
Washington and Lee University
Lexington, Virginia

Climate Action Plan



January 15, 2010

**WASHINGTON and LEE UNIVERSITY
CLIMATE ACTION PLAN**

TABLE OF CONTENTS

PART I: INTRODUCTION, GOALS, and COMMITMENT

- A. Executive Summary
- B. Washington and Lee University's Climate Action History
- C. Climate Commitment at Washington and Lee
- D. Challenges to Implementation and Solutions

PART II: EVALUATION and IMPLEMENTATION

- A. Greenhouse Gas Report (Campus Carbon Footprint)
- B. Current Sustainability Initiatives
- C. Courses of Study
- D. Communication and Campus Community Involvement
- E. Energy Conservation Measures (ECM) Project List
- F. Measurement and Verification

PART I: INTRODUCTION, GOALS and COMMITMENT

A. Executive Summary

The desire to conserve energy and to stem the tide of dwindling resources is gaining increased attention nationwide. Taking better care of the planet is on everyone's mind and drives many people's daily actions.

Washington and Lee University (W&L) has engaged in sustainability initiatives for many years, including recycling, composting, installing compact fluorescent lighting, turning off unneeded lights, increasing walking and biking, printing double-sided copies and growing vegetables for its Campus Kitchen Project. These efforts, along with the president's commitment to the Talloires Declaration and the American College and University Presidents Climate Commitment (ACUPCC), will help W&L achieve the ultimate goal of climate neutrality.

Multiple simultaneous efforts will be outlined in this Climate Action Plan (CAP) helping W&L achieve *carbon neutrality by 2050*. The general areas of focus are:

- Education
 - The University offers credit-bearing classes inclusive of sustainability, climate change and related subjects. Approximately 30 percent of the students enroll in at least one of these courses. Integrating into the curriculum topics related to sustainability is a key component of the overall sustainability strategy.
 - The University Sustainability Committee (USC), which has evolved out of early grassroots actions, is now a formal committee appointed by the president, and includes students, faculty and staff. Among other initiatives, it leads educational efforts that supplement formal classroom instruction. This group leads educational efforts toward behavioral changes that will positively impact the overall energy picture.

- Communication
 - A vital component of any University-wide initiative such as this is communication with and between many different constituents. All

University communications will be coordinated by the W&L Office of Communications and Public Affairs.

- Assessment
 - Consistent, clear and accurate tracking of our actions and progress is also necessary, and the President's Climate Commitment Task Force will be responsible for ensuring that this occurs.

- Building Infrastructure
 - Attention to energy savings will require upgrades to building equipment that heats, cools and lights our facilities. Many of the University's buildings contain aging infrastructure that was installed when our consciousness about sustainability and energy management was not as high and when technologies were less sophisticated. Much of this equipment has also served well beyond its original expected life and is no longer running at optimal efficiency.
 - We have developed Energy Conservation Measures (ECMs), which are outlined in more detail in this CAP, offering many options for energy savings at many different scales and levels of investment.

Leadership Support

Any initiative of this scale requires leadership support from the top of the organization. The following outlines several initiatives undertaken directly by Washington and Lee's President Kenneth P. Ruscio.

As one of the founding signatories in 2007 and a member of the ACUPCC Leadership Circle, President Ruscio has committed Washington and Lee University to this important journey, and he is committed to improving sustainability of our community. He restated the University's commitment to sustainability in a campus wide e-mail on Sept. 10, 2009, that addressed institutional priorities for 2009-2010. Regarding the priority of sustainability, one of five University-wide goals, President Ruscio stated:

We will continue our concerted efforts toward meeting our commitment of creating a sustainable campus. By January 2010, we will submit our implementation plan to ultimately achieve carbon neutrality. Having completed a baseline study, we now have a very clear understanding that energy (heating, cooling and lighting) is the largest

component of our carbon footprint, and fortunately it is an area where we, individually and collectively, can make significant improvements. Our goal is to reduce energy consumption by 25 percent within a four-year period. To assist us in meeting this goal, the University Sustainability Committee will focus its efforts on educating the community about individual and collective green practices.

President Ruscio recognizes the ambitiousness of the University's efforts to reduce energy consumption, and he has personally committed to several steps:

- Hosting a town hall meeting (fall 2009) to outline the University's commitment to the community, as well as discussing the community's responsibilities to be more sustainable in our daily lives.
- Engaging a consultant to help reduce energy consumption through the development of an Energy Master Plan that will provide a road map for specific initiatives.
- Working closely with Washington and Lee's Vice President for Finance and Treasurer to develop a plan to fund initiatives.

Timeline

Washington and Lee's plan for achieving carbon neutrality is underway and specifies short, intermediate and long-term goals for reducing the University's carbon footprint. All phases will include behavioral education to reduce consumption plus the following physical plant upgrades that will increase efficiency.

- *2011 – Utilities Cost Reduction (reduce by \$1M; goal set by Treasurer's Office).* This will be achieved through continued reduction of BTU/SF throughout all facilities on campus and primarily through implementation of specific projects with a return on investment (ROI) of less than three years.
- *2013 – BTU/SF of Space (25 percent reduction of current levels; goal set by President Ruscio in his charge to Energy Usage Task Force).* This will be achieved primarily through implementation of energy-saving projects with a ROI of five years or less. We will strive to improve space utilization by lowering

total University square footage, and to reduce BTUs through increased efficiency of HVAC equipment, lighting and plumbing systems.

- *2020 – Greenhouse Gas Reduction (20 percent reduction of current levels; goal of ACUPCC).* This will be achieved through the combination of 1) adding more efficient HVAC equipment, 2) reduction in the amount of space required to be heated and cooled, 3) decreased reliance on fossil fuels, 4) increased reliance on renewable energy sources such as solar hot-water generation and 5) behavioral modification.
- *2050 – Washington and Lee University achieves carbon neutrality.* This requires implementation of new technologies not yet fully developed, such as photovoltaic (PV), co-generation, and use of 100 percent renewable resources to replace natural gas consumption and purchased electricity produced by others using non-renewable resources.

Financial Considerations

An undertaking of this magnitude must include a commitment to fund the multiple initiatives. The financial commitment is a multi-pronged effort that attempts to leverage as much ongoing and planned project effort as possible to make the needed energy upgrades.

The first source for financing projects is the projected savings that improvements are expected to generate. Those projects with an expected ROI of one year or less have received blanket approval to be implemented immediately. These initiatives will pay for themselves out of the already approved annual utility budget.

The second source will be the identification of energy improvements that are part of or related to current capital projects. These projects are funded through capital expenditures that will be leveraged along with the energy component of the project. This particular approach requires careful planning, and we have identified several potential energy-savings projects as candidates. They are listed in more detail later in this document.

The third source is to package a number of projects together to generate the best payback period (ROI) and to prioritize funding and execution for those projects that

will require new investments. Projects or groups of projects with an ROI under five years will typically receive priority.

These financial sources are not mutually exclusive, and combinations of each may be used to achieve maximum efficiency and the best value.

Implementation Structure

To achieve the ultimate goal of carbon neutrality, three major University groups will monitor, lead and direct portions of the Climate Action Plan. The Chief Facilities Officer will coordinate these efforts with other arms of campus that play important roles in achieving our goals.

- *President's Climate Commitment Task Force* – Formed in March 2009. It guides the creation and implementation of W&L's plan for climate neutrality and for identifying and implementing the PCC's tangible action items. Initial goals of the committee in 2009:
 - The creation of Washington and Lee's Climate Action Plan (CAP).
 - The determination of at least two tangible actions to reduce W&L's greenhouse gas emissions.
 - Creating an implementation budget.
 - Assuring implementation of the plan.
 - Tracking progress.
- *Energy Usage Task Force* – In May 2009, President Ruscio established this group to lead the effort related primarily to identifying and implementing infrastructure projects that will directly reduce energy consumption. The majority of these projects focus on HVAC, electrical and plumbing systems for occupied buildings.
- *University Sustainability Committee* – This group will educate the community about sustainability and good green practices and will lead the effort to effect behavioral changes.

Summary

The development of this Climate Action Plan (CAP) serves several purposes:

First, it is a vehicle to confirm Washington and Lee University's commitment to this important effort and to communicate this commitment and specific actions to W&L and the surrounding communities.

Second, it is a means to organize and analyze existing information and data specific to Washington and Lee and to create a roadmap leading to carbon neutrality.

Third, it becomes an existing baseline for Washington and Lee's energy/resource reduction efforts and a framework from which to build our continuing energy and education strategies.

We imagine this document to be fluid; immediate changes will be seen, and new technologies and strategies will bring expected and unexpected results. All of this will require altering certain strategies outlined in this document. W&L will re-evaluate this document regularly and make appropriate adjustments as needed.

Our approach to energy savings is three pronged – cost reduction; usage reduction; and carbon footprint reduction. Any ECM undertaken will impact one, all, or some combination of each of these three prongs, but all not necessarily moving in the same direction at the same time. For example, W&L might reduce energy usage and reduce its carbon footprint, but have no impact on the utility expense for a particular ECM that is implemented.

While flexibility in this document and in our energy strategies is essential, the ultimate goal for Washington and Lee University to *achieve carbon neutrality by 2050* remains a constant.

B. Washington and Lee University's Climate Action History

Washington and Lee University was founded in 1749, providing a liberal arts education that promotes "life-long learning, personal achievement, responsible leadership, service to others, and engaged citizenship in a global and diverse society." The University's motto is *non incautus futuri*, not unmindful of the future. It is a clear representation of the long-time commitment of the University community to consider how our decisions and actions will impact the future. Sustainability is clearly an important part of this notion.

During the five years Robert E. Lee served as president of Washington and Lee, beginning in 1865, Lee guided all areas of the university with a characteristic consideration for future generations. This also applies to the environment. President Lee exhibited environmental stewardship and provided an enduring legacy by planting trees throughout the W&L campus. More recently, the University has become involved in climate action through a variety of avenues.

ACS Environmental Initiative (1997) - The University is a member of the Associated Colleges of the South (ACS) (<http://www.colleges.org>). The ACS initiated an Environmental Initiative in 1997 and W&L students, faculty and staff have participated in many of the programs associated with the initiative. President Ruscio was the first University ACS faculty fellow.

Environmental Studies Program (1990's) - W&L's program in Environmental Studies originates from an environmental studies major that was initially created in the Geology department. The Environmental Studies Program was then established as the result of a faculty approved proposal presented by the environmental studies committee. (The Environmental Planning and Management Committee, EPMC, was also created at that time.) Dr. James Kahn was hired in 2000 as the Environmental Studies Program Director as a result of a grant from the Jessie Ball duPont Foundation to support the program. The Environmental Studies Program is designed to educate students in a broad class of issues related to the environment and humanity's place in the natural world. (<http://www.wlu.edu/x11627.xml>) While serving as a professor of politics at W&L, President Ruscio chaired the committee that created the Environment Studies Program and was the program director until Dr. Kahn's arrival. He also chaired the search committee that hired Dr. Kahn.

Environmental Planning and Management Committee (1999) – The EPMC was the precursor of the University Sustainability Committee. It was formed in 1999 as a result of the Associated Colleges of the South’s Environmental Citizenship Initiative and student interest in recycling. The charge of the committee was to help with the “coordination, planning, management and implementation of issues related to environmental concerns in the operation of the University.” The EPMC helped to raise awareness of environmental issues on campus including recycling, storm water management and environmentally sensitive campus master planning.

Environmental Indicators Report (2005) - The EMPC conducted a campus-wide environmental audit (Environmental Indicators Report) that charted the way to a more sustainable campus in 2005.

Green House Gas Inventory (2006) - In 2006 Mr. Laurence Eaton conducted a green house gas (GHG) inventory of University emissions with the assistance from students in Dr. James F. Casey’s *Environmental and Resource Economics* class. This inventory was one of the first inventories of a higher education institution in the state of Virginia. Mr. Eaton, a W&L 2005 Economics major, served as a Program Coordinator for the Environmental Studies Program from 2005 to 2007. He raised awareness of global warming issues with the EPMC and the rest of the campus community. Mr. Eaton is presently a Post-Masters Research Associate at Oak Ridge National Laboratory in Tennessee.

Environmental Management Coordinator (2006) - Mr. Joseph Grasso, Washington and Lee’s Vice President of Administration from 2003 to 2007, was instrumental in providing support and funding for various operational programs that made the campus more sustainable. An Environmental Management Coordinator, Mr. John C. Wise, was hired in 2006 to coordinate sustainability efforts on campus and in the surrounding community.

Talloires Declaration and Presidents Climate Commitment (2007) - President Ruscio signed both the Talloires Declaration and the Presidents Climate Commitment early in 2007. He was the founding faculty member of the University’s Environmental Studies program when he served as a professor of politics and has a longstanding interest in, and commitment to environmental protection and sound environmental policy. President Ruscio signed these documents to signal the University’s commitment to improving the world’s climate and to help educate Washington and Lee’s students about the challenges and opportunities that they will encounter in their future.

Sightlines Greenhouse Gas Inventory (2007) - Sightlines, a facilities asset advisory firm, conducted a green house gas (GHG) inventory for the University that was used as the base line for ACUPCC reporting.

Energy Conservation Performance Contract (2007) - Ameresco conducted an energy conservation performance contract project for the University at a total project cost of \$2.4 million which reduced annual electric consumption by 2 million KWH in electricity use and annual natural gas consumption by 20,000 MMBtu. These actions resulted in an overall reduction of more than 2,000 metric tons of GHG emissions and annual utility expense savings of \$470,000.

University Sustainability Committee (2008) - The University Sustainability Committee (USC) was established in 2008 to further the work of the EMPC and expand into other areas of sustainability such as education, co-curricular activities and coordination with other community organizations interested in sustainability. It is the responsibility of the USC to help the University to meet the goals of the Talloires Declaration and Presidents Climate Commitment.

Sustainability Week (2008) - Campus Sustainability Week at Washington and Lee University in September 2008 was an educational and awareness event to bring sustainability to the forefront of the consciousness of W&L students, faculty and staff and the Lexington/Rockbridge community. All events were open to the public and were planned and organized by a multi-discipline group of W&L departments including Dining Services, Facilities Management, the Biology Department and the Program in Environmental Studies.

Temperature Regulation Policy (2009) - A campus-wide temperature regulation policy was implemented to reduce energy consumption by limiting temperatures to a maximum of 68°F in the winter and a minimum of 74°F in the summer.

Presidents' Climate Commitment Task Force (2009) - In March 2009, the PCC Task Force at W&L was formed by President Ruscio to create and implement W&L's plan for achieving climate neutrality. This group is also responsible for identifying and ensuring the implementation of the PCC's tangible action items.

Energy Usage Task Force (2009) - The Task Force was charged by President Ruscio to look at how Washington and Lee can reduce its energy consumption. A detailed list of

the committee's charges is presented in *Part I, Section C. Climate Commitment at Washington and Lee* of this document.

Energy Consultant Services (2009) - ENERACTIVE, an energy consulting firm, was contracted to develop an Energy Master Plan for the university and will complete this work in early 2010.

Cultivating Sustainability Conference (2009) - Washington and Lee Dining Service hosted the Cultivating Sustainability Conference in September 2009. Attendees included school nutrition and food service personnel, school and university officials, local legislators, administrators, farmers, producers, and those involved in food system development. This conference offered strategic directions for scaling up a regional food system, discussed the critical role institutions can play in the development of a regional food system, and provided practical approaches for food service personnel to learn to source locally for their institutions.

C. Climate Commitment at Washington and Lee

As stated previously, Washington and Lee's motto is *non in cautus future*, meaning not unmindful of the future. The mission of the University is to provide " ... a liberal arts education that develops students' capacity to think freely, critically, and humanely and to conduct themselves with honor, integrity, and civility. Graduates will be prepared for life-long learning, personal achievement, responsible leadership, service to others, and engaged citizenship in a global and diverse society." The commitment to prepare students for the challenges they will face requires that the University educate by exhibiting leadership as well as academic and co-curricular instruction. Climate change is one of many challenges that our students will confront.

The University's commitment to achieve climate neutrality is comprehensive in nature. The basis of that commitment is the Talloires Declaration and the Presidents Climate Commitment. These policies go beyond the promise to become carbon neutral by including other aspects of sustainability including education, community involvement, social responsibility and environmental stewardship. In order to reduce greenhouse gas emissions, solutions will be sought and identified in all areas of the University's operations, and all reduction options will be fully explored and evaluated.

- Energy Usage Task Force

The goals for the Energy Usage Task Force highlight the comprehensive nature of Washington and Lee's commitment to achieving carbon neutrality, and focus on the largest contributor to W&L's GHG emissions "picture" – the consumption of energy to heat, cool, plumb, and light buildings.

- Identify strategies to help reduce the number of BTUs per square foot of campus by at least 25% over the next four years.
- Identify measurement instruments to determine effectiveness of each strategy as it is deployed. This will ensure that results match expected assumptions and will assist with needed adjustments where this does not occur.
- Develop a set of metrics that can be shared regularly with senior administrators and the Lexington / Rockbridge communities in which we are located. Develop protocols for managing utilities across campus. These may include more detailed policies related to temperature set points, management of both centralized and distributed utilities, and guidance to the community on utility utilization.

- Determine what investments are needed to assist in meeting or exceeding objectives, and evaluate the payback period for those investments.

Facilities Management, Dining Services, Mail Services, the Printing and Copying Center, and the University Store all have sustainability initiatives. Other sustainability efforts on campus include service learning courses, various student service organizations, the Campus Garden, and Campus Kitchens program.

Information on all of these programs are available on the W&L Sustainability website at <http://gogreen.wlu.edu> .

Policies

- *Temperature Regulation* - In 2009 a temperature regulation policy was implemented campus wide in order to reduce energy consumption. The policy set the maximum winter temperature at 68°F and the minimum summer temperature at 74°F degrees.
- *Energy Star* - Washington and Lee has committed to the purchase of Energy Star rated products as part of the Presidents Climate Commitment. ENERGY STAR is a joint program of the US Environmental Protection Agency and the US Department of Energy helping us all save money and protect the environment through energy efficient products and practices.
- *Leadership in Energy and Environmental Design (LEED)* - LEED is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across several energy management areas. These include increased energy savings, increased water efficiency, reduced CO₂ emissions, improved indoor environmental quality, and stewardship of natural resources.

Education and Culture Change

Institutions of higher education are the logical setting to provide education and to implement energy and sustainability initiatives. College courses offer a controlled, formal setting to discuss the latest facts (scientific data) and perspectives regarding the state of the environment, energy usage, and social justice issues. Academic courses

inspire problem solving discussions and create new research that may be used in future energy savings initiatives, some of which have yet to be discovered.

- University Sustainability Committee
W&L's University Sustainability Committee (USC), which has evolved out of early grassroots actions, is now a formal committee appointed by the president. The USC includes students, faculty and staff. Among other initiatives, it leads W&L's sustainability educational efforts that supplement formal classroom instruction.
 - *Curriculum* - Washington and Lee has a solid record of offering courses that address sustainability and environmental issues . Courses and other programs offered to undergraduates and Law School students explore these issues, their fundamental connections, and serve as examples of W&L's educational commitment with regard to climate neutrality.
- Undergraduate Colleges
 - Environmental Studies Program
The Environmental Studies major and interdisciplinary minor require an understanding of the sciences, social sciences, and humanities. The program is designed to educate students in a broad class of issues related to the environment and humanity's place in the natural world. Experiential learning opportunities are also available through several Signature Programs.

Service learning opportunities are offered each semester under the topics of environmental education, community supported agriculture and regional conservation issues.

The U.S./Brazil Higher Education Consortia Exchange Program offers curriculum based on issues of energy, the environment and sustainable development with a focus on training future leaders to make sound decisions in regard to developing future local, regional, and global energy portfolios.

Chesapeake Bay Program is a place-based learning initiative confronting regional and national issues pertaining to the Chesapeake Bay and its watershed.

Co-curricular Events are educational opportunities to students, staff and faculty both in and outside of the classroom.

The Environmental Studies **Capstone Course** is an interdisciplinary course intended for students in the program in environmental studies. Students analyze a particular environmental issue and attempt to integrate scientific inquiry, political and economic analysis and ethical implications. The issues under examination change annually during the winter term.

In addition to regular course offerings, the Environmental Studies program hosts monthly luncheons that are open to the public. Topics in fall 2009 include "Sustainability and Participatory Action Research" and "Hays Creek: A Local Water Quality Project of the W&L ENV Chesapeake Bay Program".

Below are topics from the 2008 – 2009 Environmental Studies Luncheon season.

September 29, 2008 - The W&L Environmental Studies Program sponsored a water forum which included speakers from the Biology, Geology and History departments.

October 16, 2008 - Dr. Harvey Markowitz (Sociology and Anthropology) discussed the Yupik Inuits of Southern Alaska's spiritual understanding of their relationship with seals, whales and other aquatic mammals and ceremonies performed to maintain this relationship.

November 6, 2008 - Ecosystems Center and the Woods Hole Semester in Environmental Science Program.

December 4, 2008 -Dr. James Casey, Associate Professor of Economics, presented "Valuing the Coastal Environment in the Caribbean."

January 15, 2009 - Dr. Alexandre Rivas, environmental economist and visiting professor from the Universidade Federal do Amazonas, presented "Research and Development in the Brazilian Amazon."

February 5, 2009 - The Washington and Lee University Environmental Law Society presented "Climate Change and the Obama Administration."

March 5, 2009 - Dr. James Warren, S. Blount Mason, Jr. Professor of English, presented poems of Mary Austin, a California nature writer who published *The Land of Little Rain* in 1903 and was a tireless advocate for Native American literature and culture in the Southwest.

April 2, 2009 - The Environmental Studies 111 students presented "Community Service: The Rockbridge Area Conservation Council and the Lexington City Go Green Effort." Students presented their service projects.

May 7, 2009 - Alumni, Sarah Tilbor, discussed W&L education and career opportunities in her presentation "Energy and Environmental Consulting."

W&L students who study abroad have an opportunity to take the following energy classes:

Universidade Federal do Amazonas in Manaus

- Impacts of petroleum activities on the rainforest
- Urban/industrial activities and sustainable development
- Independent Studies in Geology, Environmental Economics and Biology

Universidade Federal do Rio de Janeiro

- Alternatives of Energy
 - Energy Planning
 - Engineering and the Environment
 - Economics of Oil
 - Environmental Impacts of the Oil Industry
 - Multidisciplinary Project in Oil Engineering
 - Energy and the Environment
- Law School
 - Courses

The law school offers several courses which teach students about subjects relevant to sustainability and/or provide them opportunities to assist with environmental projects. A brief description of each of these courses is found below.

Climate Change and Environmental Law Seminar. This course will provide an overview of the emerging law on climate change, and provide students interested in environmental law with an opportunity to engage in a serious writing project. Students will have the option of developing their own paper topics or writing on a subject that will be helpful to the Southern Environmental Law Center. The first two-thirds of the course will cover five main areas of climate change law and policy: international agreements, U.S. federal regulatory efforts, the European Union's and other countries' domestic approaches, transnational efforts by states and cities, and litigation. The final third of the course will be devoted to student presentations of their research projects.

Climate Change Litigation Practicum. Climate change litigation is rapidly emerging as an important practice area, with major private and nonprofit firms establishing practice groups to handle the various cases pending around the world. This course aims to prepare students to be competitive in that cutting-edge practice environment by giving them hands-on experience in developing litigation. The course surveys the range of climate change litigation taking place and its significance. It examines lawsuits and petitions filed in state, national, and international tribunals to explore how this type of litigation fits into transnational regulatory governance of climate change. Students then build from that background to engage in practical research projects on climate change litigation that will assist nongovernmental organizations with their work in this area.

Environmental Law. An overview of the response of the American legal system to the problems of environmental disruption. The initial class sessions will be centered around a discussion of the causes and the effects of changes in environmental quality. Next, a substantial number of classes will be devoted to an analysis of the perceived failure of traditional private litigation to redress environmental grievances and the subsequent resort to legislatively created and administratively implemented regulatory schemes. In this portion of the course special emphasis will be placed on the major federal environmental statutes.

Federal Energy Regulation Practicum. The class will study the federal government's regulation of energy products and services and will focus

primarily on regulation of the electric and natural gas industries by the Federal Energy Regulatory Commission under the Federal Power Act and the Natural Gas Act and by the Securities and Exchange Commission under the Public Utility Holding Company Act. After reviewing the basic regulatory framework, the class will consider controversies arising from deregulation and restructuring efforts being implemented at both the federal and state levels with respect to the electric and natural gas industries.

○ Externships

- Fall 2009: Department of Justice - Environmental Litigation Division in DC
- Spring 2010: Appalachian Center for the Economy and the Environment on **mountaintop removal issues**

○ Student Organizations

Environmental Law Society (ELS). The Environmental Law Society [ELS] strives to raise public awareness of the law's impact on environmental issues. Through guest speakers and discussion panels, ELS encourages a free-flowing exchange of ideas and educates others about career opportunities in the environmental field. Not content to merely talk about the environment, ELS members take an active, hands-on role in making the world a better place by helping to manage the law school's recycling program and by cleaning up the Panther Falls area as part of the Adopt A Stream program.

<http://law.wlu.edu/els> hiter.s@law.wlu.edu

Journal of Energy, Climate, and the Environment. *The Washington and Lee School of Law Journal of Energy, Climate, and the Environment* (Journal) is a student-edited periodical published by student volunteers at the Washington and Lee University School of Law, whose members comprise the JECE. The *Journal* includes articles, notes, case summaries, and legislative summaries from professors, practitioners, and students focused primarily on the areas of law surrounding energy and the climate, including, but not limited to, energy generation, energy usage, and climate impacts. JECE publishes the *Journal* solely in an online format.

Third Year Service Activity

This course is being taught at Virginia Tech with third year law students serving as teaching assistants.

- **Law, Science, and Technology: The Quest for Sustainability.** This course explores how law, science, and technology intersect with sustainability, which is generally defined as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. Topics will include: (1) the role of the patent system in sustainable development; (2) the challenges that advances in technology pose to sustainable development; (3) the use of the internet and e-commerce for sustainable development; and (4) policymaking and public law issues related to sustainable development. Through classroom discussions, readings, and presentations, students will gain insight and knowledge which can be used to inform the policies and practices that will shape a more sustainable future.

- Events

First Annual Symposium: Climate Policy for the Obama Administration

Sponsored by the Journal of Energy, Climate, and Environment and Environmental Law Society. Friday, February 20, 2009.

Symposium Description:

During his campaign, President Obama proposed a comprehensive energy plan which includes a major shift in U.S. climate policy. Among other commitments, he supported an economy-wide cap-and-trade system designed to reduce emissions to 80 percent below 1990 levels by 2050, and a reengagement with the U.N. Framework Convention on Climate Change negotiations. In the first few days since his election, he reaffirmed these issues as a priority for his administration and began to take significant policy steps.

This interdisciplinary symposium, which was held one month after the Obama Administration takes office, assessed the Administration's initial steps on climate change and reflected on the road ahead. Our aim was to not only provide interesting academic discussion, but also to produce a policy

assessment that might be useful to those advising the new Administration. Panels focused on managing scientific and policy uncertainty, addressing complexities of scale, re-conceptualizing energy policy, and achieving greater justice. A number of presenters participated remotely to reduce the carbon footprint of the conference.

The symposium also served as an initial planning meeting for a regional coalition of academics working on climate change issues. We are building from this dialogue to encourage greater collaboration and coordination among academics and policymakers in the region. If you are interested in participating in the coalition, please contact Hari Osofsky at osofskyh@wlu.edu.

Second Annual Symposium: The Intersection of Renewable Energy Development and Geoengineering

Sponsored by the Journal of Energy, Climate, and Environment and Environmental Law Society. Planned for Friday, March 19, 2010

Symposium Description:

In this symposium, leading scholars will grapple with the complexities of attempts to use technological innovation and transfer to address climate change. Renewable energy sources reduce our nation's dependence on foreign oil and nonrenewable energy sources, and in the process, our greenhouse gas emissions, but must be readily available and practical to provide the country with the energy it needs to continue to grow and prosper. Geoengineering is increasingly part of the policy discussion as concerns grow that our efforts at mitigation will be inadequate. However, this emerging field must contend with the potential for unexpected environmental impacts, as well as important legal and moral questions.

The first JECE/ELS symposium addressed climate change and greenhouse gas regulations facing the incoming Obama administration in 2009. We are in the process of finalizing the resulting publication from that symposium, which included a number of leading legal and social science thinkers, and served as the first meeting of a regional group of scholars working on climate change. The 2010 symposium expands on the work of the 2009 interdisciplinary project by exploring the legal, political, and social controversies surrounding

the many policy initiatives focusing on the development of alternative energy sources while exploring other ways that science and technology may help in repairing our already-damaged climate. This intersection of law with science and technology poses critical ethical, environmental, national security perspectives.

The symposium also served as a second meeting of a regional coalition of academics working on climate change issues. We are building from this dialogue to encourage greater collaboration and coordination among academics and policymakers in the region. If you are interested in participating in the coalition, please contact Hari Osofsky at osofskyh@wlu.edu.

A more detailed presentation of courses related to sustainability and energy, appears in Part II of this Climate Action Plan.

D. Challenges to Implementation and Solutions

As Washington and Lee moves towards climate neutrality as outlined in this Climate Action Plan, it is clear that several challenges will present themselves. Several of these challenges have already emerged and are presented here for discussion.

Behavior and Culture Change

All members of the campus community – students, faculty and staff - need to be educated about the commitments that the university has made, their responsibilities in the efforts to achieve climate neutrality and how they can help reduce the University's carbon footprint. Education materials and written policies will need to continue to be developed to help in this process. Continued support of the Senior Administration remains critical.

The combination of all initiatives, formal and informal, over time will begin to positively impact behavior and cultural changes with regard to sustainability issues at Washington and Lee and the Lexington / Rockbridge community. This is a process that begins with education, the communication of the vision and goals, and the implementation of programs and initiatives that model the desired behavior. A more detailed presentation of campus community involvement can be found in *Part II: D - Communication and Campus Community Involvement*.

- Challenges:
 - Breaking old habits and educating folks to think differently and creatively
 - Changing perceptions about importance of issues and the need for change
 - Increasing the level of awareness and communicating W&L's commitment at a community-wide town hall meeting to be held in February, 2010

- Solutions:
 - Course offerings; Educational opportunities
 - Communication; Up-to-date website with specific examples highlighting successful efforts
 - Support of student programs and initiatives
 - Climate Action Plan

Funding / Return on Investment (ROI)

Funding for sustainability initiatives is currently overseen by the Vice President for Finance who receives input from the Energy Usage Task Force on suggested energy-based items for implementation. The goal is for the majority of the initiatives to become self-funding over time through accumulated savings.

Financial support for energy conservation measures (ECM's) will be determined on an annual basis within the University's yearly capital budgeting process. The Energy Usage Task Force has been charged with identifying, prioritizing, and recommending ECM's that support the needed initiatives to move towards climate neutrality.

- Challenges:
 - Competing demands in other critical areas of the University
 - Limited financial resources
 - Cash flow – financial resources will need to be available several years in advance of realized savings
- Solutions:
 - Identify areas of overlap and duplication where funding may be reallocated
 - Identify underutilized resources that may be sold, generating cash to support direct investment or to fund a cash flow that supports potential debt

Execution & Staffing

As ECM's are implemented and systems grow in complexity, the need to allocate different kinds of resources will also grow. From an operating budget perspective, there is continued focus to be most efficient with staffing. This focus along with the potential need for additional resources will stretch the institution and provide challenges in both implementation of the ECM projects as well as ongoing operations afterwards.

- Challenges:
 - Identifying the additional staffing resources to implement the necessary ECM's
 - Identifying new technologies and expertise required to operate more sophisticated HVAC equipment

- Solutions:
 - Utilize in-house resources as much as possible
 - Train and grow current staff as much as possible
 - Utilize outside contracted resources in a directed manner for specific areas of expertise
 - Consider the addition of a Facilities Engineer over time to consolidate and focus power plant and environmental management operations

PART II: EVALUATION and IMPLEMENTATION

A. Greenhouse Gas Report

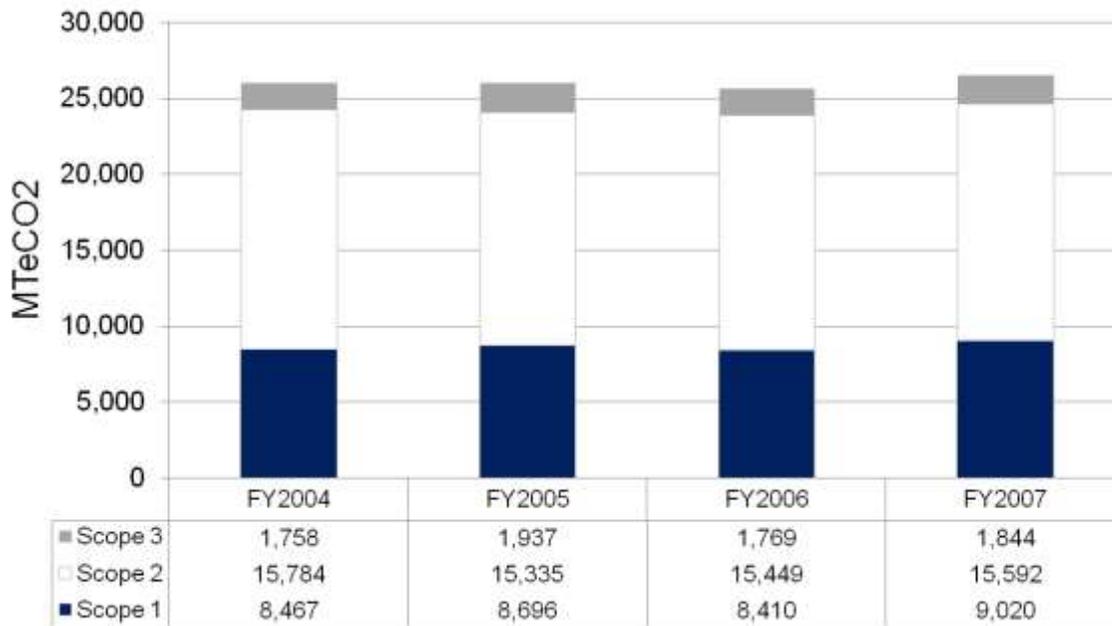
Signatories of the Presidents Climate Commitment are required to prepare a greenhouse gas (GHG) emissions inventory for their institution within one year of signing the PCC. In 2007, Washington and Lee engaged the services of *Sightlines*, a facilities asset advisory firm, to inventory and evaluate the university’s greenhouse gas (GHG) emissions. *Sightlines’ GreenLine Analysis* provides tools that measure, monitor and benchmark an institution’s carbon footprint to reveal environmental opportunities on campus. The inventory identifies the major sources of emission and quantifies the GHG emissions from 2004 to 2007 for Washington and Lee.

Sightlines GreenLine Analysis Washington and Lee University GHG emissions findings FY 2007:
 Expressed as Metric Tons of Carbon Dioxide (MTeCO₂)

| | Emissions Source | Total Carbon Emissions MTeCO₂ | % of '07 Total 26,456 MTeCO₂ |
|---|------------------------------|---|--|
| Scope 1: Direct Emissions from the direct activities of the campus | Natural Gas | 8,672 | 32.8% |
| | Vehicle Fleet | 297 | 1.1% |
| Scope 2: Indirect Emissions from utility production not at the institution | Electricity | 15,592 | 58.9% |
| Scope 3: Indirect Indirect emissions including transportation, waste disposal, etc. | Faculty / Staff Commuting | 964 | 3.6% |
| | Solid Waste – Landfilled | 880 | 3.3% |

Business travel emissions were not included in the report. This will be included in future reports and updates.

Historical Performance – Carbon Emissions



Historically, total carbon emissions in years 2004 - 2007 have been consistent across Scopes 1, 2 and 3. This has occurred even with the addition of more than 200,000 SF of new construction during 2000 – 2010. This indicates that more recent energy savings measures have had some impact in minimizing overall carbon emissions. We anticipate that more concerted and documented efforts along with new technologies, will have a much greater impact, allowing the University to move towards carbon neutrality over time.

In addition to the 2007 GHG Report led by Sightlines, W&L participated in the Jessie Ball DuPont Energy Conservation Conference in Richmond, Virginia in April, 2009. This conference, held in three different locations over a period of time, brought together thirty higher education institutions for discussion and comparison of energy policies. W&L was ranked in the lowest 10% of this data set of thirty institutions, highlighting several areas for improvement such as overall reduction of BTU/SF. The results of this evaluation are being used to help develop and frame a direction for energy conservation measures that will improve our overall carbon footprint.

- Challenges:
 - 92% of W&L's carbon footprint comes from the consumption of electricity and natural gas
 - W&L's electricity provider primarily burns coal in order to generate electricity
 - Many energy saving initiatives have already been implemented
 - Projects involving **renewable energy** are not always economically feasible

- Opportunities:
 - Additional **carbon footprint reduction** initiatives are being identified
 - Improved space utilization offers low cost and relatively "easy to implement" solutions to **reducing energy usage**
 - Carbon offset investments will help the "larger" community

Carbon Emissions – The Future

The next GHG emissions inventory/report for Washington and Lee will be prepared in 2009 and at least every other year after that. In-house expertise will be utilized as much as possible to prepare the report, using the 2007 Sightlines GHG Report as the baseline data.

Washington and Lee has registered with the non-profit group Clean Air Cool Planet (CA-CP) Campuses for Climate Action program. This program "supports institutions in finding and demonstrating energy and global warming solutions." CA-CP provides a Campus Climate Action Toolkit which includes the Campus Carbon Calculator TM. This is in use by more than 1,000 campuses across North America.

B. Current Sustainability Initiatives

There are a number of sustainability initiatives underway that are currently contributing to the overall reduction of W&L's carbon footprint. These may be generally categorized as Non-Energy and Energy initiatives and are outlined below.

Future energy initiatives will be outlined in Part II, Section E and will be identified as specific Energy Conservation Measures (ECM's). Related educational initiatives including specific course of study within the current W&L curriculum are outlined in Part II, Section C.

Non-Energy Initiatives

Non-Energy Initiatives at W&L are focused on waste minimization and include efforts to reduce, reuse and recycle.

- Reduction Strategies
Reduction Strategies include purchasing policies, water and energy conservation projects and educational efforts.
 - *Copying Services* provides paper for all University copiers that is 30% recycled content Sustainable Forestry Initiative certified paper. Some departments on campus are using 100% recycled content Forest Stewardship Council certified paper. The Copying Center also encourages clients to consider paper reduction strategies such as double sided printing.
 - In summer 2009, the University's *Copying Services* and *Information Technology Services* departments traded out all major University distributed copiers with a multi-function machine. The recently installed *BizHub* copier's default print setting is *duplex* and it has the ability to scan and attach documents to e-mails. This offers a good technology option to the more traditional approach of making single sided copies of all documents.
 - *W&L Dining Services* purchases local and organic food, uses non-disposable glass, china, and flatware and non bleached napkins in the Marketplace dining facility. Trays are not used thereby saving water required for washing. Greenware containers are provided at the "to-go" venues. Green cleaning and recycled content paper products are used for cleaning. An inventory

control program is employed to reduce waste, and vendors are requested to minimize packaging and use returnable pallets.

- The *Facilities Management Department* provides 100% recycled content paper products to offices and student housing excluding fraternities and sororities. A biodiesel blend is used in all mobile diesel engines.
- The *University Store* sells a wide range of products that are made from natural sources or recycled materials.
- Only *Energy Star* rated equipment is purchased by the university, including new washers and dryers installed in residence halls in summer 2009.
- All new buildings and major renovations will be minimum **LEED** compliant. Two new construction projects and one major renovation are currently underway and are expected to meet this goal.
- Reuse and Recycling Strategies
The W&L recycling program is more fully explained in the recycling website recycling.wlu.edu. There is information on how to reuse and recycle materials both on and off campus.

Recycling initiatives include both traditional and non- traditional materials.

- Each spring Habitat for Humanity collects donated materials from students as they move out at the end of the year. These are made available for reuse within the Lexington / Rockbridge community and provide an income source for Habitat.
- Campus student organizations collect books, toner and ink jet cartridges, as well as clothes for reuse and recycling. Any money received through these efforts is used to fund community service projects.
- Waste vegetable oil is donated to local farmers for use in agricultural production.
- The student-run *Kompost Krewe* collects and weighs prep food scraps from all Dining Services' kitchens. This group then transports the material to the

compost machine at the Campus Garden where waste material is turned into compost for use in the Campus Garden.

- The *Campus Garden* uses the compost to grow produce that is used by the Campus Kitchens and Dining Services. The garden is a cooperative effort of the Facilities Management, Biology and Dining Services Departments and Campus Kitchens. This completes the cycle as food waste helps grow new food to be consumed by the same folks that initially generated the waste.
- *Campus Kitchens* receives food from Dining Services as well as other sources and then prepares and delivers meals to those in need within the Lexington / Rockbridge community.

Energy Initiatives

Several initiatives have been implemented, and additional ECM's are planned for the future.

- Implemented a campus wide temperature regulation policy that limited the winter workspace temperature to maximum 68°F and the summer temperature to minimum 74°F.
- Upgraded boiler controls and changing control sequences on HVAC systems to improve efficiency.
- Installed variable frequency drives and high efficiency motors on HVAC systems.
- Reduced central heating plant steam boiler operational pressure from 100 psi to 75 psi.
- Installed boiler blow-down heat recovery system and stack gas economizer.
- Upgraded steam traps on campus steam line loop in order to recover more of the heated system "waste" water.
- Performed a high performance building evaluation in several buildings. For example, a recent evaluation of Huntley Hall (37,526 SF) identified \$10,000 in improvements that would generate \$14,000 savings in energy resulting in an ROI of less than one year.
- Lowered reset temperature values on systems that look at outside air temperature for reset.
- Adjusted parking lot light levels to correspond to actual usage patterns.
- Adjusted interior and exterior light levels to correspond more directly to user needs.
- Installed occupancy sensors for lighting control in many of our spaces.
- Upgraded to T8 fluorescent bulbs and installed universal voltage electronic ballasts.
- Replaced incandescent bulbs with compact fluorescent lamps in many of our spaces.
- Employed server virtualization for about 60% of the institutional need. This allows approximately seven physical servers to "act as" 50 virtual units, reducing electricity and cooling loads.
- Purchased two electric vehicles for on campus and in town use. The addition of these two new vehicles allowed the University to dispose of five existing inefficient gasoline vehicles.

CLIMATE ACTION PLAN

- Provided five Blue Bikes – loaner bikes available through library check out for travel around campus.
- Implemented the Traveller Safe Ride program available to reduce vehicle use. This is a student-oriented, free shuttle service to selected locations in the Lexington / Rockbridge community.
- Purchased biodiesel for use in all mobile diesel engines.
- Installed low flow fixtures, flow restrictors in public bathrooms. Installed front loading washers in laundry rooms reducing water consumption.

C. Courses of Study

The University offers credit-bearing classes related to sustainability, climate change and related subjects. Approximately 30 percent of all W&L students enroll in at least one of these courses. Continued integration into the curriculum topics related to sustainability is a key component of the overall sustainability strategy.

The information gathered and presented here indicates that Washington and Lee has experienced growth in academic course offerings, interest and student involvement with regard to climate and energy topics. The chart below lists undergraduate and law school courses offered at Washington and Lee University in academic years 2005-06, 2006-07, 2007-08 and 2008-09. Total enrollment for each course by year is included as well.

Based on the information gathered for this report, the percentage of undergraduates who have participated in energy/environment related courses since academic year 2005-06 has increased each year (13 – 23%) with a more modest increase seen for law students (3 – 5%).

What is notable is that while overall University student enrollment for each year has remained stable, the percentage of student participation in these classes has increased.

Washington and Lee University
 Lexington, Virginia
CLIMATE ACTION PLAN

Undergraduate Courses

| Department | Course Name / Description | School Year / Total Students per Course | | | |
|-----------------------|--|---|---------|---------|---------|
| | | 2005-06 | 2006-07 | 2007-08 | 2008-09 |
| BIOLOGY | Environmental Biology BIOL 101 | 20 | 23 | 24 | 26 |
| | Tropical Ecology BIOL 216 | 13 | | | |
| | Field Biogeography and Species Conservation BIOL 230 | | 9 | 10 | 9 |
| | Field Ornithology BIOL 241 | | | 4 | |
| | Biological Diversity: Patterns and Processes BIOL246 | 2 | | 7 | |
| | Energy and Human Environment BIOL 295 | 8 | 7 | | |
| | Conservation Genetics BIOL 322 | 4 | | 10 | |
| | Ecological Modeling and Conservation Strategies BIOL 325 | | | | 1 |
| | | | | | |
| Department | Course Name / Description | School Year / Total Students per Course | | | |
| | | 2005-06 | 2006-07 | 2007-08 | 2008-09 |
| | Experimental Botany: Global Climate Change BIOL 330 | | | | 3 |
| | Plant Functional Ecology BIOL 332 | | 8 | 5 | 6 |
| BIOLOGY/ CHEMISTRY | Atmospheric Science from the Ground Up BIOL 120 / CHEM 120 | 9 | | | |
| CHEMISTRY | Describing Nature CHEM 133 | | 4 | | |
| | The Nuclear Age CHEM 195 | | 16 | | |
| | Nuclear Power: Energy and the Environment CHEM 196 | | 14 | 13 | |
| ECONOMICS | Environmental and Natural Resource Economics ECON 255 | 23 | 41 | 40 | 43 |
| | Economics of the Environment in Developing Countries ECON 356 (Also ECON 381 in 2007) | | 9 | | 10 |
| | Directed Study; Sustainable Development ECON 401 | | | | 6 |

Washington and Lee University
 Lexington, Virginia
CLIMATE ACTION PLAN

| | | | | | |
|---------------------------|--|----|----|-----|-----|
| ECONOMICS | Directed Study; Economics Development & Environmental Preservation ECON 402 | | 1 | | |
| ENGLISH | Topics in Environmental Literature ENGL 294 | | 9 | 10 | 9 |
| | Advanced Seminar; Environmental Rhetoric ENGL 380 | | 6 | | 8 |
| ENVIRONMENTAL STUDIES | Intro to Environmental Studies ENV 110 | 24 | 42 | 115 | 113 |
| | Environmental Service Learning ENV 111 | 1 | 15 | 13 | 14 |
| | Ethics, Ecology, and Economics in Land-Use Practices; Surface mining in Central Appalachia ENV 250 | | | | |
| | Special Topics in Environmental Studies ENV 295 | 9 | | 6 | 9 |
| | Global Environmental Governance: Law, Policy, and Economics ENV 381 | | | | |
| | Special Topics: Interdisciplinary Approaches to Environmental Issues ENV 390 | | | | |
| | Special Topics in Environmental Ethics ENV 395 | | 9 | 6 | 22 |
| ENVIRONMENTAL SCIENCE | Senior Seminar in Environmental Studies ENV 397 | | 10 | 13 | 15 |
| GEOLOGY | Global Climate Change GEOL 141 | 59 | | 46 | 33 |
| | Water Sources GEOL 150 | | | | |
| | GIS and Remote Sensing GEOL 260 | 9 | 6 | 8 | 17 |
| | Petroleum Geology and Geophysics GEOL 335 | | | | |
| HISTORY | Seminar: Environmental History of Latin America HIST 336 | | | 13 | |
| | Seminar: The Struggle Over China's Environment HIST 387 | | | 5 | 5 |
| | Historical Struggle/China's Environment HIST 389 | 10 | 14 | | |
| LITERATURE IN TRANSLATION | Environment in Modern Chinese Literature & Film LIT 295 | | | 26 | |
| PHILOSOPHY | Ethics and the Environment PHIL 108 | 21 | 24 | 14 | 22 |
| POLITICS | Environmental Policy POL 233 | | 12 | | |

Washington and Lee University
 Lexington, Virginia
CLIMATE ACTION PLAN

| | | | | | |
|--------------|--|------|------|------|------|
| SOCIOLOGY | Cities and Regions SOC 266 | 12 | | | |
| BUSINESS | Seminar; International Business Sustainability BUS 305 | | | | 13 |
| ANTHROPOLOGY | Special Topics in Anthropology (Economic Anthropology) ANTH 290 | | | | 15 |
| | | | | | |
| | Total Enrollment by School Year | 224 | 279 | 388 | 399 |
| | Percentage of Undergraduates | 13% | 16% | 22% | 23% |
| | Total Undergraduates by School Year | 1738 | 1741 | 1770 | 1740 |

Law School Courses

| Department | Course Name / Description | School Year / Total Students per Course | | | |
|------------|--|--|---------|---------|---------|
| | | 2005-06 | 2006-07 | 2007-08 | 2008-09 |
| LAW | | | | | |
| | Environmental Law LAW 275 | 11 | 26 | 10 | 19 |
| | Percentage of Law Students | 3% | 7% | 2% | 5% |
| | Total Law Students by School Year | 390 | 391 | 401 | 399 |

Additional Courses in the Williams School

- In addition to the many courses already in the catalog, there are several courses in various stages of planning and development that will include some level of focus on energy and sustainability. These include:
 - *African Political Economy and African Economic Development* (spring term abroad program first offered in spring 2009) – Jointly offered by Prof. Tyler Dickovick (politics) and Prof. Niels-Hugo Blunch (economics), this

- course involved firsthand observation of a variety of economic and political issues in Ghana.
- *Business in a Developing Economy* (spring term abroad program in Nicaragua, spring 2010) – Led by Prof. Sandy Reiter (business administration), this course will look at the role that business has played in helping/hindering the economic development of the 2nd poorest country in the Western Hemisphere. In addition to carrying credit as an upper level business course, the course will satisfy elective requirements in both the poverty program and the environmental studies program.
 - *The Economics of Tropical Coastal Seascapes* (spring term abroad program in Puerto Rico, spring 2010) – Based upon the research conducted on a recent sabbatical by Prof. Jim Casey (economics), this course introduces students to the techniques economists have developed to value non-market environmental resources. In addition to credit as an economics elective, this course will satisfy elective credit in environmental studies.
 - *The Environment and Economic Development in Amazonas* (spring term abroad program in Manaus, Brazil, spring 2010) – Led by Prof. Jim Kahn (economics and environmental studies), this course will focus on both rural and urban settings, looking at the role of the environment in sustainable development in Manaus and the Amazonian rain forest which surrounds Manaus. In addition to credit as an economics elective, this course will satisfy elective credit in environmental studies.
 - *Sustainable Accounting* (either on campus or offered as a spring term abroad program in Copenhagen, Denmark, spring 2011) – Led by Prof. Jane Weiss (accounting), this course will examine the emerging need for reliable accounting methods to value sustainable business practices. Initial meetings suggest that either The Danish Institute for Study Abroad (DIS) or the Copenhagen Business School's Center for corporate Social Responsibility (cbsCSR) as partner institutions in Copenhagen. The course will likely serve as an upper level accounting elective and may play a role in the environmental studies program and/or poverty program as well.
 - *Economics of Climate Change* (field study course, spring 2011) – Taught by Prof. Joseph Guse (economics), the course will provide students first-hand exposure to the economics issues associated with climate change. Periodic field trips from Lexington to a variety of locations will give students a chance to examine these issues outside of the classroom.

- *International Corporate Social Responsibility and Sustainability* (spring term abroad in Copenhagen, Denmark, spring 2011) – Led by Associate Dean Rob Straughan (business administration), this course uses corporate strategy as a means to explore the interplay between business, government, and the individual citizen as agents for social change. Cross-cultural variation in the relative role of the various players in addressing such issues is considered. The course will be a first-year seminar offered in conjunction with either DIS or (cbsCSR). Possible credit in both the environmental studies program and the poverty program will be determined.

Summary

W&L's course offerings provide students with a well-balanced presentation of the effects of current human behavior and the possibilities to incorporate change in multiple arenas, including their own lives. Faculty leadership, from all disciplines, is committed to expanding existing programs and exploring ways to enhance the learning experience for students to enhance sustainability.

D. Communication and Campus Community Involvement

The University Sustainability Committee and the Energy Usage Task Force are both charged with identifying specific communications related to initiatives outlined in the Climate Action Plan. The University *Communications and Public Relations Department* is also participating in this effort, by providing editing and centralized management of these communications.

Past and present communication efforts include:

The University Sustainability Website <http://gogreen.wlu.edu>

The Sustainability homepage displays the latest updates from the Sustainability Blog, a featured student or faculty member profile, upcoming “eco-events,” a featured “did you know” fact and local sustainability news items. Tabs provide links to sections that elaborate upon all aspects of sustainability at Washington and Lee.

These tabs include:

- *W&L's Commitment* - This section provides an overview of the official aims of the University as determined by the administration. Institutional goals are listed, and links to the Presidents' Climate Commitment and the Talloires Declaration are established.
- *Sustainability News* - This tab redirects users to the Sustainability Blog, which features information on recent activities, efforts, and developments in campus sustainability.
- *Eco-Events/Sustainability Calendar* - This calendar displays information specifically related to sustainability and environment-related events, speakers, and meetings, both on campus and in the surrounding area. There are also links to other calendars that may have similar events listed.
- *Campus Initiatives* - This page provides links to ongoing sustainability efforts on campus such as: Departmental Initiatives and Policies, Recycling, Composting, Local and Organic Foods, Resource Conservation/Carbon Footprint, Purchasing and Transportation.

- *Education and Research* - On this page, links are provided to the Environmental Studies Department, sustainability related undergraduate and law courses, service learning courses, and other opportunities.
- *Community Outreach* - This section highlights some of the programs at W & L that have a direct effect on off campus communities including service learning courses and clubs and organizations that undertake service work. There is also information about various community resources. Links are provided to: Campus Kitchens, the Campus Garden and the Nabors Service League.
- *Resources and Tips* - Links are provided for Sustainability Educational Resources and Local and State Environmental Organizations. Both of these pages offer information on how to recycle, promote sustainability, and get involved in off campus sustainability efforts.
- *Taking Action* - This section recognizes faculty , students, and alumni as well as organizations on campus who active in promoting sustainability and environmentally friendly behavior.
- *Contacts* - This page lists e-mail contacts for people active in campus sustainability efforts and provides a link to the members of the University Sustainability Committee.

Environmental Studies Luncheons

This is a monthly forum where speakers from inside and outside of the campus community talk about various environmental and sustainability issues. The programs are free and open to the public and provide an opportunity for detailed discussion on critical topics.

Recyclemania

This is national competition to see which higher education institutions recycle the most materials during a 10 week period each spring. It also helps to educate students about the University's recycling and waste minimization efforts.

Room Thermometers and How to Talk to Your Thermostat

This is an effort to help educate the campus community about the temperature regulation policy. The thermometers give individuals a way to see if their space is too hot or too cold and the 'how to' stick up cards help explain how to adjust radiator controls. These cards are placed throughout campus offering folks a daily reminder of specific actions they may take to assist with energy management efforts.



Campus Sustainability Week

This is a cooperative effort involving the Environmental Studies, Biology, Dining Services and Facilities Management departments. Various education events are held during the week including demonstrations, talks, films, and poster board presentations. A Local Fall Harvest dinner, presented by Dining Services is the highlight of the week. This meal features local foods and includes producers as well as interested parties from the Lexington / Rockbridge community.

Student Participation and Community Outreach

Washington and Lee has a variety of student groups directly involved with environmental issues.

- *Student Environmental Action League (SEAL)* - the Student Environmental Action League (SEAL) is active in promoting environmental issues on campus and within the community. The group aims to increase environmental awareness among students, promote campus sustainability, and inform students about environmental service opportunities.
- *Environmental Law Society (ELS)* - the Environmental Law Society [ELS] strives to raise public awareness of the law's impact on environmental issues. Through guest speakers and discussion panels, ELS encourages a free-flowing exchange of ideas and educates others about career opportunities in the environmental field.

Not content to merely talk about the environment, ELS members take an active, hands-on role in making the world a better place

- *Kompost Krewe* - the student-run Kompost Krewe is a group of students paid to collect and weigh food waste from the Dining Services kitchens before transporting it to the composting operation at the Campus Garden.
- *The Campus Kitchen Project* - Campus Kitchens at Washington and Lee is an organization focused on hunger relief and leadership development. The program is a unique partnership between W&L's Shepherd Poverty Program and the Campus Kitchens Food Project, collaborating with on- and off-campus dining services and local non-profit organizations to make use of surplus food and provide hunger relief in the Lexington / Rockbridge community.
- *Nabors Service League* - Through the League, students identify and manage community service projects in the Lexington / Rockbridge area. The League assists a network of other student organizations to coordinate and support all undergraduate and law efforts to serve the local community.
- *Project Nicaragua* – Project Nicaragua seeks to encourage participation and fundraising in support of their annual Spring Break service trip to Nicaragua. Used toner cartridges are collected and recycled to help provide funding for the trip.
- There are also other student organizations that are working on related aspects of sustainability such as social justice and equity. The sustainability web site also has a section highlighting faculty, students, staff and alumni who are taking action to build a more sustainable world.

Future Communication Efforts

The University Communications and Public Affairs Department is developing new ways to educate the campus community about the President's Climate Commitment and the University's climate action plan. Some of the strategies include:

- *Sustainability Site/Blog*: Keep campus community abreast of University initiatives on the gogreen.wlu.edu site with frequent updates to the sustainability blog. Include energy saving tips and a "Green Guide to Off-Campus Living" to help

employees, students, parents and alumni reduce their personal energy consumption.

- *Homepage banner:* Create a permanent banner on the University homepage linking to gogreen.wlu.edu.
- *Suggestion Boxes:* Create sustainability suggestion boxes on the “Faculty/Staff” and “Current Students” web dashboards to draw members of the campus community into the process.
- *Sustainability Pledge:* Establish an online sustainability pledge with sections devoted to each area (electricity, gas, water). Include specific action items in each area, with information and tips to educate visitors about the importance of specific steps they can take and their impact on campus, at home, and on the overall environment.
- *25/25:* Create a list of 25 ways to reduce one’s personal impact on the environment, tying into the University’s commitment to reduce consumption by 25%.
- *Personal Energy Audits:* Offer department meetings and personal workspace audits to encourage buy-in from campus employees and students. Facilities Management staff could make recommendations for how to save energy at home as well as on campus.
- *Book Clubs:* Establish a book club or series of book clubs devoted to reading books on sustainability-related topics. Include faculty, staff and students, with moderators from the USC.
- *Speakers:* Bring in a notable speaker each term to educate the community on sustainability issues.
- *Competitions:* Encourage friendly rivalry between residence halls, Greek houses and departments and offer rewards such as pizza parties to the group who proves to be the “greenest.”

E. Energy Conservation Measures (ECM) Project List

Energy Consultant Services / Energy Master Plan Objectives

The University is currently engaged in a process that will result in the development of a comprehensive and focused Energy Master Plan. The energy consulting firm, ENERACTIVE Solutions, LLC, Asbury Park, NJ, has been engaged to partner and guide Washington and Lee through the necessary steps to create this plan and is assisting the institution in developing specific energy conservation measures.

ENERACTIVE's focus will include the following:

- Produce for Washington and Lee University an Energy Master Plan for the campus that develops a comprehensive and coordinated list of actions that help move the institution towards carbon neutrality.
- Provide the University with information, analysis, and recommendations to set a long-term strategy to reduce overall campus energy consumption, lower operating cost, and reduce the carbon footprint.
- Consider available grants, incentives, and other partnering opportunities.
- Provide a financial framework, including ROI analysis, that will enable the University to successfully implement these strategies.
- Develop strategies to increase renewable generation, investigate alternative energy sources, prioritize energy efficiency measures, develop long-term planning of major infrastructure and review measurement and verification issues.
- Work with the Energy Usage Task Force to help with an education program for the campus to understand how each person plays a part in the Master Plan.

Three-Pronged Approach

A "three-track" approach was identified by Facilities Management to evaluate and analyze decisions regarding energy. The criteria are derived from several goals that have been specified by W&L sources:

- Greenhouse Gas Reduction (20% reduction of current levels by 2020; goal set forth by Presidents Climate Commitment)
- BTU to SF of Space (25% reduction of current levels by 2013; goal set forth in charge to Energy Usage Task Force)
- Utilities Cost Reduction (Reduce by \$1M by 2011; goal set forth by Treasurer's Office)

ENERACTIVE's analysis of each new energy initiative or system change will take into account the impact in each of the three areas above. W&L understands that all three areas may not be impacted in every case or carry a positive outcome.

Energy conservation measures will be divided into four categories reflecting the commitment to short-term, intermediate-term, and long-term initiatives to move towards carbon neutrality as well as the need to implement both physical projects and educational initiatives.

The four ECM categories are organized as follows:

- A. ECM's Operational
- B. Energy Programs
- C. ECM's Capital
- D. Emerging Technologies

A. ECM's Operational

1. Central Plant retro commissioning
 - Retro commissioning of campus boiler steam system
 - Verification and optimization of demand, loads, steam flow, conversion to heating hot water, temperatures, set points and schedules
 - Retro commissioning takes into consideration original design intent and current building operating conditions to optimize systems performance for electrical, natural gas, oil and water conservation thus creating utility cost savings
2. Fuel management (electric vehicles, bio-mass)
 - Electric vehicles and equipment, renewable charging sources

3. Optimize free cooling
4. Retro Commissioning – by building,
 - Building level retro commissioning
 - Verification and optimization of HVAC and electrical equipment, demand, flows, temperatures, set points, schedules and functionality
 - Building occupant comfort and system use surveys
 - Retro commissioning takes into consideration original design intent and current building operating conditions to optimize systems performance for electrical, natural gas, oil and water conservation thus creating utility cost savings

B. Energy Programs

1. VEM (Virtual Energy Management)
 - Continuous commissioning through evaluation and response to automated trending data on HVAC equipment
 - Trend HVAC system performance, respond to and return to optimization performance trending points that drift outside of normal performance parameters
2. Asset Monetization
3. Cultural Transformation
 - Conservation versus Efficiency
 - New student orientation
 - New student energy awareness training
 - Demand Response
4. Policy Opportunities
5. Commissioning as a guiding principle for energy practices
 - Commission all new construction and major renovations

C. ECM's Capital

1. Decentralization
 - Perform analysis on boiler and chiller systems in individual buildings

- Screen for removing a large building and a small building off the campus central chilled water loop and campus steam loop
 - Decentralization will allow for, small and more efficient HVAC equipment to be installed in individual buildings and additional increased efficiencies from avoiding campus loop piping system losses. Increased efficiencies will create electrical, water, natural gas and oil conservation and create utility cost savings
2. Thermal storage
- Financial and feasible analysis of overnight ice making for peak hours cooling
 - Ice making chiller and ancillary equipment would be located at the central plant
 - Thermal storage allows for chillers to run in the overnight when electrical grid electrical demand is lower and electricity costs are lower thus creating utility cost savings
3. Geo thermal
- Screening of geo thermal, ground source heat transfer for a single building
 - Financial feasibility would allow for a more detailed analysis and detailed engineering to be performed
 - Geo thermal technology requires traditional mechanical heating and cooling systems to carry lower loads, thus creating electrical, natural gas and oil conservation and utility cost savings
4. Rain water harvesting
- Screen the recovery of rain water from campus building roof systems for collection at the central plant for boiler and cooling tower make up
 - Screen the recovery of rain water from roof systems from individual buildings for use in same building
 - Rain water harvesting creates water conservation and utility cost savings
5. Grey water recovery
- Recover grey water in buildings for use in acceptable grey water recovery applications, i.e. lavatory fixture

- Grey water recovery creates water conservation and utility cost savings
- 6. Low flow plumbing fixtures
 - Replace any older model plumbing fixtures that remain on campus with low flow plumbing fixtures
 - Low flow plumbing fixtures create water conservation and utility cost savings
- 7. No flow plumbing fixtures
 - Replace urinals requiring low flow or standard flow with waterless urinals
 - No flow plumbing fixtures create water conservation and utility cost savings
- 8. Gas utility by-pass
 - Perform financial and feasibility analysis on installing a new gas main to the main gas meters to by-pass the city gate and city gate fees
- 9. Free cooling for winter, Science building operation
 - Screen free cooling optimization at the central plant by installing a plate and frame heat exchanger and modulation valves on a chiller/s to allow simultaneous free and mechanical cooling
 - Screen methods for cooling in the winter at the New Science Center, the only building that appears to require cooling in the winter
 1. Economizers
 2. Small chiller or cooling tower at New Science Center
 - Free cooling measures create electrical conservation and utility cost savings
- 10. Condensation capture for makeup water
 - Capture condensation cooling and return to plant for boiler make up water
 - Enhance on this technology that is already in use at a few campus buildings
 - Recovery of condensation for makeup water versus allowing it to go to sewer creates water conservation and a cost savings

11. Metering and sub metering, controls strategy, make up water
 - Develop a sub metering plan of electrical, steam, campus loop chilled water and campus loop steam use on a building and perhaps system level
 - Tracking and trending use of utilities through metering and sub metering will show deviations that can be corrected back to system optimization for utility conservation and cost savings

12. LED lighting,
 - Screen analysis of LED lighting systems to replace outdoor, parking structure and typical fluorescent indoor lighting systems
 - LED lighting systems typically use less electricity than conventional systems, creating electric conservation and utility cost savings

13. Lighting occupancy sensors
 - Screening analysis of an installation of occupancy sensors to provide automation on/off of lighting fixtures based on occupants presence
 - Lighting occupancy sensors allow for lighting to go off when not needed, creating electrical conservation and utility cost savings

14. FCU and Valance occupancy sensors
 - Screening analysis of an installation of occupancy sensors to provide automation on/off/set back of fan coil units and valance units
 - Occupancy sensors on individual HVAC units allow for automation set back when they are not needed, conserving energy and creating utility cost savings

15. Single to double pane windows
 - Screen financial and practical feasibility in one building of converting from single pane to double pane window
 - Double pane windows hold a building's interior climate more stable and allow fewer BTUs to escape from the building. Heating and cooling is conserved allowing for utility cost savings

16. Insulation upgrades
 - Screen the typical costs and utility savings of insulation repair on linear feet of HHW, Steam and CHW piping

- Screen the typical costs and utility savings of installing insulation jackets on HHW, Steam and CHW piping valves and strainers
- Improved insulation measures will conserve energy by maintaining BTUs in the piping systems and create utility cost savings

17. DDC replacement of pneumatic systems

- Screen the costs and utility savings of upgrading building management system controllers from pneumatic to digital
- Screening to be on a typical AHU system upgrade
- Digital controllers on HVAC systems will allow for more accurate control of systems and also allow for modulation which will increase efficiency and result in utility conservation and cost savings

18. Heat recovery

- Screen the cost and potential utility cost savings of heat recovery on an AHU unit
- Heat recovery transfers BTUs between exhaust air and outside makeup air to reduce the need for mechanical cooling and combustion heating
- Heat recovery technology conserves electricity, oil and natural gas and created utility cost savings

19. Fix steam leaks

- Perform cost and saving analysis on repair of steam leaks
- Steam leak identification to be recommend as part of regular PM plan
- Quick repair of steam leaks conserves natural gas and oil and creates utility cost savings

20. Fix water leaks

- Perform cost and saving analysis on repair of water leaks, (domestic, heating and chilled)
- Water leak identification to be recommended as part of regular PM plan
- Quick repair of water leaks conserves natural gas, electricity and oil and creates utility cost savings

21. Motor upgrades to energy efficient

- Screen the cost and savings of replacing inefficient motors with energy efficient motors where applicable

- Energy efficient motors will perform at the same brake horse power rating while using less electricity
- Energy efficient motors create electrical conservation and utility cost savings

22. Instant hot water units versus stored hot

- Screen measures for replacing existing domestic hot water steam to hot water heat exchangers and storage tanks to instant hot systems
- Instant hot, steam to hot domestic water systems using less energy thus creating oil and natural gas conservation and utility cost savings

23. Efficiency improvements on converters

- Screen the financial feasibility and practicality of upgrading the existing steam to heating hot water converters to more efficient models
- More efficient converters will create oil and natural gas conservation and create utility cost savings

24. Weatherization

- Perform cost and savings analysis on performing weatherization measures on a building
- Weatherization includes caulking, insulation and door stripping to minimize air leaks from buildings
- Weatherization will decrease the flow of conditioned air from a building limiting BTU loss, this will conserve electricity, natural gas, oil and create utility cost savings

25. Tertiary chilled water in buildings

- Screen the financial feasibility and practicality of installing tertiary chilled water pumps in individual buildings
- CHW tertiary pumps will allow a building to pull the minimum chilled water from the campus loop for individual building needs
- CHW tertiary pumps will allow loop circulation pressure to be reduced
- CHW tertiary pumps will only function when building cooling loads require
- CHW tertiary pumps will optimize the performance of the campus central cooling plant creating electrical conservation and utility cost savings

26. Tertiary heating hot water in buildings

- Screen the financial feasibility and practicality of installing tertiary heating hot water pumps in individual buildings
- HHW tertiary pumps will allow a building to pull the minimum heating hot water from the campus hot water loop for individual building needs
- HHW tertiary pumps will allow loop circulation pressure to be reduced
- HHW tertiary pumps will only function when building heating loads require
- HHW tertiary pumps will optimize the performance of the campus central steam plant and heating hot water circulation loop creating electrical, natural gas and oil conservation and utility cost savings

27. VFDs

- Screen the financial cost and utility savings of installing VFD on motors and systems where applicable
- VFDs allow a motor to work at a reduced brake horse power when system demand allows thus creating electrical conservation and utility cost savings

28. Moisture sensors on irrigation system/s, install meters to eliminate sewer charges

- Screen the installation of advanced ground moisture sensors that will allow automatic irrigation when the ground is dry
- Ground moisture sensors take into account rain fall from previous days and actual need for irrigation before enabling watering systems
- Screen the cost and practicality of installing utility approved meters to eliminate sewage charges on irrigation systems
- Ground moisture sensors and approved meters will create water conservation and utility cost savings

D. ECM's Emerging

1. Store electricity

- Screen the feasibility of storing renewable electricity in batteries and water systems

- Stored electricity will allow the building's load to be served by renewable electricity when there is no sun or wind
 - Stored electricity is created during peak performance times when the sun and wind generating more electricity than the building required
 - Stored electricity allows for more base load to be served by renewable sources, creating electrical conservation and utility cost savings
2. Stored heat
3. Solar PV – field mounted and building specific
- Perform cost and savings analysis of a large ground mounted solar photovoltaic system and screen an individual building for a roof mounted system
 - Solar photovoltaic will create electricity from the sun that can be utilized to serve campus demand, creating electrical conservation and utility cost savings
4. Solar thermal
- Perform cost analysis and savings analysis of a solar panel system to create a heat source from the sun for domestic hot water
 - Solar thermal panels will heat domestic hot water to meet demand
 - Solar thermal technology will create natural gas and oil conservation and create utility cost savings
5. Large and Small scale wind
- Screen the cost, potential savings and implementation feasibility of installing a large wind turbine (100 kW to 1,000 kW) to create electricity on a campus grid level
 - Screen the cost and implementation feasibility of installing a small wind turbine (1 kW to 10 kW) to create a demonstration of wind to electricity technology in an accessible scenario
 - Wind to electricity technology will create electrical conservation and utility cost savings
6. Bio-mass, trash, wood
- Screen the cost, potential savings and implementation of installing a boiler system that utilizes bio-mass, some types of waste and/or wood for fuel

- Creating steam with bio mass, trash and/or wood will create natural gas and oil conservation and utility cost savings
7. Bio diesel
- Perform cost and savings analysis and evaluate feasibility of converting existing boiler fuel to bio diesel fuel
 - Converting existing boiler fuel to a bio diesel fuel will create natural gas and oil conservation
8. CHP/Tri with cooling
- Screen the cost, savings potential and implementation feasibility of combined heat and power technology
 - CHP will allow for natural gas to create both steam heat and electricity
 - CHP steam can be utilized for heating demand, domestic hot water load and steam driven absorption chillers
 - CHP electrical generation from natural gas will create utility cost savings and an increase in campus electrical system reliability
9. Back pressure turbine
- Perform cost and savings analysis and implementation feasibility of installing back pressure turbines in place of existing steam pressure reducing valves (PRVs)
 - PRVs waste energy when they reduce steam pressure from campus loop pressure to building loop pressure
 - Back pressure turbines utilize the energy spent in steam pressure reduction to create electricity that can be utilize to serve building demand
 - BPTs generate electricity and create utility cost savings
10. Forest acreage as an environmental solution
- Evaluate existing forest acreage for offset to campus carbon footprint
11. Cool roof/green roof
- Screen the cost, potential savings and implementation feasibility of installing green and cool roofs on an individual building
 - Cool and green roofs can provide high insulation values and reduce heating and cooling loads

- Cool and green roofs can create electrical, natural gas and oil conservation which creates utility cost savings as well as providing more environmentally friendly storm water management

12. Landfill gas

- Screen the feasibility of utilizing nearby landfill gas to fuel a co generation system
- Landfill gas utilized to create electricity and heat will conserve natural gas and oil and create utility cost savings

F. Measurement and Verification

The Presidents Climate Commitment Task Force is tasked with the job of tracking progress in all areas of the Climate Action Plan and providing periodic updates. Major ongoing activities may be organized as follows:

Facilities (*heating, cooling and lighting*)

- Under the guidance of the Energy Usage Task Force and the Energy Master Plan Consultant, Facilities Management is implementing a continuous improvement approach. This includes long-term analysis and improvement of existing systems as well as the identification of issues and solutions. Many of the items identified are fixed “on the spot,” incrementally moving the institution towards carbon neutrality.
- Prioritize ECM’s; execute projects; review utility expenses and evaluate actual ROI versus anticipated ROI
- Analysis of meter data from buildings
- GHG Emissions Report - preparation of the University’s carbon inventory report will take place every two years. W&L has moved from a consultant-based model to an internally managed model to achieve: better control; cleaner data; flexibility in report time period as needed; sub reports if needed for specific requests; and reduced professional fees. W&L will be utilizing existing resources, such as those through Clean Air Cool Planet (www.cleanair-coolplanet.org), to generate this report.

Education

- Under the guidance of the Climate Commitment Task Force, the University will undertake yearly analysis of curricular data to evaluate growth in course offerings and student participation over time. This will include a number of outside workshops and seminars; student orientation materials; and other educational opportunities

CLIMATE ACTION PLAN

- Survey W&L graduates to gather data on post graduation activities related to sustainability and the environment to include: employment, volunteer activities; graduate and PhD programs; etc.
- Report findings annually and reevaluate ways to improve various aspects of initiatives to maximize success.