



**Campus Sustainability
at Virginia Tech**

2011 Annual Report

**Presented by the Virginia Tech
Office of Energy and Sustainability**

2011 Annual Report on Campus Sustainability at Virginia Tech

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Acknowledgement

The Office of Energy and Sustainability would like to sincerely thank the multitude of faculty, staff, students and administrators that have contributed in many and diverse ways to Virginia Tech's continued sustainability progress over this past reporting year. We are confident that the upcoming 2011-2012 fiscal year will result in even greater accomplishments and we will look forward to your continued support as we work together to ensure a more sustainable future for us all.

Sincerely,
Fred Selby, Energy and Sustainability Manager, Facilities Services
Denny Cochrane, Sustainability Programs Manager, Facilities Services
Angie De Soto, Campus Sustainability Planner, Facilities Services

Executive Summary

The Virginia Tech Office of Energy and Sustainability (OES) is pleased to present the *2011 Annual Report on Campus Sustainability at Virginia Tech*. The purpose of this report is to provide a comprehensive status of implementation of the Virginia Tech Climate Action Commitment and Sustainability Plan (VTCAC&SP) and to highlight the accomplishments and breadth of sustainability programs at Virginia Tech. The creation of this report also meets the requirement of the Virginia Tech Climate Action Commitment Resolution, Point 13: "The university will monitor energy use and Green House Gas (GHG) emissions as well as changing internal and external conditions, *prepare an annual 'report card'* showing progress towards targets, and periodically reevaluate targets, making adjustments to targets as appropriate based on changing internal and external conditions and evolving technologies."

The significant highlights from the 2010-2011 fiscal year (FY 2011) are summarized below in order of their appearance in the report:

- ✦ Virginia Tech received a Sustainable Endowments Institute Report Card "B+" grade, a "Silver" rating in the Association for the Advancement of Sustainability in Higher Education (AASHE) Sustainability Tracking, Assessment and Rating System (STARS), and a 2011 Governor's Environmental Excellence Award.
- ✦ The Office of Energy and Sustainability expanded the Student Internship Program by forming four interdisciplinary teams, comprised of 28 students. These teams utilized the creativity of our students to reach across the boundaries of departments, colleges, administrative units, and auxiliary units to develop key pilot projects that can improve our campus - ranging from a collaboration with the EPA on football game-day best practices to a "sustainability advisors" program in the residence halls.
- ✦ A total of 15 Blacksburg campus Leadership in Energy and Environmental Design (LEED) registered projects with the US Green Building Council, including completion of and certification submittals for the Football Locker Room Addition, Institute for Critical Technology and Applied Science (ICTAS) II, and Visitors and Undergraduate Admissions Center, and an additional 908,982 gross square feet of new and renovation building projects currently either under construction or in design.
- ✦ A 4.0% reduction in Energy Use Intensity (thousand btu's per campus gross square footage) over FY 2009-10 and a slight decrease in annual greenhouse gas emissions, despite a 1.6% increase in campus footprint size and a continuing budgetary emphasis on maximizing coal-based steam production.
- ✦ An overall recycling rate of 37.5% for calendar year 2010, the second straight year of exceeding the VT Climate Action Commitment's 2012 goal of 35%.
- ✦ An alternative transportation use rate of 54%, significantly higher than the FY 2009-10 rate of 48% and FY 2008-09 rate of 45% and already exceeding the year FY 2014-15 VTCAC&SP goal of 52% four years ahead of schedule.
- ✦ Virginia Tech was awarded a gold award for the second year in a row for their alternative transportation programs in the Best Workplaces for Commuters (BWC) Race to Excellence.

Background

On April 30, 2007, University Council approved the establishment of the Energy and Sustainability Committee and charged it with the responsibility to review, develop, and oversee the implementation of an energy and sustainability policy. The committee consisted of 19 members and included administrators, an academic dean, four faculty, four staff, and four students (two graduate students and two undergraduate students).

On April 25, 2008 Virginia Tech President Charles W. Steger charged the Energy and Sustainability Committee with the important responsibility of “developing a Virginia Tech Climate Commitment and Sustainability Plan that is specific to Virginia Tech.” In addition, he directed the Committee to have the draft documents reviewed through the University Governance System, and to have the “Virginia Tech Climate Commitment” placed in resolution format presented to the University Council for action by the end of the 2009 Spring Semester. The Energy and Sustainability Committee immediately created a subcommittee consisting of 20 individuals from all facets of the university to conduct appropriate research and to prepare the drafts. The Commission on University Support reviewed and recommended the approval of all draft documentation in March 2009.

On Earth Day, April 22, (less than one year from President Steger’s charge) the University Council recommended approval of “The Virginia Tech Climate Action Commitment Resolution” and accepted the accompanying Sustainability Plan.

On June 1, 2009, at their regularly scheduled meeting, the Virginia Tech Board of Visitors unanimously approved the 14-point “The Virginia Tech Climate Action Commitment Resolution” and accepted the accompanying “Sustainability Plan” (VTCAC&SP). The Sustainability Plan is a living document and provides a way for the university to achieve the points in the VTCAC Resolution. The foundation of the policy is that Virginia Tech is to become a leader in campus sustainability.

Virginia Tech Climate Action Commitment Resolution

Per the Virginia Tech Climate Action Commitment Resolution (VTCAC), the university has adopted the following sustainability commitments:

1. Virginia Tech will be a Leader in Campus Sustainability.
2. The university will represent the VTCAC&SP in the Virginia Tech Strategic Plan.
3. Virginia Tech will establish a target for reduction of campus GHG emissions to 80% below 1990 emission level by 2050, and interim targets from 2006 emissions of 316,000 tons consistent with the Virginia Energy Plan, the Governor’s Commission on Climate Change, the Town of Blacksburg, and the federal administration: for 2012, 295,000 tons (on path to 2025 target); for 2025, 255,000 tons (2000 emission level); and for 2050, 38,000 tons (80% below 1990 emission level).
4. Virginia Tech will work toward these emission reduction targets through improved energy efficiency, reduction of energy waste, replacement of high-carbon fuels, and other measures identified in the VTCAC&SP.
5. Virginia Tech will establish an Office of Sustainability to
 - a. Coordinate programs for campus sustainability,
 - b. Oversee implementation of the VTCAC&SP,
 - c. Monitor annual electricity and other energy use and GHG emissions, and
 - d. Working with faculty and departments, manage a campus-wide student internship and undergraduate research program using the campus as a sustainability laboratory
6. Virginia Tech will pursue LEED Silver certification or better and exceed ASHRAE 90.1 2004 energy performance by 35% (ASHRAE 90.1 2007 by 30%) for all new buildings and major renovations. Capital budgets should account for future energy price, cost of building operation, return on investment, and environmental benefits of achieving this level of performance.
7. Virginia Tech will improve electricity and heating efficiency of campus facilities and their operations, including the heating and cooling infrastructure and operation, lighting efficiency, controls and operation, and equipment efficiency and controls.
8. The university will adopt at least 4 reduction measures in the Waste Minimization component of the national RecycleMania competition. Virginia Tech Recycling will adopt a goal of 35% recycle rate by 2012 and 50% by 2025.
9. Virginia Tech will require purchase of Energy Star rated equipment, maximum practicable recycled-content paper, and other low life-cycle cost products, with exceptions for special uses.

10. Virginia Tech will engage students, faculty and staff through education and involvement to reduce consumption of energy, water, and materials in academic and research buildings, dining and residence halls, and other facilities.
11. Virginia Tech will improve transportation energy efficiency on campus through parking, fleet, and alternative transportation policies. Alternative transportation use will increase from the current level of 45%, to a goal of 52% in 2015, and 60% in 2020.
12. The university will create and support a virtual Virginia Tech School of Sustainability or similar mechanism to coordinate, develop, and communicate related instructional, research, and outreach academic programs.
13. The university will monitor energy use and GHG emissions as well as changing internal and external conditions, prepare an annual 'report card' showing progress towards targets, and periodically re-evaluate targets, making adjustments to targets as appropriate based on changing internal and external conditions and evolving technologies.
14. With regard to all the items in this resolution, major personnel and investment decisions, including capital projects, associated with implementing the VTCAC&SP will be based on a joint review of costs and benefits by university financial and facilities staff and be subject to availability of funds. Virginia Tech will provide funding to support sustainability programs through a variety of sources, which might include savings from reduced electricity and energy fuels, E&G funds, loans, a Green Development Fund from private sources, and a student Green Fee.

Virginia Tech Sustainability Plan

The Virginia Tech Sustainability Plan¹, completed in April, 2009 and approved by the Virginia Tech Board of Visitors on June 1, 2009 plan incorporates three objectives:

1. A statement of Virginia Tech's Climate Action Commitment more specific to the university than the American Colleges and Universities Presidents Climate Commitment (PCC).
2. An action plan to achieve the goals of that commitment.
3. A plan to enhance Virginia Tech's sustainability programs and culture.

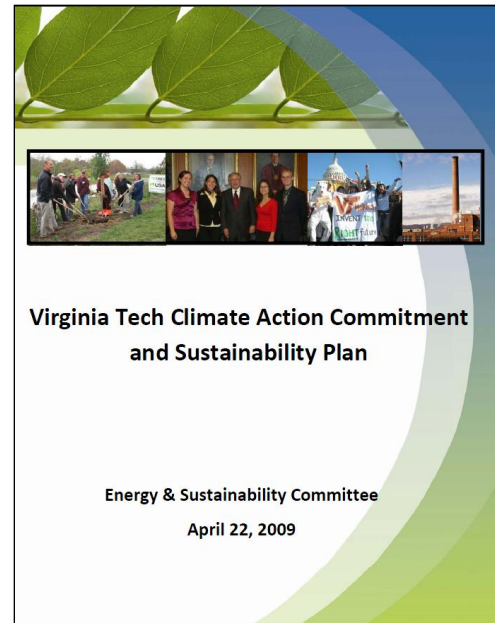
By its nature, the plan has a long time horizon since climate action and sustainability are long term issues that will not be addressed overnight. The plan recommends 118 specific actions over three time periods:

1. Immediate: 0-3 years (2009-2012) – 87 action items
2. Midterm: 4-16 years (2013-2025) – 24 action items
3. Long term: 17-41 years (2026-2050) – 7 action items

To date, approximately 67% of the immediate period action items have been completed.

The plan focuses on six action categories which will be used to provide the framework for the *2011 Annual Report on Campus Sustainability at Virginia Tech* as follows:

1. Administrative Structure and Governance
2. Facilities Infrastructure
3. Facilities Operations
4. Transportation
5. Behavior and Campus Life
6. Academic Programs



¹ <http://www.facilities.vt.edu/documents/sustainability/sustPlan.pdf>

Virginia Tech's Climate Action Commitment & Sustainability Plan Implementation Progress

1. Administrative Structure and Governance

"During the past two decades, the university has made attempts to better coordinate its environmental programs. Most of these efforts have focused on instructional and research programs, and few resulted in any substantive centralized direction of sustainability-related university activities until very recently." (Virginia Tech Climate Action Commitment and Sustainability Plan)

Leadership

Since charging the newly established Energy and Sustainability Committee on April 8, 2008 with the important responsibility of developing a Virginia Tech Climate Commitment and Sustainability Plan specific to Virginia Tech, Virginia Tech President Charles W. Steger continues to be one of its biggest proponents.

On March 17, 2011, Dr. Steger charged Paul Knox to chair a Presidential Task Force to develop a "Plan for a New Horizon" for Virginia Tech for 2012-2018². In his year-end comments to the university community on May 12, 2011 President Steger wrote "having a collective vision of the future institutional profile well understood and accepted by the community is essential in our fast changing world. It enables us to focus on what matters, particularly as current events might impinge on our actions and ideas."³ Including sustainability as one of several "key structuring questions" that must be addressed in the university's Long Range Plan initiative, he continued: "Sustainability must become part of our culture. How do we inculcate a mindset that lightens our footprint on the community and, by extension, on our planet? But few actions are no-cost. Indeed, many require large investments. Where should we invest? What evaluative mechanisms will we use to achieve useful cost/benefit analysis?"⁴



**"Sustainability
must become part
of our culture."**

Charles W. Steger
Virginia Tech President
Year-end Comments
May 12, 2011

Recognition

During the recent academic year, Virginia Tech's campus sustainability leadership again was demonstrated through a number of state and national sustainability-related awards and recognitions.

Virginia Tech received an overall rating of B+ from the **Sustainable Endowments Institute's College Sustainability Report Card 2011** which profiled 322 college and universities across the nation on sustainability performance. The university's overall grade has improved each year since it first participated in the survey in 2008. Virginia Tech received overall grades of C- in 2008, B- in 2009, and B in 2010. Virginia Tech received an A rating in six of nine categories (administration, climate change and energy, green building, student involvement, transportation, and investment priorities) used in the survey. In addition, three categories (climate change and energy, green building, and endowment transparency) improved one full letter grade from the 2010 report. Six categories (administration, food and recycling, student involvement, transportation, investment priorities, and shareholder engagement) received the same grade found in last year's survey. Virginia Tech has received an A rating in the transportation

² <http://www.longrangeplan.vt.edu/>

³ <http://www.vtnews.vt.edu/articles/2011/05/051211-president-yearendcomments.html>

⁴ <http://www.vtnews.vt.edu/articles/2011/05/051211-president-yearendcomments.html>

category for all four years it has participated in the survey, and student involvement received an A rating for all three years since this category was introduced in 2009.



In 2009, Virginia Tech registered as a charter institution in a new program to encourage sustainability in all aspects of higher education. The program, called the **Sustainability, Tracking, Assessment and Rating System (STARS)**, is administered by the Association for the Advancement of Sustainability in Higher Education (AASHE), which Virginia Tech became a member of in 2008. STARS is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance. Currently 230 colleges and universities are participating in the program. Participants report achievements in three overall areas: education and research; campus operations; and planning, administration, and engagement, and receive rating levels similar to that of LEED certification: Bronze, Silver, Gold, and Platinum. Based on its recently submitted response, Virginia Tech received a **"Silver" rating** with a sustainability performance score of 61.94. For a comparison with its peer group, eight of the twelve Atlantic Coast Conference schools have registered for STARS and five have completed their submission. Duke University received a "Gold" rating with a score of 65.74, University of North Carolina received a "Silver" rating with a score of 53.11, Wake forest University received a "Silver" rating with a score of 53.05, and Florida State University received a "Silver" rating with a score of 50.21. Georgia Tech, University of Virginia and North Carolina State University are all scheduled to complete their STARS submissions within the coming year.

On April 6 at the Environment Virginia 2011 Symposium in Lexington, Va., Virginia Tech was among the 20 winners to receive a **2011 Governor's Environmental Excellence Award**, receiving a gold award for its Sustainability Plan Implementation and specifically its 2010 Green Campus Challenge. The Green Campus Challenge, modeled after the state-wide 2009 Green Commonwealth Challenge, challenged the campus administrative units to adopt policies and behaviors to conserve and reduce energy, water, materials, and transportation. A total of 50 departments participated and produced positive results that improved administrative practices and behavior regarding sustainability. Pictured left to right receiving the award are: Doug Domenech (Virginia Secretary of Natural Resources), Rob Lowe (Virginia Tech), Angie De Soto (Virginia Tech), John Randolph (Virginia Tech), Fred Selby (Virginia Tech), Denny Cochrane (Virginia Tech), Mike Coleman (Virginia Tech), David Paylor (Director, Virginia Department of Environmental Quality), and David Johnson (Director, Virginia Department of Conservation and Recreation).



Also receiving a 2011 Governor's Environmental Excellence Award as a Gold Medal winner was the **Virginia Master Naturalist Program**, a multi-agency initiative based in Virginia Tech's College of Natural Resources and Environment. The mission of the Virginia Master Naturalist Program is to train a statewide corps of volunteers to provide education, outreach, and services to benefit Virginia's natural resources. With 30 program chapters across the state and more than 1,000 active volunteers, the program is a rapidly growing force through which volunteers broaden their own knowledge about Virginia's natural resources while benefitting their communities and the environment. Volunteers have reached more than 130,000 people through educational programs for parks, community groups, festivals, and schools.⁵

Virginia Tech was again listed among the most environmentally responsible colleges in the United States and Canada, according to "The Princeton Review."⁶ The well-known education services company selected Virginia Tech for the second year in a row for inclusion in its second annual edition of its online book, **"The Princeton Review's Guide to 311 Green Colleges: 2011 Edition."** Created by "The Princeton Review" in partnership with the U.S. Green Building Council, "The Princeton Review's Guide to 311 Green Colleges" is the only free, comprehensive guidebook profiling institutions of higher education that demonstrate a notable commitment to sustainability in their academic offerings, campus infrastructure, activities and career preparation. "The Princeton

⁵ <http://www.vtnews.vt.edu/articles/2011/05/050911-cnre-masternaturalistaward.html>

⁶ <http://www.vtnews.vt.edu/articles/2011/05/051911-facilities-vtprincetongreenguide.html>

Review" selects schools for this guide based on a survey the company polled in 2010 on sustainability initiatives. The key for Virginia Tech's qualification includes the Climate Action Commitment and Sustainability Plan which set goals for reducing greenhouse gas emissions, energy efficiency, and the commitment to pursue LEED Silver certification standards or better for new campus buildings. The integration of sustainable programs into the academic curriculum and research also was a significant consideration. Programs focused on careers in sustainability offered by Virginia Tech's Career Services. The numerous opportunities for student involvement on campus combined with the participation levels in alternative transportation, recycling, composting, and more boosted Virginia Tech as a leader in sustainability.

Governance

The Energy and Sustainability Committee continued to meet on a monthly basis during the 2010-2011 academic year to discuss numerous ongoing campus sustainability initiatives. The Committee revisited the current draft revision 2 to University **Policy 5505 "Campus Energy, Water, and Waste Reduction"** in light of Commonwealth of Virginia Governor Robert F. McDonnell's issuance of Executive Order 19 (2010) "Conservation and Efficiency in the Operation of State Government". Following the committee's approval of several minor changes to the policy, Vice President for Administrative Services, Dr. Sherwood G. Wilson approved Revision 2 on February 28, 2011.

Student Internship Program

The Office of Energy and Sustainability continues to develop its innovative student sustainability internship program. Begun in the spring semester, 2010, its mission is to provide an academic, project, and people-based learning experience to turn campus into a living laboratory and invent the future of sustainability at Virginia Tech. The program has evolved to where it now provides students the opportunity not only to develop creative solutions to ongoing campus sustainability challenges in a structured setting, but also provides leadership training and skills-based workshops for personal and professional development. The program's strength and uniqueness lies in its emphasis on interdisciplinary collaboration between all layers of the university and its focus on synergy between project-based and classroom-based learning outcomes.

Following a fall semester 2010 program hiatus, four project teams comprising 28 unpaid student interns were created for spring semester 2011 to begin development work on the following four projects:

- **Virginia Tech Sustainability Web Portal** - a comprehensive and dynamic information portal (www.sustainability.vt.edu) for the Virginia Tech community to streamline, connect, and organize all sustainability-related activities
- **Football Game Day Recycling Best Practices Toolkit & US EPA Partnership** - a list of best practices in the ten specified areas of game day operations, a "10 Quick Fixes" guide on getting a game day program started, and case studies on the nation's top programs; this team has and will continue to work in collaboration with the US EPA and a panel of technical experts from universities across the nation to compile data on how to best handle material management processes for large and small scale football games
- **Greening of Virginia Tech Athletics: Near Zero Waste Games and "Sustain Lane" Partnership with Athletics Department** - a full assessment of Virginia Tech game day operations, applying the best practice toolkit to game day programs and developing a logistical framework and implementation plan for a near-zero waste (90% diversion rate) football season; a "Green Effect" type program similar to the successful Student Government Association's (SGA) orange and maroon effect campaigns, built around a sustainably-produced "rally towel" to be developed, promoted and sold throughout the season in conjunction with the near zero waste game day efforts and to generate funds for sustainability initiatives on campus
- **Framework for a "Sustainability Advisors" (Eco-Reps) Program** – a peer-to-peer education and engagement program to promote sustainable living in Residence Halls

At present, a group of 23 returning and new students are working on the Virginia Tech Sustainability Web Portal, Football Game Day Recycling Best Practices Toolkit & US EPA Partnership, and Greening of Virginia Tech Athletics: Near Zero Waste Games and Rally Towel Fan Engagement teams throughout the summer and will continue through the fall semester, building on the results from the previous semester's teams. A five-year strategic plan entitled "Tomorrow's Sustainability Professionals" has been developed for the student internship program that implements a studio class structure for the 2012-2013 academic year and grows to a total of 12 teams, with two teams each working on specific projects within the following six comprehensive campus sustainability program strategic pathways:

1. Academic Programs and Research
2. Campus Culture and Social Sustainability
3. Sustainable Materials Management
4. Current Built Infrastructure & Campus Expansion
5. Sustaining Sustainability on Campus
6. Outreach and Community Partnerships



The Football Game Day Recycling Best Practices Toolkit & US EPA Partnership team was invited to present their semester work on Wednesday, April 27th in Washington, DC to representatives from the EPA as well as members of the Technical Experts Panel. Pictured from left to right are: Front Row: Katie Cooke (VT Intern), Erica Putman (VT Intern), Noor Khalidi (VT Intern), Ash Venkat (VT Intern), Angie De Soto (VT Sustainability Planner); Back Row: Jennifer Thangavelu (VT Project Manager), Thomas Younce (VT Intern), Josh Dickson (VT Intern), Katie Ridgeway (VT Project Manager), and Ron Vance (US EPA)

Funding

As an alternative to a student green fee initiative suggested in VTCAC point #14, representatives from the Office of Budget and Financial Planning and the Office of Energy and Sustainability established the “**Green RFP (Request for Proposal) Program**”, a successful pilot program to solicit and respond to proposals from recognized student organizations to help advance campus sustainability. Student organizations submitted their Green RFPs to the Office of Energy and Sustainability during October 2010, which included additional bicycle racks, mixed paper recycling containers at residence hall collection locations, hosting the Fall 2011 Virginia Power Shift Conference on the Virginia Tech campus, a drip irrigation system and water line connection for the Sustainable Garden Demonstration project located near the Smithfield Plantation, a portable solar power generator, outdoor individual recycling containers for aluminum cans and bottles, Terracycle Recycling Receptacles for Residence Halls, and a Green Wall/Modular Trellis system on an existing building.

The individual proposals were reviewed and prioritized by the Energy and Sustainability Committee with four proposals recommended for university funding:

1. 15 Bike Racks
2. 10 Mixed Paper Recycling Containers for External placement near Residence Halls
3. Partial funding for Virginia Tech Students to host the “2011 Virginia Power Shift Conference”
4. Irrigation System and Water Connecting Line for the Sustainable Garden Demonstration

In his March 15 Memorandum, Vice President for Finance and Chief Financial Officer, Mr. M. Dwight Shelton, Jr. approved all four proposals and provided funding in the amount of \$26,763. Priority projects 1, 2 and 4 began during the 2011 Spring Semester, while coordination is underway to develop a strategy for students to raise their half of the funding required for project 3. The program is expected to be continued during the coming academic year.

2. Facilities Infrastructure

“Any effort to reduce greenhouse gas emissions on campus must begin with its physical infrastructure.” (Virginia Tech Climate Action Commitment and Sustainability Plan)

Campus Growth

FY2011 saw continued growth to Virginia Tech’s ever-changing Blacksburg campus landscape. The completion of both the Institute for Critical Technology & Applied Sciences (ICTAS) – II and Visitors and Undergraduate Admissions Center buildings, combined with the new Football Locker Room Facility completion increased the number of major buildings from 139 to 141 and increased total campus major building gross square footage (GSF) from 8,539,232 GSF to 8,641,722 GSF. In addition, new buildings currently under construction include the Veterinary Medicine Infectious Disease Facility (October, 2011 scheduled completion), West End Market Expansion and Renovation (December, 2011 scheduled completion), Academic & Student Affairs Building (May, 2012 scheduled completion), Veterinary Medicine Instruction Addition (summer 2012 scheduled completion), and Center for the Arts (September, 2013 scheduled completion.)⁷ Completion of these new construction projects will add an additional 256,332 GSF to the Blacksburg campus and increase its total to 8,898,054 GSF.

⁷ <http://www.facilities.vt.edu/documents/udc/proposals/status/narrative.pdf>

LEED Certification

The university now has a total of 15 owned LEED-registered projects with the US Green Building Council (USGBC) located on the Blacksburg campus. The Henderson Hall Renovation and Theatre 101 Addition project was completed in fall 2009 and received LEED "Gold" certification on February 5, 2010. During FY2011, three LEED-registered projects were completed and documentation for each sent to USGBC for certification determination. These projects include the addition to the Football Locker Room, the Institute for Critical Technology & Applied Sciences (ICTAS) II, and the Visitors and Undergraduate Admissions Center. Seven LEED registered projects are under construction and four are in the design phase. Specific projects are listed below:

Recently Completed & Documentation Submitted to USGBC – Pending LEED Certification (102,490 GSF)

- Addition to the Football Locker Room (42,145 GSF)
- Institute for Critical Technology & Applied Sciences (ICTAS) - II (42,190 GSF)
- Visitors and Undergraduate Admissions Center (18,155 GSF)

Under Construction (588,332 GSF)

- Renovate Ambler Johnston Residence Hall (272,000 GSF)
- Academic & Student Affairs Building (91,200 GSF)
- Center for the Arts (120,000 GSF)
- Infectious Disease Research Facility (15,700 GSF)
- Technology Research & Innovation Center- Hampton Campus (60,000 GSF)
- West End Market Expansion and Renovation (7,432 GSF)
- Vet Med Instruction Addition (22,000 GSF)

Under Design (320,650 GSF)

- Signature Engineering Building (160,000 GSF)
- Human & Ag Biosciences Building (92,000 GSF)
- Renovate Davidson Hall Chemistry Building (50,000 GSF)
- Chiller Plant I (18,650 GSF)



Inside the Hokie's New Prestigious and LEED-Registered Football Locker Room Facility



ICTAS II



Visitors and Undergraduate Admissions Center

Tree Campus USA Recognition

Virginia Tech earned national **Tree Campus USA** recognition for the third consecutive year from the Arbor Day Foundation for its continued dedication to campus forestry management and environmental stewardship, the only institution of higher education in Virginia so recognized.⁸

During the fall semester, more than 900 Virginia Tech students, alumni, donors, and supporters signed up to become tree planters on the Arbor Day Foundation website, more than any other Tree Campus USA college or university. By finishing with the most tree planters, Virginia Tech won the Tree Campus USA “Root for Your Home Team” contest and received \$2,500 in free trees to plant on campus.⁹ As a result, Virginia Tech students, employees, and members of the community were invited to take part in the planting of 25 new native hardwood (Pin Oak, Tulip Poplar, Black Gum, Red Oak, and Sweet Gum) trees near Slusher Wing (north of Dietrick Dining Hall) as a part of Earth Week 2011 on April 21. President Steger and Virginia Secretary of Natural Resources Doug Domenech participated in the event by presenting speeches and planting a ceremonial first tree.



Janaki Alavalapati, Professor and Forest Resources Department Head, President Steger and Doug Domenech, Va. Sec. of Natural Resources, Plant Ceremonial Tree During Earth Week Ceremony



Tree-Planting Ceremony Participants

3. Facilities Operations

“The physical infrastructure determines to a large extent campus energy use and related carbon emissions, but so does its operation.” (Virginia Tech Climate Action Commitment and Sustainability Plan)

Greenhouse Gas (GHG) Inventory and Analysis

For FY2011, total campus GHG emissions of 330,372 tons of CO_{2e} represented a slight reduction from FY2010’s 332,155 tons, and a 4.1% reduction from 2009’s reported inventory maximum of 344,477 tons. Conservation efforts and efficiency improvements however, have helped to offset the growth in campus buildings over the last several years; on a per-GSF basis, GHG emissions have been reduced from FY2008’s high of 0.0424 tons CO_{2e} / GSF to 0.0387 tons CO_{2e} / GSF in FY2011, an 8.7% reduction.

Although the university’s coal-fired power plant continues to be the focal point for GHG emissions, in reality GHG’s resulting from purchased electricity contribute most significantly to the university’s carbon footprint. Electricity purchased from Appalachian Power Company is sourced predominately from coal-based, traditional Rankine-cycle power plants operating with overall efficiencies in the 30 to 40 percent range. Conversely, Virginia Tech’s combined heat and power (CHP) facility operates in the 70 to 80 percent range. As a result, on a per-btu basis, GHG emissions from purchased electricity are 2.7 times greater than that of coal.

EPA categorizes GHG emissions as Scope 1 (direct GHG emissions from sources that are owned or controlled by the entity), Scope 2 (indirect GHG emissions resulting from the generation of electricity, heating and cooling, or steam generated off site but purchased by the entity, and the transmission and transmission/distribution losses associated with some purchased utilities such as chilled water, steam, and high temperature hot water) or Scope 3 (indirect GHG emissions from sources not owned or directly controlled by the entity but related to the entity’s activities).¹⁰

⁸ <http://www.vtnews.vt.edu/articles/2011/03/031011-vpas-treecampus.html>

⁹ <http://www.vtnews.vt.edu/articles/2011/04/041411-cpsre-treeplanting.html>

¹⁰ <http://www.epa.gov/oaintrnt/ghg/index.htm>

Per the VTCAC, the university is committed to reducing its carbon footprint by 2050 to 38,000 tons CO_{2e} annual (80% below 1990 emission level), with intermediate milestones of 295,000 tons CO_{2e} annual by 2012 and 255,000 tons CO_{2e} annual by 2025.) Figure 1 shows emissions by EPA scope category and campus GSF trends along with VTCAC&SP emissions milestone targets.

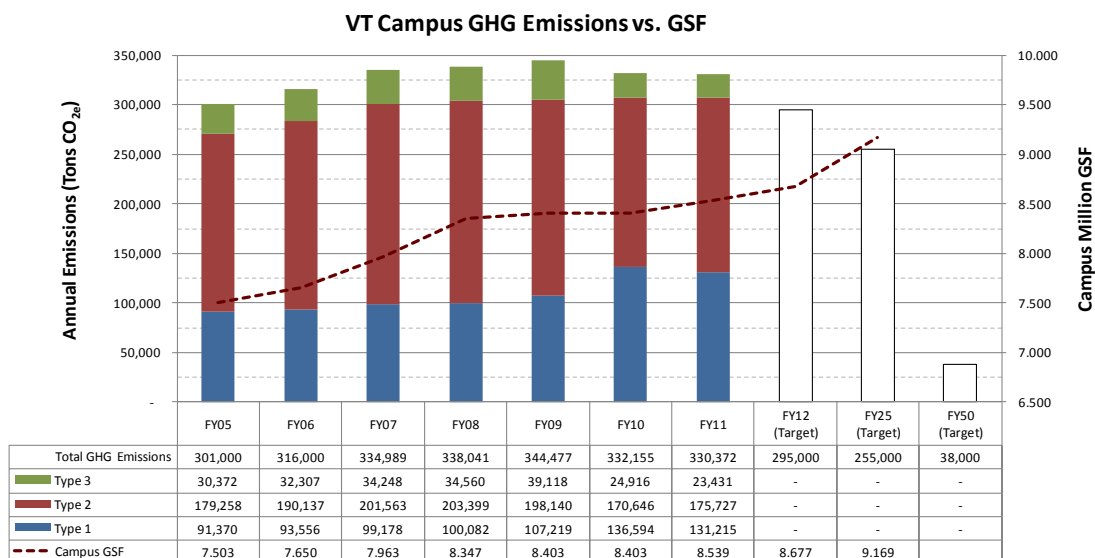


Figure 1

Renewable Energy Opportunities

Over the last several years, the university has invested significantly in its highly efficient, environmentally compliant, and relatively low operating cost coal-based combined heat and power (CHP) facility and will continue to maximize the central powerplant's operation in the near term. However, in addition to continued efforts in energy reduction and efficiency improvements, a third short term solution to reducing the university's footprint is co-combusting of **solid biomass fuel** in the central powerplant. During FY2011, Virginia Tech Facilities personnel investigated the feasibility of co-firing several types of biomass fuels, namely native warm season grasses, wood pellets, and wood refuse. The campus central powerplant's chain grate stoker boilers naturally lend themselves to a co-firing of biomass with coal. Virginia Department of Environmental Quality (DEQ) approval for test burns to determine operating and emissions characteristics was requested and granted. A co-firing test burn of native warm season grasses is scheduled for late summer / early fall of 2011. Test burns of other biomass sources will be scheduled as both fuel and boiler availability exists.

At their March 28 quarterly meeting, the Virginia Tech Board of Visitors approved plans for the new **Perry Street Parking Garage solar photovoltaic (PV) array** to be installed on the parking garage roof. The nominal 100 kW_{peak} dc, utility grid connected solar photovoltaic power system will consist of a total of 480 solar panels and cover approximately 16,000 square feet of area. The system is expected to produce 136,415 kWh or 13 percent of the estimated annual energy use of the facility. Once approved, construction on the \$1.3 million project could begin this fall. The project is being funded from federal stimulus money coming from the state of Virginia.

Energy Consumption and Analysis

Energy consumption on campus was reduced from 1.954 trillion Btu's in FY2010 to 1.906 trillion Btu's in FY2011, or 2.48%. Volume data for natural gas to campus buildings, unavailable in time for the 2010 Annual Report, was included in FY2011 results and added to FY2010 results retroactively, in order to provide a complete energy consumption picture. Energy Use Intensity (EUI), a measure that represents energy consumed on a per-GSF basis improved by 4.0%, from 232.6 kBtu's per GSF in FY2010 to 223.2 kBtu's/GSF in FY2011. For comparison, the USA Energy Information Administration's (EIA) "Commercial Building Energy Consumption Survey" information aggregated data showed an average source EUI for higher education of around 280 kBtu's per GSF per year.¹¹ Figure 2 and 3 below show campus absolute and per-unit energy consumption trends and FY2011's purchased energy source percentage breakdown on a per btu basis:

¹¹ <http://www.aashe.org/forums/energy-usage-intensity-eui-benchmarks>

VT Total Energy Use

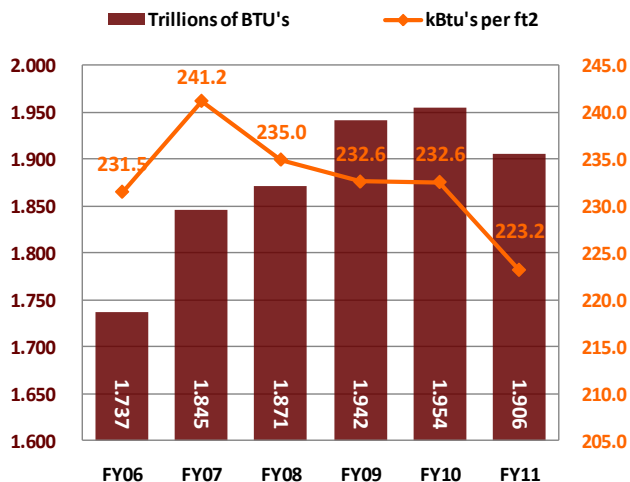


Figure 2

FY11 Campus Energy Use By Source

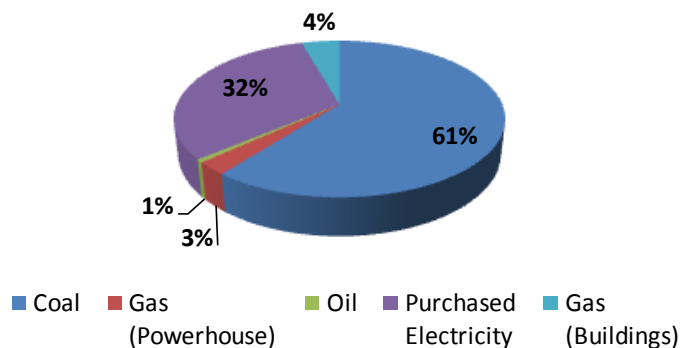


Figure 3

During the summer of 2010, Virginia Tech enrolled in “**Interruptible Load Reliability**” (ILR), an electrical demand response program that pays customers in exchange for a commitment to reduce electrical load in the event of an electrical grid emergency condition that could result in outages. ILR is sponsored by regional electric grid operator PJM Interconnection, overseen in Virginia by the Virginia Department of Mining, Minerals, and Energy and administered by EnergyConnect Inc. For 2010, Virginia Tech participated in the program with a 3,000 kilowatt reduction commitment and received a \$162,210 phased-in payment for its participation. For 2011, the university doubled its commitment to 6,000 kilowatts, and will receive payments totaling \$204,831 once it successfully completes its participation for the remainder of the summer. To help facilitate the program requirement for participants to successfully demonstrate for one hour their ability to meet their load reduction commitment, Facilities Services sponsored a “Lights Out! / Power Down!” event on June 23, where campus community members were asked to turn off and unplug, if appropriate, all non-critical lighting and electrical loads during the 3:00 pm to 4:00 pm hour. Although the university still awaits the official results from EnergyConnect, on-campus metering revealed that the university exceeded its 6,000 kilowatt goal by approximately 2,500 kilowatts.

Maximizing electrical self-generation in the central powerplant continues to be a short-term focus to reduce energy costs and resultant GHG emissions. Historically the campus has idled its low pressure steam distribution system during the summer and provided only medium pressure steam to users. Due to changing summertime steam load profiles over recent years, the low pressure system was able to remain in service for the summer of 2011, increasing output of the turbine generator and minimizing steam flow to the summer condenser unit.

Providing chilled water for campus cooling continues to represent a significant energy demand for the university and is also its most pressing future energy need. In July 2009 the **Chilled Water Infrastructure Master Plan Study** was completed and recommended consolidation of Virginia Tech’s existing combination of district and decentralized/stand-alone chilled water networks into a total of five regional chilled water production plants, joined to an interconnected distribution network. During FY2011, the Master Plan Study was revisited in light of current cooling energy loads and the need to soon provide district chilled water cooling to the new Academic & Student Affairs and Center for the Arts buildings, both currently under construction, as well as the new 154,935 GSF Signature Engineering Building, with its groundbreaking scheduled within the next several months. The Master Plan Study revisit revealed that all three buildings could now be accommodated by increasing chilled water capacity in the existing central chiller plant, negating at present the Master Plan Study recommendation to construct a new Northwest Chiller Plant (NWCP) to supply chilled water to the Signature Engineering Building.

Water Consumption

Campus water consumption continued to increase, with FY2011’s total of 492,088,171 gallons representing a 21.3% increase over FY2010’s total of 405,635,683 gallons. Despite the increase, sustainable water use practices are prevalent across campus: a comprehensive domestic water metering and billing system to users, using non-potable water from the Duck Pond to irrigate the Virginia Tech Golf Course, using plants requiring a lot of water only in areas that have access to naturally occurring water, and specifying native drought-resistant trees and shrubbery as preferred in its Campus Design Principles document.¹²

¹² http://facilities.vt.edu/documents/sustainability/unlinked/Virginia_Tech_design_principles.pdf

Waste Minimization

For the second consecutive year, Virginia Tech exceeded its 2012 goal of achieving an **overall 35% recycling rate** with a FY2011 result of 37.5% and improving over FY2010's 36.5%. Although the quantity of Principle Recyclable Materials (paper, cardboard, yard waste, tires, e-waste, oil, etc.) declined slightly from 2010 to 2011, a 10.8% reduction in Municipal Solid Waste generated drove the overall improvement in rate.

Virginia Tech was among the 550 colleges and universities in the United States and Canada participating in **RecycleMania 2011**, a friendly 8-week competition among college and university recycling programs in North America and Canada designed to promote waste reduction activities in their respective campus communities. This is the sixth consecutive year that Virginia Tech has participated. Among its peer colleges and universities within the Atlantic Coast Conference, Virginia Tech typically placed in the bottom third for recycling categories, but achieved 2nd place in the Waste Minimization category at 38.32 cumulative waste pounds / person, improving over its 2010 performance of 42.41.

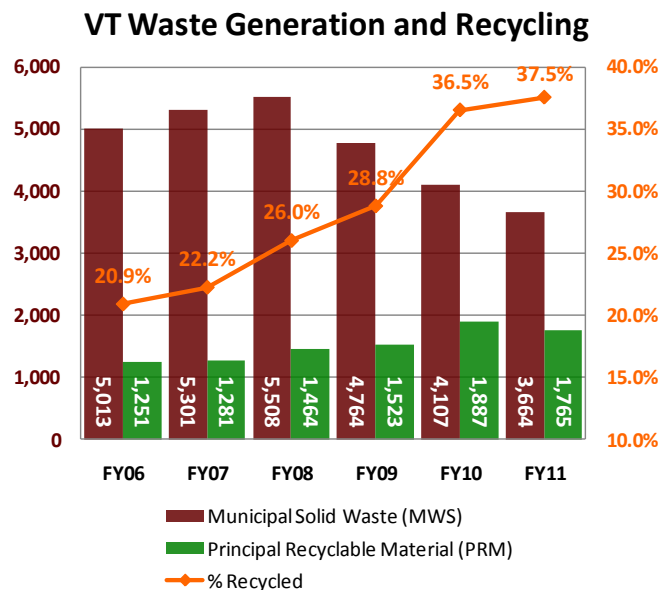


Figure 4

The Office of Energy and Sustainability teamed up again with the YMCA at Virginia Tech, the Department of Residence Life and the Town of Blacksburg to host **Ytoss 2011**. Ytoss encourages students to donate leftover goods they no longer want, such as clothing, food, furniture, rugs and any kind of electronics. The slogan for Ytoss 2011 was “we want what you’ve got” and more than ten tons of goods were collected. These items have been cleaned, tested and stored for the summer and will be resold back to the community during the first two days of move-in the fall. All proceeds go to YMCA community student-led programs, such as after-school tutoring, senior connections, buddy playgroup and alternative service break trips. Eight collection points across campus were set up for students to donate their items, with each located next to a dumpster for trained volunteers to encourage students throwing goods away to donate them instead.

Virginia Tech Dining Services’ successful and growing **composting program** also continues to help drive the improving recycling rates. In 2008 Dining Services established a partnership with Poplar Manor Enterprises (PME), LLC and began to compost its pre-consumer food waste in January of 2009 at its Southgate Food Processing Center. Composting was next introduced at the Owens Hall Dining Facility and these two facilities composted 131 tons of food waste. During calendar year 2010 the university introduced composting at the Dietrick Dining Hall (the largest dining facility on campus), several other small dining venues, and at the Inn at Virginia Tech and Skelton Conference Center and diverted over 325 tons of food waste from the landfill which was instead collected and processed into rich soil by PME.¹³ Some of this soil was also used at the Dining Services Garden at Kentland Farm, which is run in collaboration with the College of Agriculture and Life Sciences. In early 2011, the program was expanded further, with the new inclusion of Sbarro and all Au Bon Pain locations. Within a year, West End Market is expected to be participating in the program and the newest dining center currently under construction, Turner Place, is expected to be composting beginning with its first day in operation.¹⁴ Dining Services has as its goal to expand its composting program to include all 12 dining facilities in the future.

In June, the Office of Energy and Sustainability’s Waste Management Taskforce completed its **Comprehensive Waste Management Plan for Virginia Tech (CWMP-VT)**. The CWMP-VT describes current waste management operations on campus and recommended improvements for the management of campus waste. The plan’s stated “long term goal is the development of a comprehensive strategy to reduce all waste streams in all campus units.” Several specific recommendations to enable the university to reach the Virginia Tech Climate Action Commitment’s next state, designated benchmark of a 50% waste reduction by 2025 were made in the following areas:

- Municipal Solid Waste and Recycling Collection
- Compostable Material Collection
- Reusable Material
- Waste Minimization

¹³ <http://www.vtnews.vt.edu/articles/2011/04/041211-dsa-composting.html>

¹⁴ <http://www.dining.vt.edu/sustainability/composting.php>

4. Transportation

“Transportation is a critical element of campus sustainability. According to the GHG inventory, commuting and on-campus transportation contributes about 8-10% of campus GHG emissions. In addition, fuel used by Fleet Services amounts to another 0.6% and aviation services another 0.3% of total Virginia Tech emissions.” (Virginia Tech Climate Action Commitment and Sustainability Plan)

Alternative Transportation



Students Commuting by Bicycle on Campus

Virginia Tech continued to make great strides in the area of alternative transportation, with overall campus alternative transportation use increasing for the third consecutive fiscal year. FY2011's **alternative transportation use rate of 54%** was significantly higher than both 2010's rate of 48% and 2009's rate of 45%. By achieving this, the university has already exceeded the VTCAC&SP goal of 52% by 2015 (four years ahead of schedule) and now has the 2020 goal of 60% in its short-term sights.

Virginia Tech was awarded a gold award for the second year in a row for their Alternative Transportation programs, in the 2010 **Best Workplaces for Commuters (BWC) Race to Excellence**. A total of 23 companies, institutions, and individuals nationwide were recognized in the 2010 Race to Excellence which is designed to encourage sustainable transportation innovation and recognize organizations that have taken exemplary steps to offer transportation alternatives for their employees, thereby reducing air pollution, traffic congestion, and fuel consumption. Virginia Tech's gold award for 2010 is attributed to new and/or enhanced programs such as the new

departmental billing option from U Car Share, Virginia Tech's support to the new Smart Way buses, the hybrid and articulated Blacksburg Transit buses, a significant increase to carpool participation, the launch of the first Freshman Summer Bike Sale during orientation, and the official online Virginia Tech Ride Board.¹⁵

Virginia Tech Transportation and Campus Services and Blacksburg Transit teamed up in the **2011 Commuter Challenge** to track commute times and methods from April 11 to April 15 in an effort to raise awareness of alternative transportation methods and efficiencies.¹⁶ Results from 141 logged commutes that included car, bus, bike, and walking as primary modes of travel, or some combination thereof, were released during Earth Week.¹⁷ Fifty percent of the commutes that were logged were multi-modal commutes where people put their bikes on buses, or walked a fair distance to catch the bus. One surprising result was that even though cars traveled at a faster speed, cyclists had the quickest commute from Terrace View Apartments to Burruss Hall, taking only 9 minutes, versus 15 minutes by car and 17 minutes by transit.¹⁸ Participants were able to log their commuting information online daily at the Commuter Challenge website and each time a participant logged their information, they were automatically entered into a daily prize drawing.

Through Virginia Tech's contract with **U Car Share** which originally brought six vehicles to campus in August 2009, a new departmental billing option was made available for Virginia Tech departments. By registering a departmental account with U Car Share, employees within that department are now able to reserve and use the U Car Share vehicles for official university business and have the charges billed back to their departmental fund instead of paying out of their pocket and dealing with complicated processes and forms involved in reimbursements when employees use their own personal vehicles for such purposes.¹⁹ Virginia Tech's U Car Share program also implemented its new NOVA car sharing technology that eliminates the need for the members' card to gain entry into the vehicle. In addition to faster access, it requires less energy, and captures more information about each reservation.²⁰

¹⁵ <http://www.vtnews.vt.edu/articles/2011/02/021811-tcs-bwgold.html>

¹⁶ <http://www.vtnews.vt.edu/articles/2011/04/040611-tcs-commutechallenge.html>

¹⁷ <http://www.vtnews.vt.edu/articles/2011/06/060311-tcs-commutechallengeresults.html>

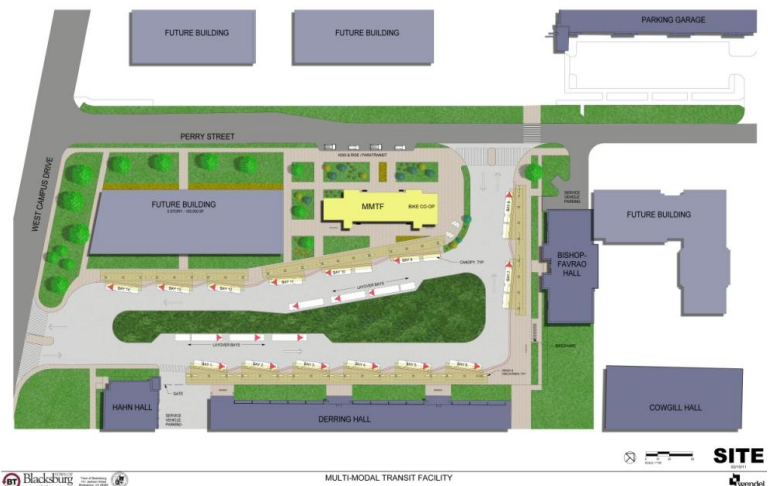
¹⁸ http://www.facilities.vt.edu/documents/tcs/alternative/commuterchallenge_highlights.pdf

¹⁹ <http://vtnews.vt.edu/articles/2010/09/090810-tcs-ucarshare.html>

²⁰ <http://www.vtnews.vt.edu/articles/2011/01/011411-tcs-ucarsharetech.html>

Virginia Tech's Alternative Transportation division launched an **online ride board** that will become a central location for easy carpooling among students.²¹ The ride board aims to encourage on-campus students to leave their car at home. With a fully functional, official ride board in place, carpoolers can now also easily link up and find rides to and from locations that do not have easy access to other public transportation options.²²

On March 28, the Virginia Tech Board of Visitors approved the conceptual plan and design preview of a new **multi-modal transit facility** tentatively sited in what is now the Derring parking lot. The proposed 12,000-gross-square-foot facility, an initiative of the university and the Town of Blacksburg, would include a conditioned rider waiting area with information services, a bike share/bike co-op, multi-use meeting space, public restrooms, and administrative space for transit operations. In addition, the current plan calls for 14 canopied bus loading/unloading bays grouped around a central green space. No date has been set for construction to begin.²³ A request of \$1.6 million was made to the federal government in early spring for designing the building, and projected construction costs are estimated to be between \$15 million and \$20 million.²⁴



Parking and Fleet Services



During the past year Virginia Tech Parking Services invested in three new **biodiesel-powered Kubota RTV1100 utility vehicles**, replacing three full-sized pickup trucks. The Kubotas will allow parking enforcement officers to travel easily and efficiently around campus while significantly reducing fuel consumption. Following the purchase of the Kubota vehicles, Parking Services saw a 50 percent decrease in the amount of fuel needed for their daily operations. These vehicles also help contribute to the university's effort to minimize damage to the campus landscape and the small size of the vehicle also enables Parking Services employees to maneuver more easily than a car or truck through parking lots and sidewalks. In addition to the general campus enforcement operations, it was necessary that the vehicle selected would be able to perform jump-starts and carry the equipment necessary for football and special event parking, maintenance, and for helping those who are locked out of their cars.²⁵

²¹ <http://www.ridesolutions.org/workplace/vt/index.shtml>

²² <http://vtnews.vt.edu/articles/2010/09/091510-tcs-rideboard.html>

²³ http://www.bov.vt.edu/documents/Buildings_and_Grounds_open_03-28-11.pdf

²⁴ <http://www.collegiatetimes.com/stories/17325/tech-bt-to-construct-bus-hub-in-parking-lot/p2>

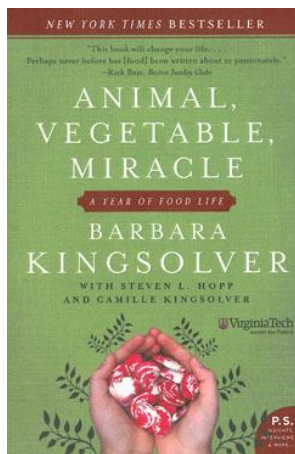
²⁵ <http://www.vtnews.vt.edu/articles/2010/10/102010-tcs-kubota.html>

5. Behavior and Campus Life

“...the behavior of students, faculty, and staff directly impacts the effectiveness of all of the VTCAC’s proposed actions in terms of participation, engagement, and overall campus culture. Reducing campus-wide emissions requires conscious and educated efforts to mitigate personal and institutional impacts on the natural environment, as well as the reexamination of consumer habits.” (Virginia Tech Climate Action Commitment and Sustainability Plan)

Sustainability Events

The **2010 New Student Orientation** was restructured to streamline the information provided to incoming students. Campus organizations and departments were invited to participate in **Gobblerfest 2010**, which occurs the Friday of the first week of the fall semester, instead of the Hokie Resource Fair. To ensure that sustainability was still prominently featured in the 2010 New Student Orientation events, the Office of Energy and Sustainability partnered with the Student Government Association (SGA) to train the 2010 New Student Orientation Leaders about the importance of sustainability at Virginia Tech, the ongoing sustainability initiatives, and ways that new students could get involved. Additionally, the 2010 SGA president, Bo Hart, included remarks about sustainability in his speech during New Student Orientation. Gobblerfest, the outdoor welcome festival for students, staff, faculty, and community members to learn more about Virginia Tech and the Town of Blacksburg community, supports ways to get involved with student organizations, volunteer opportunities, campus events, and learn what local businesses have to offer. It has become a highlight of the start of the academic year. Gobblerfest 2010 attracted an estimated 19,000 people for the street fair and 3,000 students for the late-night activities held in Squires Student Center. The Office of Energy and Sustainability had a booth at Gobblerfest 2010 to promote Virginia Tech’s ongoing sustainability initiatives and sustainability-related student organizations on campus.



On September 14, Barbara Kingsolver and her husband Stephen Hopp, co-authors of *Animal, Vegetable, Miracle: A Year of Food Life*, the **University Common Book** for Academic Year 2010-2011, visited the Virginia Tech campus. Kingsolver and her husband gave a presentation in Burruss Hall Auditorium and signed copies of their book afterward. This visit included the “Virginia Harvest Celebration” dinner which showcased the late-summer harvest in Southwest Virginia, with fresh seasonal vegetables and locally raised beef, pork, and lamb sourced from the Dining Services Garden at Kentland Farm, other Virginia farms, or sustainable food operations. The meal gave students the opportunity to experience a night of local dining inspired by Kingsolver’s book. The meal was held at the D2 Dining Facility, was a huge success, and fed over 2,300 including 175 from outside the university community.

For the fourth consecutive year Virginia Tech, the Town of Blacksburg, and the local citizens group Sustainable Blacksburg green partnership hosted **Sustainability Week** the week of September 18-25, with Sustainability Week 2010’s theme being “Celebrate, Educate, Motivate.” First launched in 2007, Sustainability Week has been recognized with the Governor’s Environmental Excellence Award for the efforts and abilities to promote sustainability awareness and education, and to support positive actions with practical results. Highlights of the week included:

- Saturday: Game Day Tailgate Recycling at the Virginia Tech – East Carolina University football game, where the recycling rate improved to 10.49% compared with 2009’s game day recycling event rate of only 1.56%
- Monday: Ribbon-cutting and dedication ceremony for the YMCA on North Main Street’s “Y Wind and Solar” project, a 640 watt wind turbine and 1,050 watt solar array initiated by a \$15,000 Community Action Grant from Virginia Tech’s Office of the vice President for Research
- Tuesday: Planting of approximately 25 native hardwood shade trees on the north side of Holtzman Alumni Center Pond
- Wednesday: The Virginia Tech Active Commute Celebration, held on the drillfield to help faculty, staff, and students find more affordable commuting methods, and Farmer’s Market Chef Roulette, where local chefs took on the Sustainability Week cooking challenge to cook an appetizer, main course, and dessert using only foods found at the Blacksburg Farmers Market.
- Thursday: Unveiling of the Blacksburg Transit Hybrid Bus and celebration of the Blacksburg Motor Company facility receiving its Platinum LEED designation.
- Friday: Ecotainment Fest 2010, eco-entertainment at the Blacksburg Market Square Park which showcased artists and musicians using sustainable materials or portraying an environmental message in their work.

- Saturday: Community Sustainability Fair held at the Blacksburg Community Center, including a sustainable transportation expo featuring energy efficient vehicles, a watershed open house providing education on stream ecology, children's activities, presentations, etc.



Game Day Tailgate Recycling



Active Commute Celebration

Earth Week 2011 was hosted the week of April 18-22 by the Environmental Coalition student group, with support from the Office of Energy and Sustainability, College of Natural Resources and Environment, and several other student environmental organizations on campus. The weekend prior to Earth Week, 65 Hokies traveled to Washington DC for Powershift 2011, the nation's largest youth environmental conference and grassroots training event. On-campus highlights for the week included the following:

- "Sustainable Food Monday" featured a Farmer's Market at Graduate Life Center Plaza and a speech by Mark Winne, author of Closing the Food Gap and Food Rebels, Guerrilla Gardeners and Smart Cookin' Mamas.
- "Alternative Transportation Tuesday" featured lobby training, climate change discussion, a lively Scavenger Hunt, and a nighttime concert by entertainer Ben Folds.
- "Education & Awareness Wednesday" provided eighty-seven students from Harding Elementary School information about environmental stewardship and ecological importance, and the documentary Electricity Fairy was shown in Squires Student Center.
- "Think Global, Act Local Thursday" featured the ceremonial planting of 25 native hardwood trees near Slusher Wing accompanied by commemorative speeches from Commonwealth of Virginia Secretary of Natural Resources and VT alumnus Doug Domenech and President Steger (see page 11), a drillfield presentation by mountaintop removal activist Larry Gibson and a showing of the acclaimed film "Wasteland" at the Lyric Theater.
- "Earth Day Friday" concluded the week's events with an outdoor festival that included over 20 vendors, several businesses, silent art auction, and diverse musical entertainment.

celebrate

earth  week

Hosted by Environmental Coalition Week of Earth Day: April 22nd

Full Schedule at
EW2011.com

Sustainability Communications

The university's first **sustainability newsletter** was made available by the Office of Energy & Sustainability. This newsletter will be distributed electronically on a quarterly basis and will include information about initiatives to help the university reduce its carbon footprint.²⁶

Virginia Tech's College of Natural Resources and Environment Magazine **CNRE News** spring edition focused exclusively on sustainability, addressing a broad spectrum of topics that included sustainable coasts, sustainable water, sustainable climate, sustainable fish and wildlife, sustainable forests, sustainable land, sustainable leadership and engagement, sustainable world, sustainable business, sustainable courses, sustainable natural resources, and sustainable ecosystems.²⁷

Transportation and Campus Services also publishes a newsletter **Transportation & Parking Update** which often provides additional information about alternative transportation options. The Summer 2011 Transportation & Parking Update newsletter highlights information about Virginia Tech's Vanpool program and the Commuter Challenge results.²⁸

In the recently-issued summer 2011 edition of Virginia Tech magazine, President Steger in his **"Message from the President"** ("Campus makes sustainability gains"), recognized the "steady progress" being made towards VTCAC&SP goals and cited as examples the new student intern program, campus energy reduction accomplishments, LEED, sustainable dining and composting practices, and innovative alternative transportation solutions. At the same time, President Steger also raised the important question, "How will we support campus expansion in an environmentally and cost-conscious fashion?" and acknowledges that "hard decisions still remain in our future" regarding campus heating solutions, water resources, agricultural operations in an environment of "continual erosion of state (financial) support."²⁹



6. Academic Programs

"The university now boasts a comprehensive set of academic degrees, majors and minors related to sustainability..., including environmental engineering; environmental science; environmental policy and planning; landscape architecture; humanities, science, and humanities; as well as many related majors in agriculture, natural resources, and the sciences. In addition, the university hosts several research and outreach centers and institutes...that focus on specific aspects of environmental sustainability. These provide the foundation for sustainability-related research, but many faculty conduct such research outside of the center structure." (Virginia Tech Climate Action Commitment and Sustainability Plan)

Instruction and Learning

Virginia Tech defines sustainability in the curriculum generally as sustaining natural and human systems and their related economic, social, and environmental dimensions, consequences, and opportunities. This definition was created by the Ad Hoc Committee on Sustainability Programs, Subcommittee on Survey of Colleges. The ad hoc committee included students, faculty, a dean, and other administrators. Virginia Tech defines sustainability-focused courses as courses which use sustainability in the course title or syllabus and/or at least 50% of course content addresses long term environmental protection, social justice, and/or the relationship of the economy to environmental and social equity. Virginia Tech defines sustainability-related courses as courses in which at least 20%, but less than 50%, of course content addresses long term environmental protection, social justice, and/or the relationship of the economy to environmental and social equity.

Currently, the university offers 370 different sustainability-focused and 251 sustainability-related graduate and undergraduate courses for the upcoming 2011-2012 academic year,³⁰ or 14.8% of total courses offered. Fifty-seven departments out of a total of 81 offer at least one sustainability-related or -focused course.

²⁶ <http://www.vtnews.vt.edu/notices/070511-facilities-sustainabilitynewsletter.html>

²⁷ http://cnre.vt.edu/cnr_pdf/cnre-newsletter-spring-2011.pdf

²⁸ <http://www.facilities.vt.edu/documents/unlinked/TPsum2011.pdf>

²⁹ <http://www.vtmagazine.vt.edu/sum11/president.html>



Virginia Tech's Hybrid Electric Vehicle Team of College of Engineering graduate and undergraduate students based in the College of Engineering's Joseph F. Ware Jr. Advanced Engineering Laboratory recently won the **International EcoCAR Challenge**, a three-year design competition that seeks to inspire science and engineering students to build more energy-efficient "green" automobiles. A total of 16 collegiate teams from across the United States and Canada participated in the competition, with 14 teams making it to the final day of competition in Washington, D.C. Awards were presented in Washington, D.C., after a two-week finale completion that had teams at General Motor's Milford Proving Grounds in Milford, Mich., and then the U.S. Department of Energy's headquarters in the nation's capital. In all, the team won 14 first place awards at the EcoCAR: The NeXt Challenge: Best Vehicle Testing Complete Presentation, Shortest Braking Distance, Lowest Fuel

Consumption, Best Dynamic Consumer Acceptability, National Instruments Most Innovative Use of Graphical System Design Award, Best Progress Reports and Fastest Autocross 'Fun Run' Time. They tied for Best AVL Drive Quality, and won second place or runner up for Battery Workmanship Award, Lowest Petroleum Energy Use, and Lowest Tailpipe Emissions.³¹

An innovative **community involvement class** in the Department of Urban Affairs and Planning that focuses on issues, concepts, and practices of citizen participation in the development of a community, provided some of its members the opportunity for hands-on learning about the local food system by volunteering at the Dining Services Garden at Kentland Farm. Students learned by weeding and harvesting the sustainable herbs and vegetables the garden produces. The Dining Services Garden at Kentland Farm has been in production since summer 2010 and has grown to almost two acres. Its fresh vegetables and herbs are served in dining centers across campus.³²



Dining Services Garden Student Farm Manager Chelsea Graves

In a class called **Economic Development Studio @ Virginia Tech**, eight Virginia Tech graduate students conducted a market analysis of small town community Floyd County's assets and proposed new green business opportunities for government economic developers to support and that entrepreneurs could nurture and adopt. The class of began with and then worked to define good-fit business opportunities. They came up with four green business ideas: (1) wood pellet manufacturing; (2) a micro dairy; (3) flooring and countertops manufacturing; and (4) a "sustainable living" training-and-education center.³³

Research and Discovery

Virginia Tech's 2006-2012 Strategic Plan Update affirms the university's commitment to achieving excellence as a comprehensive land-grant university that makes innovative contributions in learning, discovery, and engagement. The Discovery Scholarship Domain³⁴ outlines the university's commitments to research and creative scholarship in strategically important areas, drawing upon established strengths and building resources in order to capture opportunities and produce quality research. Sustainability research definitions are embedded within the four strategic priorities of the Discovery Scholarship Domain as follows:

1. Energy, Materials, and Environment
2. Social and Individual Transformation
3. Health, Food and Nutrition

³⁰ http://www.facilities.vt.edu/sustainability/courses_research.asp

³¹ <http://www.vtnews.vt.edu/articles/2011/06/062111-engineering-hevtcarwins.html>

³² <http://www.vtnews.vt.edu/articles/2011/02/022111-dsa-farmvolunteers.html>

³³ <http://vtnews.vt.edu/articles/2010/12/121510-outreach-gradstudentsfloyd.html>

³⁴ <http://www.president.vt.edu/strategic-plan/discovery.html>

4. Innovative Technologies and Complex Systems

Of the 1,748 Virginia Tech faculty who are engaged in research, 636 or 36.4% are engaged in sustainability research; they also represent 54 of 70 total academic departments that conduct research.³⁵

The July 14 issue of *Science*, the world's leading journal of original scientific research, featured the findings of a global team of cellulose researchers that includes Professor Barry Goodell, head of Virginia Tech's Department of Wood Science and Forest Products in the College of Natural Resources and Environment. The researchers studied how woody plants evolve and how fungi, the primary decomposers of wood in the forest, work symbiotically with them in order to better understand several important issues ranging from the development of cellulosic biofuels to the cycling of carbon in the environment. Understanding the cell wall degrading machinery is key to isolating the basic building blocks of cellulose sugars, which can then be used to **sustainably produce renewable biofuels and chemicals**. The research team, which also included students who studied under Goodell, summarized its collective findings in the paper, "Plant cell wall decomposing machinery underlies the functional diversity of forest fungi."³⁶

A consortium of southern land-grant institutions that included Virginia Tech, was awarded a five-year Coordinated Agricultural Grant by the National Institute of Food and Agriculture (NIFA) to study the effects of **climate change on southern pine forests**. Virginia Tech's Department of Forest Resources and Environmental Conservation will receive a \$3.4 million portion of the grant, which aims to develop the knowledge needed to sustainably manage southern pine forests in the face of changing climate.³⁷ NIFA also awarded a \$9.28 million grant to Dr. Brett Tyler and scientists at the Virginia Bioinformatics Institute and Virginia Tech's College of Agriculture and Life Sciences to address global food security concerns through **improved soybean production**. The research team will use new diagnostic tools and genetic information to identify genes that restrict the potential for pathogens to cause disease.³⁸ The goal of the project will be to create new disease management technologies to improve the sustainability of soybean production and improve soybean yields.³⁹

On September 30, Virginia Tech released its full version of the **Smart Grid Information Clearinghouse Web portal**. The Virginia Tech Advanced Research Institute was awarded a \$1.25 million five-year contract by the Department of Energy in October 2009 to develop the portal with assistance from the IEEE and the EnerNex Corporation. The Web portal provides a platform for direct sharing and dissemination of relevant smart grid information, and is designed to serve as the first stop for smart grid related information and acts as the essential gateway that connects the community to various information sources scattered on the worldwide web. On its release date, the portal contained background and in-depth information on more than 200 smart grid projects in the United States and more than 50 projects overseas.⁴⁰

Virginia Tech's Interdisciplinary Center for Applied Mathematics was named a partner along with 11 other academic institutions in the \$122 million **U.S. Department of Energy (DOE) Energy Innovation Hub** which will be led by Pennsylvania State University. The mission of the partnership is to research, develop, and demonstrate new technologies to make both new and existing buildings more energy efficient. Technologies include computer simulation and design tools, advanced combined heat and power systems, building-integrated photovoltaic systems, HVAC systems with integrated indoor air quality management and sensor and control networks to monitor building conditions and optimize energy use.⁴¹

Outreach and Engagement

The **Virginia Tech Center for Student Engagement & Community Partnerships (CSECP)** is "a facilitator for relationships between students, faculty, and community members around the world;" through service, they "encourage both individuals and groups to contribute to their community, both local and global, in meaningful ways."⁴² This year the CSECP initiated the "Seasons of Service" to foster the idea that service / engagement can and should be as natural as the seasons themselves, now and throughout one's life. Three programs that illustrate this initiative deserve special mention:

- "Local Food, Global Hunger: Sharing, Learning, Serving," a three-day event facilitated by CSECP in partnership with the local community and two international nonprofit organizations (Stop Hunger Now and Why Hunger)⁴³, culminated in a "Fall Day of Service," during which more than 2,000 people, ages 4 to 81, packing over 285,000 meals for the people of Haiti displaced by that nation's recent earthquake.

³⁵ http://www.facilities.vt.edu/sustainability/courses_research.asp

³⁶ <http://www.vtnews.vt.edu/articles/2011/07/071511-cnre-celluloseforbiofuels.html>

³⁷ <http://www.vtnews.vt.edu/articles/2011/03/030311-cnre-nifagrant.html>

³⁸ http://www.nifa.usda.gov/newsroom/news/2011news/03281_vt_soybean.html

³⁹ <http://www.vtnews.vt.edu/articles/2011/03/032911-vbi-usdaaward.html>

⁴⁰ <http://vtnews.vt.edu/articles/2010/09/093010-ncr-finalsmartgridportallaunch.html>

⁴¹ <http://vtnews.vt.edu/articles/2010/08/083110-research-doehubgrant.html>

⁴² <http://www.vtserves.vt.edu/CSECP/About/>

⁴³ <http://www.vtnews.vt.edu/articles/2010/09/092210-outreach-3dayevent.html>

- 2011 Virginia Tech Relay for Life: Sponsored by the VT Student Government Association, involved nearly 5,500 participants and raised more than \$600,000 for cancer research; Virginia Tech is currently ranked the No. 1 university in terms of online fundraising, according to American Cancer Society reports.⁴⁴
- 2011 Big Event: Virginia Tech's largest day of service event, enlisted 6,731 volunteers to complete 950 different projects addressing community needs throughout the New River Valley.⁴⁵

Virginia Tech researchers are involved in a five-year project, titled “**A Conservation Agricultural Production System for the Central Plateau**” which hopes to use conservation agriculture to bring about a rebirth of productive farming in the Central Plateau highlands region of Haiti. The team, in partnership with Haitian governmental and charitable organizations is working with local farmers in three separate locations to implement conservation agriculture techniques such as minimal tillage, cover crops, and crop rotation that minimize soil disturbance and environmental impact. At each of the three locations, a small-farm resource and teaching center will be built. Researchers are also conducting trials to see if they can find varieties of beans that might be more productive and better suited for the harsh conditions of Haiti. One hope in conducting the project in rural areas is that if the venture succeeds, people will be encouraged to return to the countryside and relieve some of the population pressure on Haiti's overcrowded cities.⁴⁶

Virginia Cooperative Extension and Virginia Tech's Kentland Farm hosted the fifth annual **New River Valley Agriculture Field Day** on Tuesday, August 17, at Kentland Farm in Montgomery County, Virginia. With support from Extension agents in the New River Valley and surrounding counties, the event provided sustainability learning opportunities for livestock, crop, and horticulture producers such as a soil profile workshop to help producers understand soil relationships, irrigation systems for home and commercial vegetable growers, sustainable vegetable production updates, and farm food safety through the Good Agricultural Practices program.⁴⁷



New River Valley Agriculture Field Day Fencing Demonstration

The **Catawba Sustainability Center** continues to be a showcase for researchers and students from Virginia Tech to engage with the local community – a place to practice, demonstrate, learn, and teach about sustainability issues (from green building and construction to low-input agricultural production to water quality to onsite energy production to community-based business development) that affect not only the world today but the future as well.⁴⁸ On November 6, the Center hosted a planting day in which 50 Virginia Tech students along with several community members planted over 200 native and edible trees and shrubs funded through a United States Department of Agriculture National Agroforestry grant.⁴⁹ Virginia Tech students have also been involved in generating creative ideas for further development of the 377-acre center's facilities, a former dairy farm.⁵⁰

Working in conjunction with the Catawba Sustainability Center is **VT EarthWorks**, a business-acceleration program for land-based sustainable businesses and part of Virginia Tech's Outreach and International Affairs. VT EarthWorks helps growers, farmers, and other businesses in the startup or expansion phases by providing access to markets, land-lease arrangements, innovative technology, and research. Last summer VT EarthWorks helped publish the *Roanoke Valley Locavore Directory* for people committed to eating foods produced or grown locally. The comprehensive directory includes everything from vegetables, meat, and cider, to restaurants, markets, and bakeries.⁵¹ “Field to Fork”, a meet and greet event on March 13, was sponsored by VT Earthworks and the Catawba Sustainability Center for local community members to meet and interact with local farmers and food producers.

⁴⁴ <http://www.vtnews.vt.edu/articles/2011/05/052611-dsa-relay.html>

⁴⁵ <http://www.vtbigevent.org/>

⁴⁶ <http://vtnews.vt.edu/articles/2010/12/121310-oired-workinhaiti.html>

⁴⁷ <http://www.vtnews.vt.edu/articles/2010/08/081210-cals-nrvfieldday.html>

⁴⁸ <http://www.catawbalandcare.org/going-on/csc-earthworks/>

⁴⁹ <http://www.vtnews.vt.edu/photo-galleries/plantingdaygallery.html>

⁵⁰ <http://vtnews.vt.edu/articles/2010/12/122010-outreach-catawbastudents.html>

⁵¹ <http://vtnews.vt.edu/articles/2010/07/072810-outreach-locavore.html>

Conclusion and Future Steps

President Steger in the recently-issued summer 2011 Virginia Tech magazine's "Message from the President" ("Campus makes sustainability gains"), states "The university has made steady progress toward goals enumerated in the Virginia Tech Climate Action Commitment and Sustainability Plan adopted in 2009. Improving the environmental stewardship and reducing the carbon footprint of this enterprise—equivalent to a small city—is no small task."⁵² Virginia Tech's recent receiving of a AASHE STARS "silver" rating in only 3+ years since President Steger's April 25, 2008 charge to develop a Virginia Tech Climate Commitment and Sustainability Plan certainly affirms both his and the university community's sincere commitment and dedication to Virginia Tech becoming a leader in Campus Sustainability. Yes, much progress has been made, but much work remains and many more opportunities and challenges lie ahead.

While many within the Virginia Tech community will be contributing to furthering campus sustainability in the upcoming 2011-2012 fiscal year, specific areas of focus within the Office of Energy and Sustainability will be to

- Coordinate the completion of as many remaining open VTCAC&SP Immediate term (2009-2012) action items as possible and begin to address Midterm (2013-2025) action items;
- Strive to meet the 2012 interim GHG emissions target of 295,000 tons CO_{2e} through aggressive energy conservation, utility supply efficiency improvement projects, and phased-in implementation of renewable fuel and energy sources for campus utilities;
- Begin implementation of recommended action items in the new Comprehensive Waste Management Plan for Virginia Tech to enable the university to reach its VTCAC designated 2025 benchmark of 50% waste reduction;
- Continue to expand and enhance the OES Student Internship program to both help implement campus sustainability initiatives and to increase student personal and professional development;
- Continue to coordinate and/or participate in campus and community sustainability-enhancing events such as New Student Orientation, Gobblerfest, Game Day Recycling, Sustainability Week, RecycleMania, Earth Week, Ytoss, etc.;
- Assess the recent comprehensive AASHE STARS submittal information and data and identify improvement opportunity areas and generate strategies to improve;
- Coordinate a second wave of the "Green RFP" process to fund student-generated ideas and proposals that advance campus sustainability;
- Support Dining Service's continued growth of its composting program throughout campus dining facilities;
- Improve communications and reporting of campus sustainability goals, metrics, performance and successes;
- Assess past water conservation audits and analyses and develop an updated campus water conservation strategy.

⁵² <http://www.vtmagazine.vt.edu/sum11/president.html>