3. Access to AASHE directories and online databases, fact sheets, and publications.
4. Free consulting via phone and email to members. Publications include the *AASHE Bulletin* a weekly e-newsletter on sustainability in higher education in North America and *AASHE Update* a bi-monthly newsletter with information on AASHE activities
5. Shared governance. Members can participate in AASHE committees, working groups, and governance
6. Speakers Bureau. members can participate themselves or use the bureau to find speakers
7. Partnering through AASHE to learn more about and participate in the Campus Climate Challenge (an energy initiative), Campus Sustainability Day, the Campaign for Environmental Literacy, Net Impact's Campus Greening Initiative and more.

Cost: $1000 annually for 4-year institutions with 1000-15,000 full time students. (Institutional membership covers everyone in the campus community.)

For more details: http://www.aashe.org/.

V. Energy and Atmosphere

In considering both new facilities that are to be built, as well as the state of existing facilities and renovation plans for existing facilities, Elon has a number of different levels of compliance with the best techniques of energy conservation. Some of the newest facilities (Koury Business Center) have the

most efficient and effective systems and processes available. Contrasting this, some of the oldest facilities, at least those not yet renovated (Alamance) have the least efficient and effective systems. Some facilities are known to be inefficient on a relative basis compared to what a complete gutting of the facility could provide.

It is important to note, however, that many innovative and efficient systems have been introduced over the last 15 or more years that have avoided millions of dollars of utility expense. Some of these are as follows:

1. The abandonment of a highly inefficient steam distribution system (operating at 20% efficiency using fuel oil) was replaced with three gas fired hot water/steam systems which operate at 85%+ efficiency.
2. The introduction of a chilled water loop serving Moseley Center, Koury Athletic Center, and the Center for the Arts, thereby reducing the need for huge chillers by 1/3rd.
3. The sharing of a heating and cooling system plant between Belk Library and McMichael Science Center thereby leveling the energy load requirements for each building and reducing energy.
4. Retrofitting many of the residence halls with radiant cooling systems thereby eliminating the need for energy consumption for forced air circulation.
5. Managing a significant number of university buildings with an energy management system that turns heat, cooling and other systems on and off to better manage consumption.
6. The replacement of many light fixtures with higher efficiency bulbs and ballasts.
7. Introduction of lighting systems with motion detectors and other sensor eyes to turn off lights when spaces are not occupied and lights are not needed.
8. Introduction of bio-diesel buses for transportation.
9. Cross connection of Lake Mary Nell and Lake Verona for campus irrigation.
10. Campus reforestation program.
11. Pervious paving projects.
12. Slow release fertility program.
13. Natural means of goose control, i.e. swans and border collie.
14. New perennial flower beds.

Even with these initiatives, there is much more that could be accomplished. Also knowing that the resources for a massive set of renovations are not readily

available, the following long-range energy and atmosphere initiatives (needing bi-annual updates) are recommended for adoption:

- **Metering each building on campus, particularly the residence halls and other large energy consumers**. Where appropriate meters should be introduced.

- **Auditing each facility with an eye toward identifying systems that could be improved.**

- **Investigating and implementing alternative fuels where appropriate**. This initiative should include buildings and transportation systems.

- **Reducing energy consumption.** This goal should be a stretch goal and on the magnitude of a 50% reduction in energy per student per square foot (for example).

- **Purchasing Green Power through the electric or other utility on the order of 30% of the energy purchased.**

- Consider options for the generation of Green Power in facility design, including wind, photovoltaic and geothermal energy sources where feasible.

- **Rigorously examining each new or renovated facility as to energy reduction, using either LEED guidelines or HPG (High Performance Guidelines) created by the Triangle J Council of Governments.**

- **Certifying each architect engaged for new or renovated facilities, if not already certified according to LEED certification or other guidelines.**

- **Joining the Energy Star Program and using its online tools for building design and renovation.**

- **Using Energy Star tools to improve energy monitoring and energy consumption.**

- **Expanding its energy management system to include all buildings and all energy systems.**

- **Programming to educate our community about the importance of energy conservation and to change behaviors around this issue.**

- **Phasing our and replacing all chillers with CFC refrigerants with non-CFC refrigerants.**

- **Developing a cost benefit analysis for all of the initiatives included in this plan.** Estimates of future energy costs should be developed on at least three bases:
    1. low increase in costs,
    2. generally expected costs, and
    3. higher than anticipated costs.

  Each of these estimates will yield a different payback calculation, but the ultimate analysis and decision should recognize the volatility of energy costs, and, when all other things are equal, tilt slightly toward the "higher" cost model.

VI. Materials and Resources Conservation

Composting

Yard waste comprises the single largest source of recyclable waste generated by the University. Approximately 2,850 cubic yards of leaves, limbs, grass

clippings and other organic debris is generated by the university annually. This amounts to approximately 450 tons or 15% of Elon's total waste stream.

Of this amount, 600 cubic yards (90 tons) of leaves are composted on campus while 1,200 cubic yards of mixed yard waste are sent to the county solid waste compost facility, and 1050 cubic yards of leaves, grass clippings and limbs are deposited in a local landfill. Forty percent of the latter is large limbs and the remainder cannot be transferred to the landfill stream because of logistical constraints. However, this material could be composted on campus.

North Carolina solid waste management rules will allow the establishment of yard waste composting facility for this volume of yard waste materials without a permit, provided certain operational requirements and physical setbacks are met and an annual notice of operation is submitted.

Food wastes comprise an average of 15% of the municipal waste stream. While composting of food wastes is technically simple, there are significant logistical obstacles to doing so. Food waste can only be composted in a class III permitted facility, which has more stringent facility, operational and permitting requirements, and subsequently more capital and operational expense. The collection of food waste must be performed in a regular and sanitary manner. There are spatial, visual and access constraints for collection containers and the materials must be source separated by the food service workers. However, there are two contractors in the area who offer collection and composting of food waste in permitted facilities for a fee. They provide the collection containers, collect the material on a schedule and even work with the local health department to ensure all inspectors are informed and satisfied with the program.

The following initiatives, related to composting, are recommended for adoption:

- **Selecting a four acre site for a composting facility**. Possible locations exist on the north side of the Loy farm on Front St., behind the Elon Cemetery on Oak St, in the old fields on the rear of the walker farm on Walker Rd. or on South Campus off Truitt St.

- **Constructing a yard waste composting facility and composting 100% of all yard wastes.** Use the material in campus landscaping and

as a topdressing and soil conditioner in turf areas. This will also help reduce irrigation water consumption over the long term.

- Investigating cost and options of hiring a private contractor to collect and compost food waste.

Costs of implementing composting recommendations:

Capital $39,000 Annual Net $9,935

Capital -

1. Site establishment cost will vary based upon site., est. $4,500
2. Compost spreader - $7,000
3. Tractor Loader - $27,500

Annual -

1. Labor to create compost and spread compost in landscaped areas – 500 hours - $6,250 annually
2. Tub grinding - $10,000 annually

Direct Cost Savings

1. Republic Waste $3,315
2. Apples Landfill $ 3,000

Recycling

Elon has a recycling program which was begun as a student initiative in 1991. Approximately 90 tons of cardboard and paper and 15.5 tons of glass, plastic and aluminum were recycled in FY 2006. This comprises 3.5% of Elon's current total waste stream of approximately 2,996 tons in FY 06. Currently, it costs the university $38 to dispose of one ton of waste, $33 per ton to recycle paper and cardboard and $160 per ton to recycle glass, plastic and aluminum.

In the past year several improvements and additions were made to the recycling program. More containers were placed throughout campus, labels were added to existing recycling containers, larger capacity containers were placed in residential facilities and 1200 recycling bags were distributed to all student rooms.

Two trials are currently on-going with positive results. Several classrooms have received clusters of three containers for trash, paper, and plastic, glass and aluminum. These 'classroom clusters' have improved the site separation of recyclables and hence increased the volume of material recycled. An outdoor recycling container was also placed next to a trash container outside the

entrance to Moseley Center. Preliminary results of this trial have shown that a significant amount of material can be successfully diverted from the sidewalk receptacle with an appropriately identified and strategically placed container.

Without the option of a materials separation process for all campus waste, recycling must be convenient to be successful. While it is very difficult to project the amount of additional material that will be recycled by these recommendations, it is reasonable to expect a minimum 50% increase.

The following initiative related to recycling are recommended for adoption:

- **Conducting a waste audit of the entire campus waste stream and identifying point sources of large volumes of recyclable materials and use as a basis for strategically designing an expanded recycling program.**

- **Increasing the amount of material recycled by adding at least 100 classroom clusters in all campus classrooms.** Place an additional 60 clusters in appropriate building locations throughout campus.

- **Purchasing and place 20 outdoor recycling containers in high use, high volume locations across campus.**

- **Adding six large 'Igloo' style units for bulk materials in central outdoor areas such as the North Area and the Oaks.**

- **Creating a recycling awareness campaign and establish consistency of colors, styles and labels in all recycling containers**

Costs of implementing recycling recommendations:
Capital $42,080 Annual $2,751

Capital -
1. 160 classroom clusters - $15,000
2. 20 Victor Stanley outdoor receptacles - $13,280

3. 6 Igloo Containers - $13,800
4. Professional waste audit - $ 4,000

Annual –

1. Transportation of additional recyclables
   – Cardboard & paper – 45 Tons $1,485
   - Glass, plastic, Aluminum – 8 Tons - $1,280
2. Savings from Republic waste removal – ($2,014)
3. Awareness Campaign $2,000

Construction and Demolition Waste

Unused building and demolition materials are responsible for 30% of the waste stream nationally. Each year in the United States alone 136,000,000 tons of construction and demolition waste are sent to landfills. Much of this material could be recycled into new products. Not only would recycling this material divert it from the landfill, but it would also reduce the demand on harvesting natural resources.

As Elon University continues to develop, the needs of the University evolve to reflect changes in the population, teaching ideologies, and programs. Elon University has strived to be a good steward by renovating existing structures to provide for the changing needs and looking for environmentally friendly construction materials when new construction is required.

However, there are untapped opportunities to reduce the amount of construction and demolition waste that is generated on Elon University's campus. Since the majority of the construction and renovation practices are handled by outside contractors, Elon University will need to partner with these companies to better understand how the materials are produced and where the waste goes when it leaves the campus.

The following recommendations related to construction and demolition waste are recommended for adoption:

- **Investigating opportunities to divert at least 50% of the construction and demolition waste from the landfill.** This would be handled by separating recyclable materials into bins on site or taking all of the unsorted waste to a local recycling contractor who will sort and salvage materials off site.

- **Establishing design guidelines and verify during construction that at least 10% of the building materials will be produced from recycled content.**

- **Requesting that at least 10% of the materials used be extracted, harvested, and manufactured within 500 miles of Elon University.** This will promote local economies and reduce the amount of fuel required to bring materials to construction sites.

- **Requiring that at least 50% of the wood used in construction projects are from responsible wood supplies.**

- **Setting up a trailer during renovation projects, where materials that are not being reused in the project can be stored until after the completion of the project and then donated to local non-profit agencies.**

Costs of implementing construction and demolition waste recommendations:
The cost of these recommendations would be minimal. There would be no capital cost since the burden would fall primarily on the contractors. The annual cost will be dependent on the scope of construction projects that the university undertakes each year. Recycled content materials must be requested, but cost no more than their less environmentally favorable counterparts. The majority of the extra cost would result from the labor required to sort and salvage the construction and demolition waste, but this would be only a fraction of a percent of the total construction contract.

VII. Indoor Environmental Quality

A healthy indoor environmental quality on Elon's campus will lead to healthy and happy students, staff, and faculty.

In order to achieve optimal indoor environmental quality, the following initiatives are recommended for adoption:

- **Use low Volatile Organic Compounds (VOCs) materials for all new construction and remodeling projects on campus.** (Volatile organic compounds (VOCs) and other hazardous chemicals are contained in many construction materials and furnishings, posing a risk to the general population. Elevated levels of VOC materials have been linked to eye and respiratory irritation, headaches, fatigue and other symptoms associated with "sick building" syndrome.) Each of the following should be required in campus construction and renovations:
    1. The use of low VOC paints,
    2. The use of low VOC adhesives,
    3. The use of low VOC solvents,
    4. The use of low VOC caulks,
    5. The use of low VOC wood products, and
    6. The use of low VOC carpets and sealants

  Information from http://www.cleanaircounts.org

- **Use environmentally friendly cleaning products in all campus buildings.** The following guidelines should be followed when selecting cleaning products:
    1. Choose products that are biodegradable and nontoxic (These would double the current costs of products so further study is needed.)
    2. Choose products with VOC concentrations of less than 10% of the weight of the products when diluted for use as directed (Although, most already are less than 10 %.)
    3. Avoid products with petroleum-derived ingredients
    4. Avoid products containing EDTA and NTA
    5. Avoid products containing chlorine bleach or sodium hypochlorite (However, Physical Plant has found that this is the best product to use, as needed, for killing mildew.)

  Information from http://www.ecomall.com/biz/cleaning.htm

- **Flush out new buildings with natural air prior to occupying.**

Continue to manage indoor air quality, especially to maintain the indoor relative humidity with the optimal range.

- **Install heat recovery wheels on HVAC units to reduce power consumed to ventilate the buildings.** The use of high performance HVAC equipment (including heat recovery wheels or plates) can result in considerable energy and cost savings. Harmful emissions can be filtered out of the air by using heat recovery wheels. Elon has four heat recovery wheels on campus with two more being added when the Colonnades buildings adjacent to the Koury Business Center come on line. Heat recovery wheels allow Elon to recover 70% of the energy that it would normally lose when bringing in unconditioned outside air and exhausting the interior conditioned air. When using heat recovery wheels, the fan energy required by the air handling unit increases; however a cost analysis is done on each new building system in the design phase to decide if the payback is reasonable before deciding to incorporate heat recovery wheels in the design.

  Information from http://www.epa.gov/laq/schooldisign/hvac.html

- **Prohibit smoking in all Elon buildings, including those that are under construction.** A smoking policy is being implemented at Elon this year; by next year no smoking will be allowed from 30 feet of campus buildings with a few exceptions including the space in back of the fine arts building. Other areas where policies are still being refined include sports facilities and buildings under construction.

VIII. Site Protection

Site protection activities on the campus will reduce the impact of construction disruption and the potential for a long term change in the nature and character of the original site, even beyond what is necessary and prudent for the development of the site.

In order to be aware of this issue, and to address it the following initiatives are recommended for adoption:

- **Developing a Land Use Master Plan that clearly protects environmentally significant areas (sites away from natural habitats, further than 100' of wetlands/bodies of water, green spaces, etc.).**

  To protect natural resources and systems during a period of building and campus expansion, each of the following should be required in campus construction documents:

  1. A site-specific tree protection plan.
  2. A site-specific storm water mitigation plan.
  3. A site-specific erosion and sediment control plan, and
  4. A waste specification committing contractors to maximize recycling.

Further, additional master planning efforts should be undertaken to include:

1. Identifying locations of natural habitats and wetlands on campus property.
2. Considering locations for land conservancy, like an Elon Forest.
3. Increasing the campus reforestation plan in existence.

- **Reducing vehicular traffic and congestion on the campus and surrounding areas.**
  1. Promote alternative means of transportation - walking, biking, ride share, mass transit, etc.
  2. Create bike paths and bike parking pads around key areas of the campus.
  3. Create a master plan for better sidewalks and bike paths, lighting, curb and gutters with Town of Elon.
  4. Parking lots lined off with preference for compact cars in prime locations
  5. Better lighting where needed.
  6. Consider more remote mass parking and create pedestrian-only zones on the campus.
  7. Expand the bus/tram/shuttle system and convert all these vehicles to bio-diesel or other alternative fuels.
  8. Construct parking decks to reduce amount of land consumed and to reduce heat gain to campus.
  9. Where feasible, make university vehicles electric or bio-diesel and as compact as feasible.

10. When necessary to construct them, create pervious parking areas and walks.

- **Develop Soil Erosion and Sedimentation Plans during the design phase for all new construction projects.**
    1. Require all plans to be developed by architects which minimize the disruption of the site in terms of water run off and erosion

- **Developing an outdoor lighting policy that addresses the needs of security, as well as the impact on the campus community**
    1. On flat roofs, use high-albedo (reflective) surfaces to reflect heat from building site.
    2. Design site lights so that light trespass does not let light leave the site.

IX. Water Conservation

Storm Water Irrigation

Irrigation of landscaped areas can consume significant amounts of water. In North Carolina, the primary consumer of irrigation water is turf. Trees and shrubs typically do not require more than minimal amounts of water once they are established. When potable water is used for irrigation purposes, significant quantities are removed from the municipal water system and from the watersheds.

Two decades ago, Elon began irrigating portions of its landscape with reclaimed storm water. Today, only one third, or 61 acres of Elon's 182 landscaped acres are irrigated. Of this, 89 % is irrigated with storm water in three ponds. Collecting storm water from parking lots, roads and roofs in ponds improves downstream water quality by allowing eroded sediment and other materials a chance to precipitate out of the water, thereby reducing the sedimentation of natural waterways. Irrigating the landscape with storm water also uses the natural filter of earth to remove and biodegrade pollutants before they enter the groundwater or the natural waterways. Lastly, any runoff from irrigation is also recaptured for future irrigation.

In 2006 the Scott Plaza system was switched from well water to storm water. Currently, McMichael Science Center and Belk Library are using city water, but improvements to the irrigation infrastructure will allow us to switch to storm water in 2007, but that will require the full capacity of the pond and pumping system.

Academic Village, The Oaks and the Softball field are currently irrigated with city water while Holland House and the Powell Tennis Center are irrigated with well water. These areas can be converted to storm water, but will require significant additions to the irrigation infrastructure. A new pond and pumping station will need to be constructed and mainlines installed to each location.

Areas in the historic campus area are irrigated occasionally with city water from hose bibs and fire hydrants as this area is generally not irrigated.

The following measure is recommended for adoption:

- **Construct a new pond and pumping station connected to the current irrigation supply main.** Install new main supply lines to Academic Village, Holland House and the Oaks. Several possible sites for a new pond exist, including a location for a two acre pond on the former Page/Loy Property north of the Koury Business Center. Another excellent location is on the corner of Williamson and Bypass 100 in front of Rhodes Stadium; however a five acre parcel of land would need to be purchased. There is also an existing pond on the Brannock Page property in a prime location just off of Phoenix Drive, but this property would need to be purchased or a long-term leased established.

  Costs of constructing pond and pumping station:

Pond construction	$30,000
Pumping station	$20,000
Mainline infrastructure	$15,000

Install efficient irrigation systems

Using storm water to irrigate the landscape is likely the greatest contribution to water conservation in the campus landscape. However, reducing the amount of storm water used for irrigation is also a worthy water conservation goal.

Irrigation efficiencies can be gained through accurate design, appropriately sizing irrigation system components to match precipitation rates with soil

infiltration rates and by effective scheduling and programming. Of these three, the first two typically need to be done prior to construction and retrofits are typically very cost prohibitive for little benefit. However the use of modern scheduling and programming software and hardware can improve irrigation efficiencies significantly with relatively modest expense.

For the past two years, the university has begun installing a new series of irrigation controllers in new construction. This latest generation of web-based controller systems offers numerous water conservation improvements. Expanded programming capability will allow us to operate more systems during the night when the evaporation rate is lowest. Flow rates can be accurately monitored to detect leaks and the system programmed to shut down the suspect zones. Weather data is automatically downloaded and system run times adjusted based on a calculated evapo-transpiration or shut down during rain.

When the entire campus irrigation control system is converted we anticipate reducing the water consumption (and therefore electricity used for operating pump stations) twenty percent.

The following irrigating measure is recommended for adoption:

- **Converting all campus irrigation control systems to the Sentinel Irrigation System.**

  Costs of conversion**:**
  Seven controllers and weather station - $31,124

<u>Use Only Native Plants for Landscaping</u>

In the arid and semi-arid regions of the United States, the use of non-native species and turf grass in landscaping, requires significant amounts of irrigation water. Therefore, many governmental agencies and institutions in those regions have made the planting of native species a mandate or a requirement for sustainability.

However, in North Carolina's temperate climate with an average rainfall of 45 inches, this is not a concern. In fact, no water is used to irrigate non-native plants on the Elon Campus. Many areas of campus receive little or no irrigation and the only specific watering of trees and shrubs is during their establishment period after planting. Consequently the use of non-native plants has no effect on the amount of irrigation water used.

Both annual and perennial flowers are used in the display beds on campus. While these do require watering, the amount used is estimated to be less than one percent of all irrigation water on campus. Further any annual planting, whether native or not, would require watering. Perennial plants have been used in increasing numbers over the past three years. However, to be kept looking attractive, they also need some supplemental water.

The following measure is recommended for adoption:

- **Take No Action.**

  Cost:
  None

Potable Water Conservation
The largest consumers of potable water are toilets, showers, sinks and washing machines.
There have been many efforts made in recent years to reduce the consumption of potable water. New equipment has been tested and installed, operational procedures implemented or changed and studies performed. It is important that we recognize the following substantial improvements to date.
Equipment Installed

1. We purchase only energy star dishwashers and washing machines. In 2005, we changed out of 97 (95%) of the campus washing machines to Energy Star rated units. This has saved an estimated 27,000 gallons of water per washer or 2,619,000 gallons and $21,437 annually.
2. We replaced 5.5 gpf tank type toilets at three dorms in 2005 with high efficiency 1.28 gpf. The American Standard Champion toilet was tested and had the best flush power and warranty against two other major brands. Additionally, these toilets have no flapper which is where most water is lost (1150gal/wk-11,550gal/wk) with tank type toilets.
3. We use leak detection water fill valves in tank type toilets that signal flapper leaks.
4. We currently use 2.5 gpm low flow shower heads and 2.2 gpm low flow aerators on sinks.
5. The Plumbing Dept. purchased a fountain vacuum to use in the three campus fountains which eliminates the need to drain the fountains to clean them. This will save 186,720 gallons of water annually.

6. Most buildings are cooled with air cooled chillers instead of water cooled eliminates water loss to evaporation. Large building loads (greater than 200 tons) require water cooled due to offsetting energy costs.
7. We have replaced water cooled icemakers with air cooled.

Procedures Implemented

1. The campus design standard specifies 1.28gpf Champion versus the 1.6gpf for new construction.
2. Domestic hot water recirculation systems are specified in the design standards to minimize water waste due to long distance from the water heating source.
3. The campus design standards specify flush valve toilets versus tank type to minimize flapper leaks and double flushing to prevent stoppages.
4. Inspect tank type toilet flappers during annual summer maintenance.
5. Perform a bimonthly water meter comparison report which allows us to identify usage spikes and spot leaks.
6. The 21,000 gallons in Fonville and Boney fountains is used for irrigation when they are drained for cleaning or repair.
7. Steam condensate is re-used in our steam boilers.
8. Steam traps are tested every four years. Faulty steam traps cause steam to be vented to the atmosphere requiring instead of being condensed and re-used as boiler make up water.
9. We do not use garbage disposals in most residential facilities to lessen water use and lighten the load on the sewer system.

Studies

1. A high end, dual flush toilet was installed and tested. However, the toilet was removed because of its poor performance.
2. We replaced the flush handles on the Moseley 1st floor women's restroom with dual flush handles that allow either a liquid or solids flush. This retro fit works very well as long the users operate them properly. This option is recommended for further expansion.
3. We have evaluated the option of cooling condensate to provide make up water for the cooling tower. However, the piping was found to be cost prohibitive and would unbalance the tower water chemistry.
4. The university has 130 urinals which consume an estimated 1,762,500 gallons of water annually. Waterless urinals could be installed and the total saving in maintenance and water would be $9,382 annually would provide a simple payback of expense in seven years. However, there are serious concerns about odor, maintenance and user acceptance of these. Therefore this option does not appear to be a good fit at this time.

5. Motion sensor faucets can save water by shutting off during the hand soaping process, but they are quite cost prohibitive. The office/classroom sinks have the highest use per faucet and are the best case for the motion sensor faucet. The University currently has 350 office/classroom lavatories that use 1,357,125 gallons of water annually (assumes 3 hand washings/person/day for 15 seconds each). If we change to a motion sensor faucet (assume 5 seconds saved per hand wash during soaping process) the University will save 177,100 gallons of water a year. The dollar savings would be $1,452 annually. The material and labor cost would be 350 @ $396/faucet = $138,600. The simple payback would be 95 years.

The following initiative is recommended for adoption:

- **Implementing all the toilet efficiency improvements possible since toilets are the single largest consumer of potable water on campus.** The design standard for toilets has been steadily decreasing from 7.5 gallons per flush (gpf) in 1975 to 1.6 gpf today.

  1. Replace 261 Tank Type Toilet with High efficiency models
  The University currently has 261 toilets installed prior to 1995 that average 5.5gpf. If these toilets are changed to a 1.28gpf high efficiency model, the University could conservatively save an estimated 3,128,085 gallons of water annually. The dollar savings would be $25,578. Additionally, since these toilets have no flapper you can assume another 583,000 gallons annually or $4,780 savings (1 in 20 flappers have a minimum leak of 1150 gal/wk). The total would then be 3,711,085 gallons annually or $30,358.

  Cost:
  260 Toilets @ $270 material and labor = $70,200.
  Simple Payback:
  2.3 years.

  2. Replace 489 Flush Valve Toilet with high efficiency models
  The University currently has 489 toilets that use 3.5gpf . If these toilets are changed to a 1.6gpf, the University could conservatively save an estimated 3,907,110 gallons annually. The dollar savings would be $32,274.

  Cost:
  489 Toilets @ $275 material and labor = $134,475.

Simple Payback:
4.2 years

3. Install Dual Flush Handles on Flush Valve Toilets
We currently have 824 flush valve toilets that could be retrofitted to dual flush handle to save water. These allow the user to flush up (1.1 gpf) for liquid and down (1.6gpf) for solids. The University could conservatively save an estimated 781,140 gallons. The dollar savings would be $9,615 annually.

Cost:
824 toilets @ $36 material and in-house labor = $29,664
Simple Payback:
3.1 years

4. Install Low flow Sink Aerators (1.0gpm office/classroom and 1.5gpm dorm lavatory)
We now have 1710 sinks with 2.2 gpm aerators. If we change the aerators on 350 office/classroom sinks to 1.0 gpm; the 1010 residential lavatory sinks to 1.5 gpm; and leave the 350 kitchen sinks at 2.2 gpm the University could conservatively save 2,116,880 gallons annually. The dollar savings would be $17,358. However, using less gpm will have people washing longer or unsatisfied with the sink operation.

Cost:
1310 aerators @ $5.25 (tamperproof) and in-house labor= $6878
Simple Payback:
0.4 years

5. Showerhead (1.6gpm)
The University currently has 902 showers that use 2.5gpm. If we change these to low flow 1.6gpm heads we will save an estimated 3,815,460 gallons annually. The dollar savings would be $31,281. However, people may shower for longer periods or be unsatisfied with the shower operation.

Cost:
902 shower heads @ $45 = $40,590
Simple Payback:
1.3 years

X. Green Purchasing

One of the main impacts that Elon can have on the natural world is through the millions of dollars that we spend each year on purchasing products. Many areas of Elon's campus are just beginning to pilot projects related to green purchasing, purchasing which encourages the development of environmentally responsible products and industry.

The following green-purchasing recommended for adoption:

- **Use local and organic food in all dining halls.** The issue of local and organic food is a priority at Elon for the coming year. Elon is one of approximately a dozen ARAMARK pilot sites (nation-wide) studying the feasibility of expanding local and organic produce use into a much larger venue. Currently, apples are the only local produce being used by Elon; depending on the season and local weather, various other high-quality fruit and vegetables would be available from Overton's, a local distributor. Currently, Overton's sends ARAMARK local produce availability lists which help in planning future menus. Because of the lack of transportation costs, local food costs less than non-local foods. ARAMARK would also like to involve the student body in this endeavor in a program similar to Furman University's where students grow produce. Students might also be able to grow herbs, and ARAMARK hopes that students can grow 60% of Elon's herbs during the summer, spring, and fall and 20% of Elon's herbs during the winter. Space exists outside the dining halls for growing herbs. Currently, catering is the only department on campus using organic foods. Although Danieley sells Amy's Organics including its pasta, cookies and cereals. Amy's Organics are distributed to ARAMARK by US Foodservice. Organic products are more expensive than non-organic products.

- **Use recycled paper at all locations on campus.** Since last year, Elon has seen a 50% reduction in all paper, recycled and non-recycled, used on campus. Although priced at $10.10 more per case, Elon currently uses some recycled paper at some areas on campus. As of now, departments and offices on campus can specify their preferences for recycled paper. Recycled paper is used exclusively in McMichael.

Approximately one quarter of the paper sold at The Campus Shop is recycled. Some locations on campus are avoiding recycled paper because of real or perceived problems that recycled paper might cause to copiers. Recycled paper also may use more ink than non-recycled paper. Print Services currently uses white paper and colored paper which is 30% recycled. In the past Print Services has not been able to use 100% recycled paper in its high speed copier due to the dust content; however, Print Services is going to revisit this questions since improvements are constantly being made in the recycling process. (Note: Ink Cartridges are being recycled by many offices and departments.)

Cost of buying recycled paper:
Paper prices as of 10/15/06:
Recycled paper=$34.50 per case
Thirty percent recycled paper=$26.50 per case
Standard Paper=$24.50 per case
The cost of recycled paper is projected to decrease.

- **Using Energy Star Lights and Appliances**. Elon buys all of its light bulbs from Hunt Electric Supply in Burlington. Because of federal regulations, most florescent and HID lights are energy saving; incandescent lights are not as energy saving, but Elon has few of these. Incandescent lights can be switched out to CFL lights which are not only more energy efficient, but also require less maintenance. Elon's new buildings are much more energy efficient in terms of light bulbs than older buildings. Elon buys all appliances from Lowes where a large percentage of appliances—especially those that are more expensive—are Energy Star. During the last two years Elon purchased approximately 30 dishwashers, 20 refrigerators, and 97 washing machines with Energy Star ratings. No such rating exists for clothes dryers; however the Energy Star rated washers help cut the cost of using dryers (electric or gas) by spinning more water out of clothes.

  Cost: Energy Star lights and appliances are more expensive upfront, but they are more cost effective in the long run. Hunt Electric Supply can do a facility energy audit on Elon's buildings (free of charge) and recommend where lighting improvements can be made.

- **Use Environmentally Friendly Cleaning Supplies.** Although the Environmental Services department uses products that comply with all federal standards, it does not currently use many Green Seal products, those earmarked by Green Seal, a nonprofit organization devoted to the conservation of resources and the reduction of pollution. Initial studies by Elon have concluded that the Green Seal products are more expensive and less effective. Because these products are continuously being improved for effectiveness, current studies may produce better results. Efforts are underway now to use Green Seal products on a single building at Elon while charting effectiveness and the relationship between effectiveness and cost. (The only Green Seal products currently being used at Elon include standard toilet tissue and jumbo roll tissue.)

XI. Green Building

Buildings in the United States account for 36% of the total energy consumed, 30% of the natural resources used, and 12% of potable water consumed. These same buildings produce 30% of the greenhouse gases and 30% of the waste going to landfills. New design and construction practices have provided significant ways to reduce or eliminate these negative impacts. Buildings that incorporate these practices are referred to as Green, Sustainable, High Performance, or Environmentally Friendly.

There are environmental, economic, and community benefits in Green Building. First, sustainable buildings help protect ecosystems, improve air and water quality, and conserve natural resources. Second, sustainable buildings reduce operating costs, reduce maintenance costs, and lower infrastructure costs. Finally, green buildings have occupants with increased productivity, less absenteeism, and reduced health costs.

Because of these benefits of environmentally friendly buildings, organizations have formed to provide leadership, education, and a voice for green building. One of the leading and most recognized organizations, the United States Green Building Council (USGBC), has developed a sustainable guideline and third party certification process to ensure that a project is constructed and maintained to green building standards. The sustainable guidelines assign points to sustainable technologies and activities that are incorporated into a project in five major categories (Site, Water, Energy, Materials, and Indoor

Environmental Quality). If the project obtains enough points, it is awarded the distinction of being "Certified," "Silver," "Gold," or "Platinum" depending on the number of points the project earns. The certification by USGBC costs about $100,000 in labor to collect and review the project documentation, but it is one of the only ways to attest that a project is sustainable.

Elon University recognizes the value of providing positive living, learning, and working environments. The University currently occupies about 1,500,000 square feet of building area. Changes in programs, populations, and teaching pedagogies require that the University's campus also evolve to meet these changing needs. The University develops the campus with the environmentally friendly building practices as listed below.

Site Protection measures include:

1. Eliminating erosion and protect storm water runoff
2. Installing pervious asphalt in parking lots
3. Constructing multi-story buildings to reduce the amount of land disturbed.
4. Promoting alternatives to automobile use including pedestrian walkways, bike paths, and shuttle services
5. Planting trees in parking lots to provide shade that reduces the amount of heat gain
6. Installing exterior lights that control the direction of light to eliminate the amount of light leaving the campus

Water Consumption measures include:

1. Irrigating with collected storm water
2. Installing efficient irrigation systems and controls
3. Investing in efficient water fixtures and appliances

Energy Consumption measures include:

1. Incorporating passive design features to take advantage of natural light without the unwanted heat gain
2. Installing highly efficient steam and chilled water distribution systems to serve multiple buildings and reduce the overall load requirements.
3. Administering a significant number of university buildings with an energy management system that turns heat, cooling and other systems on and off to better manage consumption.
4. Installing higher efficiency bulbs and ballasts.
5. Allowing energy conserving devices, like motion sensors, to turn off devices when not in use

Material and Resource Conservation measures include:

1. Conveniently providing bins for the collection of materials that can be recycled so that the users can divert their waste away from the landfill
2. Renovating buildings when appropriate instead of demolishing existing and construction new buildings.
3. Using building materials that have recycled content.
4. Incorporating materials that are harvested, manufactured, and distributed locally.
5. Utilizing durable materials to reduce the maintenance or replacement costs.

Indoor Environment Quality measures include:

1. Providing normally occupied spaces, like offices and classrooms, with natural light, views to the exterior and fresh air whenever possible.
2. Allowing the users to control the lighting and temperature of their own environment.
3. Prohibiting smoking from the interior of buildings.
4. Installing mats at all major entries to trap contaminants outside the building.
5. Locating noisy equipment away from normally occupied spaces.

Even with all of these efforts, the buildings on campus would probably earn only half of the points required to obtain a sustainable level of "Certified." These remaining points could be earned with a little more focus and effort.

Most buildings in the United States are not sustainable because it is believed that building Green costs more. In fact, current research suggests that a sustainable building may have a higher cost of 2% compared to conventional buildings. The higher front end costs are because more work is required of the design and construction teams to ensure that they are producing an environmentally friendly product. However, reduced operating costs will payback this premium within a matter of years. The earlier green building features are incorporated into the project the lower the cost.

The following Green Building initiatives are recommended for adoption:

- **Designing each new or renovated facility to include sustainable features using sustainable guidelines from the United States Green Building Council, commonly known as LEED.** Each project should set as a target to obtain enough points, that if taken through the

certification process, would earn a Silver Certification or higher. Appropriate projects based on their location, function, and program will be selected to be officially certified as sustainable.

- **Verifying that each architect engaged for new or renovated facilities possesses LEED certification or a similar certification/experience with the design of sustainable projects.**

- **Verifying that, throughout the design of the project, the design team submits a sustainable design checklist with each major submission for review with the drawings.**

- **Verifying that each contractor engaged for new or renovated facilities should be LEED certified or have a similar certification/experience constructing green buildings.**

- **Reviewing the sustainable checklist on a monthly basis to track the sustainable feature throughout the construction process.** Also documentation should be gathered for submission to a third party for certification.

XII. Student Activities

The following student activities initiates are recommended for adoption:

- **Developing sustainability programs and awareness in various departments within the Division of Student Life.**
    1. Develop a Residential Energy Conservation and Sustainability Policy/Program which focuses on six problem areas: computer use, other appliance use, lights, water, heating, and recycling.
    2. Buy nightlights for all bedrooms or bathrooms – the nightlights are $4.90 each. The night light turns on at dusk and turns off at dawn. Using only 0.03 watts, not only is the light very

inexpensive to operate, it comes with a 100,000 hour, lifetime guarantee.

3. Train residence life student staff on energy conservation and sustainability efforts. Require all student staff to continually educate residents on energy saving and sustainability practices at floor meetings and individual interactions, such as: enabling power management feature on computers; mindfully turning off unnecessary lights in rooms, bathrooms, and lounges; reporting leaky water faucets and turning off running water; reporting heating problems; motivating students to use energy wisely; having have them seek out energy-efficient appliances and electronics; and educating students on recycling efforts.
4. Create an Energy Star room to spotlight widely available energy-efficient and sustainable lifestyle products and practices applicable to students residing both on and off-campus. Included in the room would be Energy Star qualified lighting, appliances, and electronics commonly found in student rooms, such as DVD players, compact refrigerators, and stereos. Regular tours would be available for the Energy Star demonstration room, which can also feature signage explaining the benefits of purchasing Energy Star qualified products instead of conventional ones.
5. Update Residence Life and Orientation literature to include information on Energy Star product information to all incoming student residents. Administer a survey to residential students to gather information on their understanding of energy usage.
6. Using the survey results, focus educational efforts around the information gathered.
7. Include a written Energy Conservation statement and policy in the Guide to Residence Hall Living, Residence Life website, and Orientation materials sent to incoming first year students.

Cost:
$1,225.00 to purchase 250 night lights
$200 for educational efforts
TOTAL - $1425.00

- **Training residence life student and staff on energy conservation.**
    1. In August student staff training, educate staff on conservation issues regarding residence halls.

2. Discuss with student staff possible programs and meetings to educate their residents.
3. Require each residence life student staff member to implement an energy conservation/education program on their hall.

Cost:
Zero

- **Educating students about their efforts toward reducing the amount of natural resources used and sustainability efforts.**
    1. Create a marketing campaign around sustainability and personal responsibility.
    2. Brainstorm marketing ideas with students involved with the Sierra Club.
    3. Work with the Leadership and Organization Office on communicating with student groups.
    4. Implement the marketing campaign.

    Cost: $500 towards marketing.

- **Working with student groups on their responsibility and involvement concerning sustainability efforts.**
    1. Ask Resident Student Association (RSA) and the Student Government Association (SGA) to assign student representatives to sit on the Environmental Council committee.
    2. Form partnerships between the Environmental Council and representatives from Resident Student Association (RSA), Student Government Association (SGA), Peace and Justice, and the Sierra Club.
    3. Develop activities for a week long focus on sustainability ending on Earth day.
    4. Research other Universities student programming on sustainability efforts.
    5. Establish a student committee to plan and implement the event.
    6. Implement a week long celebration and awareness including local environmental organizations, music, food, ongoing efforts and end the festivities on Earth Day (April 22, 2007) http://www.earthday.net/resources/2006materials/EarthDay-in-a-Box.aspx

Cost :
$1500 for marketing, t-shirts, music and administrative expenditures.

- **Developing residential hall competitions around conservation of water, electricity, and waste.**
    1. Create a week of "Green Games" in the fall semester. The residence halls will face off to determine which hall has the greenest power.
    2. Work with the RSA to help promote conservation in the residence halls through ongoing campaigns to remind students about conservation efforts and reinforce this commitment to environmental stewardship.
    3. Use some of the savings in utility costs from the campaign efforts of RSA to support conservation programs in residence halls. For example, one hall could use its share of the funding to hold an old-fashioned "field day" – complete with cookouts, activities and prizes – to get residents outdoors, thereby reducing utility use within the building for that day.

Cost**:**
Zero

XIII. Communication

Our efforts to enhance the environmental sustainability of Elon should involve a collaborative effort with staff, students, and the community. Staff, the community, prospective students and families, and astudents alike should be educated about our environmental initiatives and what they can do to help live more responsibly. Furthermore, communication is one way this council will try to insert sustainable practice into the institutional image of the school.

The following communication initiatives are recommended for consideration:

- **Creating a "Green Calendar" of sorts, a collection of environmental events on campus and in the Triad area.** This would be available on the internet and a campus mailing. Picture the cultural calendar Elon currently publishes, but environmentally focused and wider in scope. Allow these environmental events to, even if off campus, count as colloquium events for in-class/program requirements, even if they are off campus.

- **Reviewing how sustainability is represented on the internet.** The link on e-net needs to be changed to read "Environmental Sustainability" or something of the like; a phrase more catching and meaningful than "Env-Aware." Maybe even move it up within that list on the left if we can, make it seem more important to the school and less like an afterthought. The website is kept current and looks nice, but should include more *accessible* information, like easily observable facts and stats about our environmentalism and what can be done by the average visitor to increase it.

- **Communicating environmental sustainability in class when it is possible.** A method of accomplishing this would be placing the proposed sustainability coordinator in charge of providing resources to professors hoping to incorporate environmentalism in class. He or she would make the science and importance of sustainability accessible to professors and students.

- **Making our commitment to sustainability an important facet of admissions and global university publications.** This kind of

commitment will attract an environmentally conscious student and convey the institutional image we are looking for.

- **Sending out periodic emails to staff, students, and faculty about campus energy use and little, easy ways they can help reduce energy use**. (Ed Eng currently sends out this kind of emails to the Elon community.)

- **Funding environmental projects that students and staff initiate, such as the garden proposal, and publicizing them**. Knowledge is power, the more people who know about what the school does environmentally, the better.

- **Utilizing campus media to support sustainable practices and advertise "green activities."**

Cost of communication recommendations:
Most of these recommendations are more costly in time rather than money. The only monetarily costly ideas are the overhaul of campus literature, printing costs associated with the calendar, and funding environmental proposals, which ranges from low to conceivably high. Otherwise, these communications are undertaken through channels like the internet. The cost will be in researching the environmental emails and leaning on the right people to get sustainability into the university publications and in the Global curriculum.

XIV. Curriculum

Enhancing the theme of Sustainable Practice in the General Studies Program

- Enhance the General Studies goal of students gaining 'an understanding of their interconnectedness with other people and the environment, as well as their responsibility to both' and the Global Experience (GST 110) core theme of understanding the 'relationship of humans to the natural world' core theme by improving faculty awareness of environmental sustainability. This would require designation of a Green coordinator, who would provide resources to the GS Director for workshops, themed lunches, and other venues for faculty development in this area
- Sustainability Summit for GST 110 sections – modeled after the Model UN. This would require designation of a Summit coordinator, who

would provide resources to participating GST 110 faculty as well as coordinate the Summit

Establishing a Visiting Environmental Scholar-in-residence
Elon University will host a Visiting Scholar in Residence each year. The Visiting Scholar may reside at Elon for a semester, or a year. The Environmental Scholar will be someone with a renowned reputation in Environmental Sustainability. Their area of expertise may be in any discipline (natural/physical science, social science, humanities, business, communications, education), but will center on the theme of sustainable practice. The Visiting Scholar will engage in teaching, working with Elon faculty, students and staff, and sharing their expertise with the Elon community.

Including Sustainability Focus in the Departmental and Program end of year reports
Departmental and Program end of year reports to the Dean and Institutional Research will include a section discussing the theme of environmental sustainability and how it was integrated or developed in their program/department.

Develop an Environmental Scholars program
Similar to the Periclean Scholars, this program would engage students in a three year program of study and work on environmental issues.