NC STATE UNIVERSITY

FOUNDATION
FOR ADVANCING SUSTAINABILITY:

A STRATEGIC PLAN
FOR NC STATE UNIVERSITY

April 2011

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CAMPUS ENVIRONMENTAL SUSTAINABILITY TEAM

The Vice Chancellor for Finance and Business and the Provost charged the Campus Environmental Sustainability Team (CEST) to develop a sustainability strategic plan for NC State University and appointed Jack K. Colby and William E. Winner as Co-Chairs. CEST includes staff members, faculty members, and students who voluntarily work to advance sustainability at NC State. The NC State University Sustainability Office supported CEST throughout the process. A full list of contributors can be found in Appendix A.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

NC State University is among hundreds of colleges and universities across the country seeking to advance sustainability by conserving and more efficiently using resources and energy, by revising academic and research programs, and by engaging institutional partners and the public. As the largest four-year institution in North Carolina, NC State University can make a large impact on both aggressively managing resource use on campus, and on preparation of students, faculty members, and staff members for a new and sustainable future. NC State University can lead by planning for sustainability in a way that engages the university community, and by ensuring that sustainability occurs in all facets of its mission and operations.

The Vice Chancellor for Finance and Business and the Provost charged the Campus Environmental Sustainability Team (CEST) with guiding the campus sustainability program starting with creation of a Sustainability Strategic Plan (SSP). The SSP, Foundation for Advancing Sustainability: A Strategic Plan for NC State University, addresses the immediate need to take action to advance sustainability, and sets a vision for growing the intellectual and scholastic scope of the university while using fewer resources. The SSP supports the University's Strategic Planning efforts and by better utilizing resources, provides insight into how NC State University can continue its missions in a budget constrained environment. The SSP calls for the creation of a new campus culture where students, faculty members, staff members, and university partners work together, forming the foundations of a new community capable of advancing sustainability.

The SSP provides a comprehensive roadmap for advancing sustainability at NC State University. The SSP consolidates and integrates three major planning efforts that took place during the 2009-10 and 2010-11 academic years into a single document: 1) the SSP that is a near-term (five-year) plan; 2) the Climate Action Plan that is a long-term (40-year) plan; and 3) the Strategic Energy Management Plan that immediately implements activities to use energy more efficiently. The integration of these three efforts ensures the processes are complimentary. The SSP identifies strategies that form a plan for advancing sustainability, based on quantitative measurements, monitoring, benchmarks, and capacity for adjusting trends in sustainability targets.

The planning process represented a full and open process , which was open to all students and members of the faculty and staff. The planning process spanned more than a year to allow for the full participation needed for a broadly accepted SSP. Ensuring broad involvement in the planning process, the CEST populated eight working groups around the focus areas of academics and research, buildings, community and culture, energy and water, land use, materials and purchasing, transportation, and waste reduction and recycling. Participation in a working group was open to volunteers, and efforts to recruit working group members reflected expertise, interest, and diversity.

Although each working group created strategies based on the expertise of their members, the CEST remained vigilant of overlapping issues which maintained a balanced, systems approach to sustainability. A systems level approach ensured that progress in one focus area does not adversely affect progress in another area. The strategies listed represent this balanced, systems approach to sustainability. The full list of strategies can be found in Section 5 of the SSP.

Sustainability Strategies

- Establishing a campus culture of sustainability
- Establishing courses & curricula for sustainability literacy
- Creating opportunities for service learning
- Engaging in sustainability research
- Using the campus as a classroom
- Improving allocation of resource & space efficiency
- Implementing a sustainability policy
- Reporting sustainability metrics on a national level
- Locating funding (grants, student fee, campaigns)
- Creating community networks
- Establishing annual event traditions
- Creating incentives, recognition, & rewards
- Achieving 30% energy consumption reduction
- Achieving 50% water consumption reduction
- Implementing green information technologies
- Improving data management capabilities & decisions
- Diversifying fuel sources
- Training technical staff for efficiency
- Including sustainability into all building projects
- Undertaking holistic building modifications
- Utilizing total cost of ownership and life cycle cost analysis
- Increasing open space and natural areas
- Implementing operational best practices
- Achieving 60% landfill diversion rate
- Promoting environmentally & socially preferable purchasing
- Implementing source reduction
- Expanding composting
- Enhancing outdoor recycling
- Achieving 10% increase in local & organic food purchases
- Increasing alternative fuels in fleet
- Integrating infrastructure and programs for bicyclists & pedestrians
- Increasing use of buses
- Evaluating parking policies
- Reducing traffic congestion
- Utilizing telecommuting & videoconference

The SSP sets the direction for sustainability on campus. Among the next steps, working groups will continue the open process to create a Tactical Plan for the SSP's implementation. The CEST will review the SSP and tactic progress annually. Both the SSP and Tactical Plan will be formally reviewed at five-year intervals.

1. ADVANCING SUSTAINABILITY AT NC STATE UNIVERSITY

1.1 *The University Mission For Sustainability*

"To engage the students, faculty members, staff, and University partners in preparing for a more sustainable future"

The report, Foundation for Advancing Sustainability: A Strategic Plan for NC State University, commits our academic community to a long-term effort to advance sustainability regarding campus operations, instruction in classrooms, use of space and facilities, and engagement with our partners and the public. As the largest four-year institution in North Carolina, NC State University has the opportunity to lead by example while advancing sustainability. The challenge is to provide for growth of the University while more efficiently using and conserving energy, water, land, and physical resources. Those at the university must also recognize that the current use of energy, water, materials, and other resources is not sustainable. Hereafter, we refer to this document as the "Sustainability Strategic Plan (SSP)" and show how it provides a foundation supporting the effort for advancing sustainability.

NC State University has many areas in which to address activities for advancing sustainability. The university interface with sustainability includes:

→ Preparing students and leaders for emerging issues such as a new energy future, "green" careers, and responsible citizenship.

→ Providing the research capacity to discover new technologies, policies, and processes for sustainability such as solar fuels, a smart grid, water reuse systems, and eco-cars.

→ Providing society with information about options for pursing a vision of life that is sustainable while still providing for housing, transportation, creative expression, economic opportunity, and other social needs.

→ Leading by example in areas such as conservation and efficient use of energy and water, reducing waste, wise purchasing policies, providing alternative transportation, and many other aspects to support campus activities

→ Fostering cross-campus networks and a culture that leads to faculty members, staff members, and students working and living together in a productive setting while using facilities and resources more efficiently.

→ Demonstrating how a large group of people connected in a common enterprise can grow while becoming more sustainable.

1.2 *The University Vision For Sustainability*

"To advance sustainability into the culture, mission, and activities of the university and to become nationally recognized for its successes."

There is no single concept for sustainability. Models differ among businesses, agencies in the public sector, and among individuals. Even within the university, there are many opinions about the meaning of sustainability, and how to achieve it on campus. Exploring the wide range of definitions and models of sustainability is beyond the scope of this document. However, the immediate need is for those at NC State University to

recognize that the current practices for operating are not sustainable and therefore must change.

Since the student enrollment of the university is projected to grow over the next decade, sustainability will be part of the university's growth strategy. NC State University will continue growing to meet the needs of those in North Carolina, and to play an increasingly important role in the emerging national and global debates about energy, environment, and resource use. Looking ahead, the number of students, faculty members, and staff members will increase. The future will embrace new buildings and renovation and expansion of existing buildings. For NC State University to continue providing the educational systems that are increasingly important for developing society, increased commuting, roads, parking, and air travel will all be part of the future. The goal is not to preserve the NC State University we have today, but to transform the university into a new kind of institution that provides education, new knowledge, and connects to the public in a way even more dynamic than currently exists.

Photo Credit: Roger Winstead

In the broadest sense, the university commits to sustainability with all of its actions. The Provost and Vice Chancellor for Finance and Business are responsible for guiding activities and investments to advance sustainability. Planning for sustainability requires embracing diversity as an essential part of the sustainability discussion. In the future, all campus development, growth, and modification will include sustainability as a factor.

Advancing sustainability includes university-wide commitments as well as commitments of individual action. Historically, the university operated with students, faculty members, and staff members as largely independent groups. Each of the groups has different needs, responsibilities, interests, and values. The new culture will place a priority on conservation of energy and water, make waste reduction and recycling second nature, establish merit in optimizing use of space , and bring a shift to alternative transportation modes. The new culture will also accelerate development of courses and curricula that inspire students and faculty members to envision the issues of sustainability now, and in their activities after their time at the university.

1.3 *Plan Objectives*

The SSP provides a comprehensive plan for advancing sustainability at NC State University. In addition, the SSP consolidates three major planning efforts that took place during the 2009-10 and 2010-11 academic years: 1) A five-year, Sustainability Strategic Plan (this document), 2) a 40-year Climate Action Plan, and 3) a five-year Strategic Energy Management Plan. The SSP provides a road map for moving NC State University towards a long-term vision of sustainability. Specific objectives of the SSP include:

- Explain the vision and mission for strategic sustainability planning.
- Outline the process for institutionalizing sustainability within the university.
- Explain existing sustainability commitments and state requirements.
- Explain the process of forming the SSP and results from other planning activities.
- List the strategic goals for advancing sustainability needed to build tactics for action.
- Characterize the process of reviewing , implementing, and amending the SSP.

2. INSTITUTIONALIZING SUSTAINABILITY AT NC STATE UNIVERSITY

2.1. *National Interest in Sustainability*

NC State University is among hundreds of colleges and universities across the country seeking to advance sustainability, to further academic missions, and to manage the impact on natural resources and human health. The Association for Advancement of Sustainability in Higher Education (AASHE) lists over 840 colleges and universities as members. Nearly 700 academic institutions have signed the American College and University Presidents Climate Commitment (ACUPCC), committing to work towards climate neutrality. In addition, many academic institutions listed as NC State University peer institutions have sustainability plans that embrace strategic goals.

As evidenced by the numerous "green" rating agencies that publish sustainability surveys, potential students evaluate a university's sustainability attributes as part of their school selection. Student interest in sustainability holds true at NC State University. In a 2010 Assessing Student Attitudes Toward Sustainability Issues survey, 85% of respondents thought it important for NC State University to be a leader in sustainability and 68% thought climate change will be a major problem for future generations.[1] Sustainability opportunities are part of the appeal that attracts and retains the brightest students, researchers, faculty, and staff to NC State University, and keeps the university competitive among its peers.

2.2. *New Community for a New Culture to Advance Sustainability*

The vision for growing the intellectual and scholastic scope of the university while using fewer resources is within the grasp of current and emerging technologies. However, it requires a fundamental change reflecting new priorities and actions. All activities, programs, and investments advance the capacity of the university to accomplish its future missions. Including sustainability at the core of the university's identity will require the creation of a new culture of sustainability. The new culture will be guided the following principles.

- Planning for sustainability involves the community; students, faculty members, and staff members.
- All viewpoints, suggestions, and opinions are welcome and treated with respect.
- The university advances sustainability with fiscal responsibility and social equity.
- The university advances sustainability with activities and investments that reflect the value of the institution, recognizing that costs provide benefits that extend far beyond its campus.

Creating the new culture of sustainability requires recognition of a new community at NC State University. The obvious need to advance sustainability now drives students, faculty members, and staff members to sit together and form the new foundations for a university community capable of planning for the future. The new community focused on sustainability provides a new vehicle for improving the way we live and work, and transcends the issues of fuels, water, waste, and the other issues commonly associated with sustainability.

2.3. *Roles for Community Members*

Faculty Members

Faculty members develop the scholarship, including the courses, curricula, and research needed for students to become literate about energy, environment, and sustainability. Faculty members contribute to the discussions for advancing sustainability, including changing use of energy and water, creating new plans for buildings and land use, improving efficiency of transportation, and rethinking the use of existing space.

Research is an important function of the university, and plays

[1] *Assessing Student Attitudes Toward Sustainability Issues. NC State University Sustainability Office and Energy Management. April, 2010.*

an essential role in advancing sustainability. Discovering new technologies that advance sustainability, securing patents, and employing new sustainability-minded workers are imperative to success. NC State University has the reputation for excellence in research that fosters innovation, entrepreneurial opportunity, engaging of partners in public-private ventures, and connects new discoveries to the marketplace and to the public.

The research expertise of faculty members should also contribute to the sustainability discussions when campus renovations affect existing buildings, energy production and distribution systems, and land use. Faculty members must be mindful about the resource efficiency of their equipment and the space needed to conduct state of the art research.

Students

The elements of sustainability should permeate the classroom, and grow in student organizations, residence halls, and dining facilities, and the wide range of activities that constitute the student experience. Sustainability is an increasingly important aspect of the work place, professional schools, and graduate education. Students must have access to courses, curricula, and educational experiences outside the classroom to be leaders in sustainability.

Staff Members

Staff members support the mission of the university and make day-to-day decisions that furthers the sustainability goals of the university. Staff members play key roles in the way energy, water, and other resources are used and can advance sustainability by practicing and by making recommendations to eliminate waste and enhance efficiencies.

2.4. *Sustainability Advanced with Metrics*

Metrics are necessary to assess the university's sustainability progress. Measuring progress toward sustainability is key to the implementation of the SSP. Although, at present, there are no accepted industry-wide metrics capturing the breadth of sustainability, there are key performance indicators that track areas such as energy consumption, water consumption, and waste reduction. The keys to using metrics for advancing sustainability include: 1) defining baseline data for current use of energy and resources; 2) monitoring change in use from baseline values; 3) comparing measured use against benchmark values; and 4) implementing correction to attain benchmark values.

Examples of, quantifiable metrics are energy consumption per gross square foot, water consumption per gross square foot, utility cost per student, and landfill diversion rate. The CEST and the working groups will engage in additional discussions to determine the best metrics to track that each of the strategies is advancing sustainability. Section 6 discusses implementation more fully, including establishing metrics in key areas, pertaining to the SSP.

2.5. *Assumptions for Institutionalizing Sustainability*

NC State University, has a responsibility to ensure that advancing sustainability occurs in all facets of its mission and operation. To advance sustainability, the university acknowledges the following assumptions:

- Operating costs will never be lower than they are today.
- Costs per unit of fuel, water, and other resources will increase.
- Increased cost of operation compromise missions of education, research, and engagement.
- Approaches to optimizing resource use require new priorities for infrastructure investments.
- Advancing sustainability will challenge students to adapt to new practices in residence halls, dining halls, and classrooms.
- Advancing sustainability will require faculty members to adapt to new approaches for using classrooms, laboratory space, research equipment, and travel.
- Advancing sustainability will require staff members to engage faculty members and students in open discussions leading to new tactics for reducing resource use.
- Advancing sustainability will require careful planning for university growth, including the development of curricula, research themes, the annual increase in student enrollment, and hiring faculty and staff members.
- Advancing sustainability will require the university to engage the public in support of activities across the region and state.

3. UNIVERSITY COMMITMENTS & LEGISLATIVE REQUIREMENTS

NC State University is subject to a number of commitments and laws that address sustainability issues (Appendix B). Listed are the major commitments and laws.

→ *American College and University Presidents Climate Cotmmitment (ACUPCC)*

Nearly 700 higher educational institutions signed on to the ACUPCC. NC State University became a signatory in 2008. By signing this agreement the university committed to completing an emissions inventory, setting a target date and interim milestones for climate neutrality, taking immediate steps to reduce greenhouse gas emissions from a list of near-term actions, integrating sustainability into the curriculum, and making the climate action plan publicly available.

→ *Energy Star Partner*

As of April 21, 2008, NC State became an ENERGY STAR partner making a fundamental commitment to continuous energy performance.

→ *Leadership in Energy and Environmental Design (LEED) Silver Certification Minimum*

In 2008, one of NC State's immediate actions to support the ACUPCC was to commit all new buildings and major renovations over 20,000 gross square feet to be a minimum of LEED silver certified.

→ *NC Laws Require Energy Conservation in State Buildings*

State law GS 143-64 (SL 2007-546/SB668) stipulates reducing energy consumption in all existing state buildings by 20% by 2010, and 30% by 2015 relative to fiscal year 2002-03. All new state buildings will be 30% more efficient than the ASHRAE standard 90.1-2004. All State agencies will develop a comprehensive plan to manage their utilities, and to report energy use each fiscal year to the State Energy Office and Department of Administration. Buildings with new water system designs and construction, and that meet the 2006 North Carolina Plumbing Code, should use at least 20% less potable water than the baseline originally calculated for the building.

→ *University of North Carolina General Administration Sustainability Policy*

Adopted in 2009, UNC-GA Policy 600.61 calls for action in seven areas of campus administration and operation. The seven areas cover master planning, design and construction, operations and maintenance, climate change mitigation and renewable energy, transportation, recycling and waste management, and environmentally preferable purchasing.

4. SUSTAINABILITY PLANNING

4.1. *Role of the Campus Environmental Sustainability Team*

The Provost and the Vice Chancellor for Finance and Business charged the CEST with guiding the campus sustainability program starting with creation of the SSP. The CEST additionally took a deeper look at the Climate Action Plan, and at energy management. The CEST became an Administrative Advisory Committee in August 2008 and membership represents faculty members, staff members, students, and community members. Although the membership of the CEST is appointed, the CEST is open to all those who want to participate.

To expand participation, eight working groups formed around the focus areas of academics and research, buildings, community and culture, energy and water, land use, materials and purchasing, transportation, and waste reduction and recycling. The themes of the working groups enabled group members to focus on work that pertained to their expertise or interest. Each working group's appointed chair identified and engaged key topic area stakeholders in the conversations. The CEST now involves many campus and community members in sustainability planning (Appendix 1).

The CEST and the working groups used an open planning process, with work spanning more than a year to ensure full discussion needed for a broadly accepted SSP. Working groups functioned as a conduit for communications across the university. Notice of working group activities included announcements in the Technician and the Bulletin, email lists, sustainability e-newsletter, campus communicator networks, presentations, web sites, campus organizations, podcasts, LED screens across campus, Facebook, and Twitter. Meeting notes and presentations from all working groups and the CEST meetings are available on the CEST web page. Throughout the planning process the University Sustainability Office provided staff support to the CEST.

Several appointed CEST members connected the sustainability planning process to campus groups. Included in these groups were the Energy Council, Student Government, Faculty Senate, Staff Senate, the College of Agriculture and Life Sciences Planning Committee for Sustainability and Managed Ecology on Centennial Campus, several student organizations, and Physical Environment Committee. These organizations had working relationships with CEST to promote coordination. Once adopted by the CEST, the SSP went to campus for further input. After those across campus provided input, the SSP advanced to the university Executive Officers, the University Council, and to the Board of Trustees. The final action included approval by the Chancellor.

4.2. *Integration of Systems View and Focus Areas*

Viewing sustainability at a systems level reveals interactions among the system components. However, to begin discussions about sustainability it was necessary to break the system down into components, or focus areas. The CEST working groups formed around the focus areas of academics and research, buildings, community and culture, energy and water, land use, materials and purchasing, transportation, and waste reduction and recycling. The groups were determined based on the 2006 Campus Environmental Sustainability Assessment which established a sustainability baseline.[2] Additionally, these focus areas align with existing offices to carry out resource management.

The challenge with creating recommendations from a series of working groups is that broader systems perspective can be lost if the strategy for advancing sustainability for one working group works against the sustainability strategies for another working group. As a rule, advancing sustainability in one area must reflect a net gain for the university, and not exceed losses of sustainability in another area. For example, the Building working group might recommend increasing intensity and building use on Central Campus, a recommendation that works against a Transportation working group strategy to reduce transportation into Central Campus. The CEST remained vigilant of the interdependent broader system view while the working groups evaluated the more detailed focus areas.

[2] *NC State Campus Environmental Sustainability Assessment,. 2006. http://issuu.com/ncstatesustainability/docs/ncstate_sustainability_assessment_2006*

4.3. *Coordinating Three Planning Efforts*

The SSP creates a comprehensive, unified approach to sustainability, including the university's impact on climate change and the approach to managing energy (Figure 1). The SSP also unifies the campus-wide sustainability planning process, and maps a path forward by integrating the summaries of two additional sustainability planning efforts into a single document. The SSP incorporates recommendations from the 40-year Climate Action Plan and the five-year Strategic Energy Management Plan.

CEST guided the three planning efforts that comprise the SSP. Figure 2 displays the sequencing and time line of the planning process.

1. Five-Year Sustainability Strategic Plan

Purpose	*To create a unified approach to further sustainability in academics and research, buildings, energy and water, land use, purchasing, transportation, and waste reduction and recycling*
Authorization	*Provost and Vice Chancellor for Finance and Business*
Time horizon	*Five-year strategies toward long-term sustainability*
Level of detail	*High level strategies to achieve within five years*
Main coordinating entity	*CEST and working groups, University Sustainability Office as staff support*
Strategy creation time frame	*September 2009 – January 2010*
Product	*Foundation for Advancing Sustainability: A Strategic Plan for NC State University (SSP)*

2. Climate Action Plan

Purpose	*To create a long-term plan to reduce NC State University's greenhouse gas emissions and ultimately, to achieve climate neutrality. Major components include green development, energy conservation, fuel mix and renewables, transportation, waste management, and emerging technologies*
Authorization	*American College and University Presidents Climate Commitment (per Chancellor's signature)*
Time horizon	*40 years (2010-2050)*
Level of detail	*Sustainability strategies, the focus is on near-term actions with some long-term options*
Main coordinating entity	*CEST and working groups with support by the University Sustainability Office. NC State University contracted with Affiliated Engineers, Inc., (AEI) to facilitate the climate action planning process and conduct the modeling*
Strategy creation time frame	*January 2010 – August 2010*
Product	*NC State University Climate Action Plan*

3. Strategic Energy Management Plan

Purpose	*To create a plan to reduce energy consumption and improve energy efficiency on the NC State University campus consistent with the needs for a safe, secure, and inviting campus community.*
Authorization	*Vice Chancellor for Finance and Business*
Time horizon	*Strategies to be implemented within five years*
Level of detail	*Evaluating 41 methodical and aggressive approaches for efficient energy use*
Main coordinating entity	*NC State Energy Management with support from CEST and working groups*
Strategy creation	*May 2010 – August 2010*
time frame	*Strategic Energy Management Plan*
Product	

Figure 1

The Sustainability Strategic Plan integrates three planning efforts as well as a systems approach guiding the working groups. Each of the focus areas was part of an interdependent SSP. Each of the three planning efforts had a different time frame and scope and consolidating the efforts provided a coordinated sustainability approach.

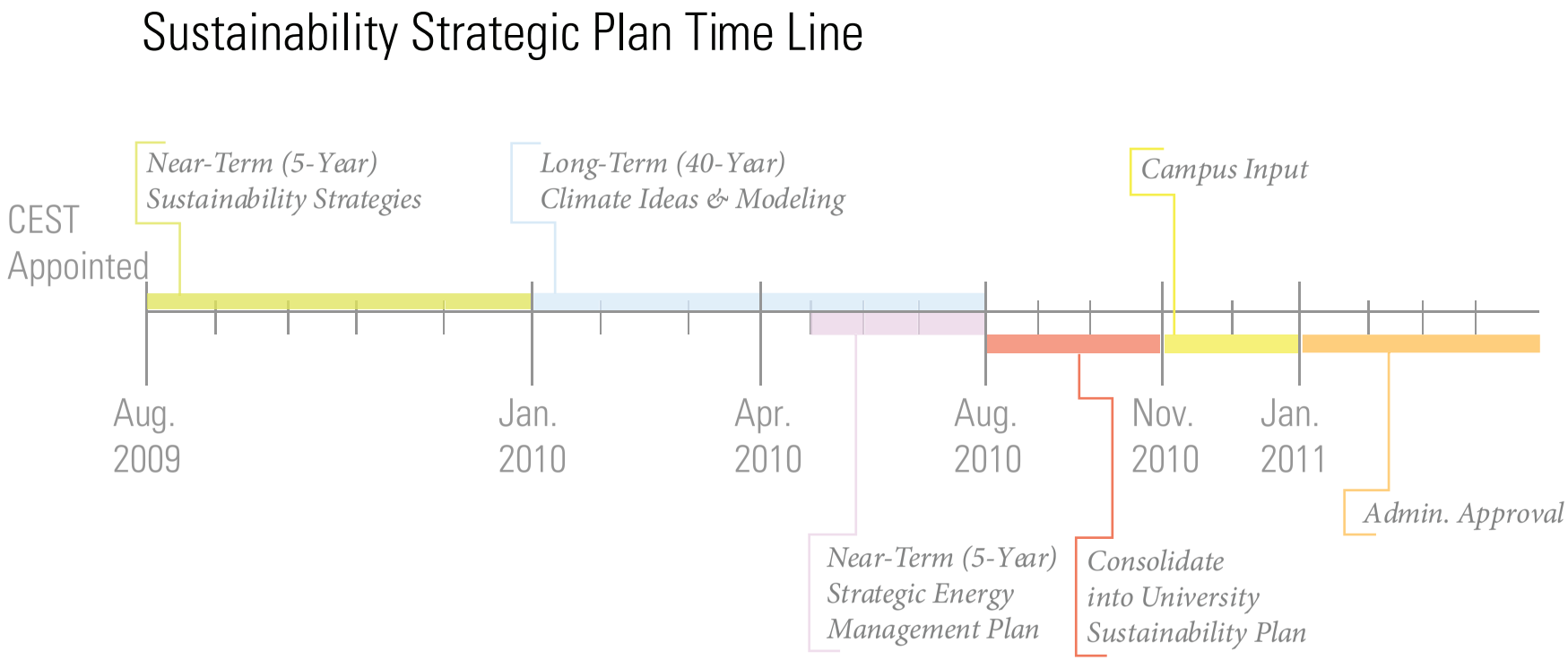

Figure 2

The sequencing of the planning processes and the time line for developing the StrategicSustainability Plan, the CEST guided the three planning efforts that comprise the SSP. Figure 2 displays the sequencing and time line of the planning process.

4.4. *Climate Action Plan*

The goal regarding potential climate impact at NC State University is to achieve climate neutrality by 2050. The first step to achieving neutrality is understanding the potential impact that current and future greenhouse gas (GHG) emissions have. The next step is to lay the groundwork for change by exploring available opportunities. Lastly, is to implement strategies and monitor and measure progress. The purpose of the Climate Action Plan (CAP) is to create a framework and provide supporting information to assist in decision-making. [3]

The 2008 NC State University Greenhouse Gas Inventory establishes the university's GHG baseline and estimates NC State University's GHG emissions to be approximately 270,069 metric tons of Carbon Dioxide equivalence (MTCDE). [4] NC State University's GHG reduction portfolio contains a variety of strategies, which, if implemented, would help lead NC State University towards climate neutrality. The first iteration of the plan focuses on strategies developed for implementation in the near-term, or within five years. The five-year strategies in the CAP could result in approximately a 20% GHG reduction from 2008 levels by 2015. Similar strategies are grouped into categories, which are referred to as wedges. The wedges chosen for the CAP are: green development, energy conservation, fuel mix and renewables, transportation and waste management. The CAP also examines how some of the long-term changes to existing infrastructure might impact the university's emissions.

Photo Credit: Roger Winstead

The collective impact of near-term strategies on the GHG emissions of NC State University through the year 2050 is illustrated in Figure 3. The red line at the top represents the projected GHG emissions in a "business as usual" scenario and shows that the campus's GHG emissions could rise to almost 400,000 MTCDE. The blue line at the bottom represents the university's emissions after abatement. Each of the wedges capture the GHG reduction potential over the next 40 years. Though all of the wedges are equally important, it can be ascertained that the near-term strategies within the 'Energy Conservation' wedge offer the largest opportunity for GHG reduction. In addition, the 'Grid Footprint Change' wedge represents benefits that the university would receive from Progress Energy as they reduce GHG emissions within their energy supply. The dark grey section, 'Future Technologies', represents the remaining GHG emissions NC State University might have to abate in order to reach neutrality by 2050 and acknowledges the important role that future innovations will have in the long term.

NC State University is already making significant GHG reduction headway, and these efforts are moving the university closer to climate neutrality. However, a challenging road lies ahead in order to reach the goal of climate neutrality by 2050. The university must build on successes and continually work to find creative solutions to current and emerging issues.

4.5. *Strategic Energy Management Plan (EMP)*

The five-year Strategic Energy Management Plan provides three perspectives regarding the consumption of energy and water resources on NC State University's campus.[5] First, the EMP provides a historic perspective on NC State's metrics back to a 2002 baseline. Second, the EMP describes current activities to address the five focus areas of data management, demand side and supply side management, conservation, efficiency, and campus involvement. Third, the EMP identifies 41 areas where activities can reduce consumption, reduce cost, and contribute to the university's GHG reduction goals.

The majority of energy use comes in the forms of electricity, natural gas, and fuel oil (Figure 4). State law now mandates significant reductions in energy and water use. Large energy use reductions are necessary for the university to meet mandates at a time of growth in building area, research activity, and in student population. Mandated energy and water reductions with SSP reduction goals are shown in Figures 5 and 6.

A balanced, multi-faceted approach to conservation, reduction, and efficiency is required to demonstrate progress against these goals.

[3] *NC State University Climate Action Plan. December 1, 2010. http://sustainability.ncsu.edu*
[4] *NC State University Greenhouse Gas Inventory. 2008. http://sustainability.ncsu.edu*
[5] *NC State Strategic Management Plan. Energy Management, Utilities and Engineering Services, Facilities Operations. September 17, 2010. http://sustainability.ncsu.edu*

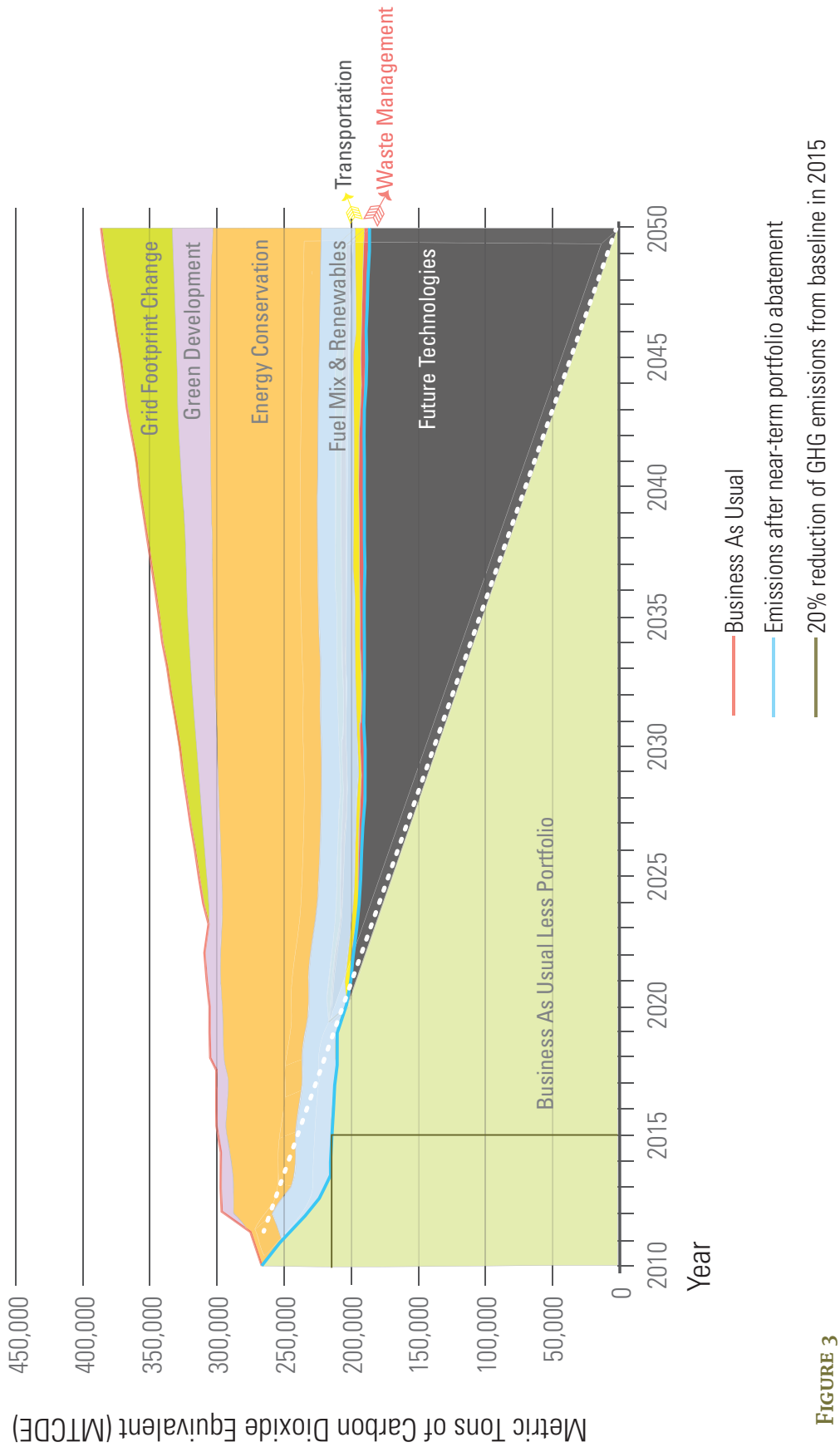

Figure 3
The carbon reduction of the near-term portfolio by wedge through 2050 shows the impact of five-year strategies over the next 40 years.

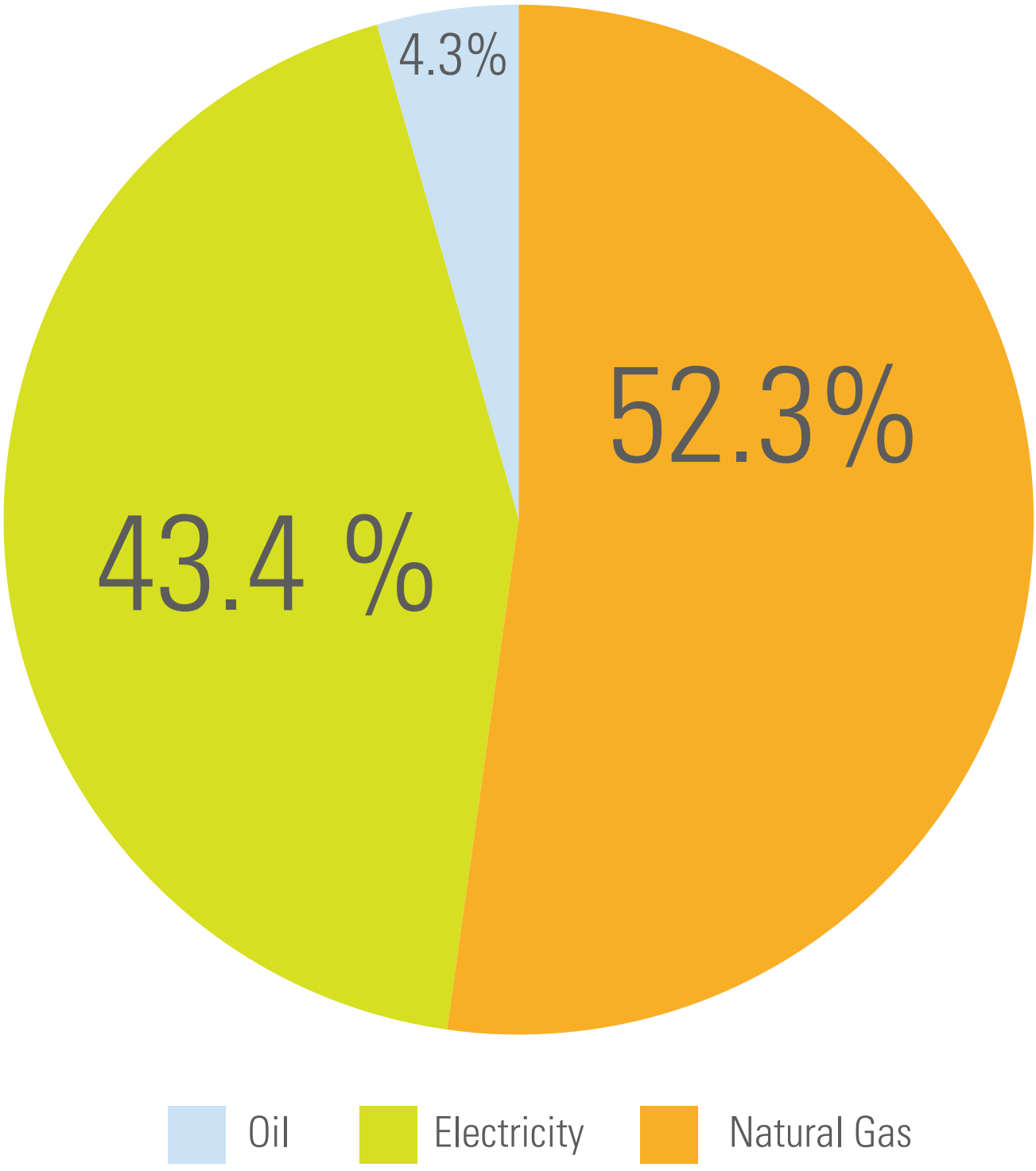

Figure 4
Energy use distribution for 2009-2010

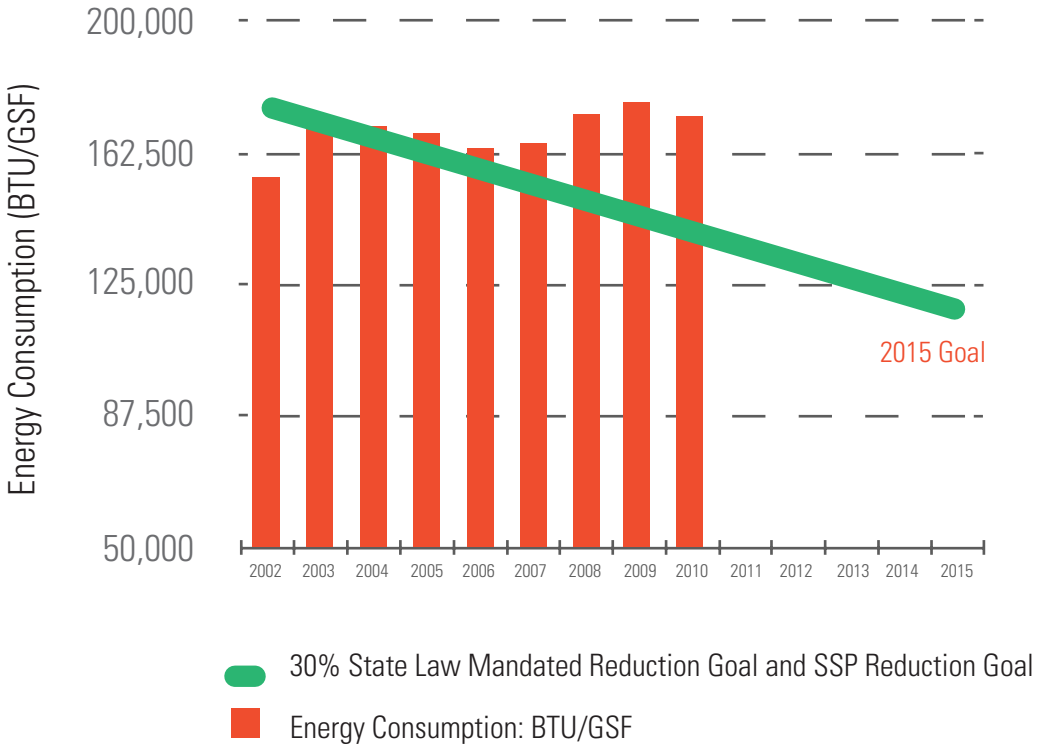

Figure 5

Energy Consumption in British thermal units (BTUs) per gross square foot (GSF) of building space showing the energy consumption decrease needed to meet the 2015 state law levels and the SSP energy reduction goal.

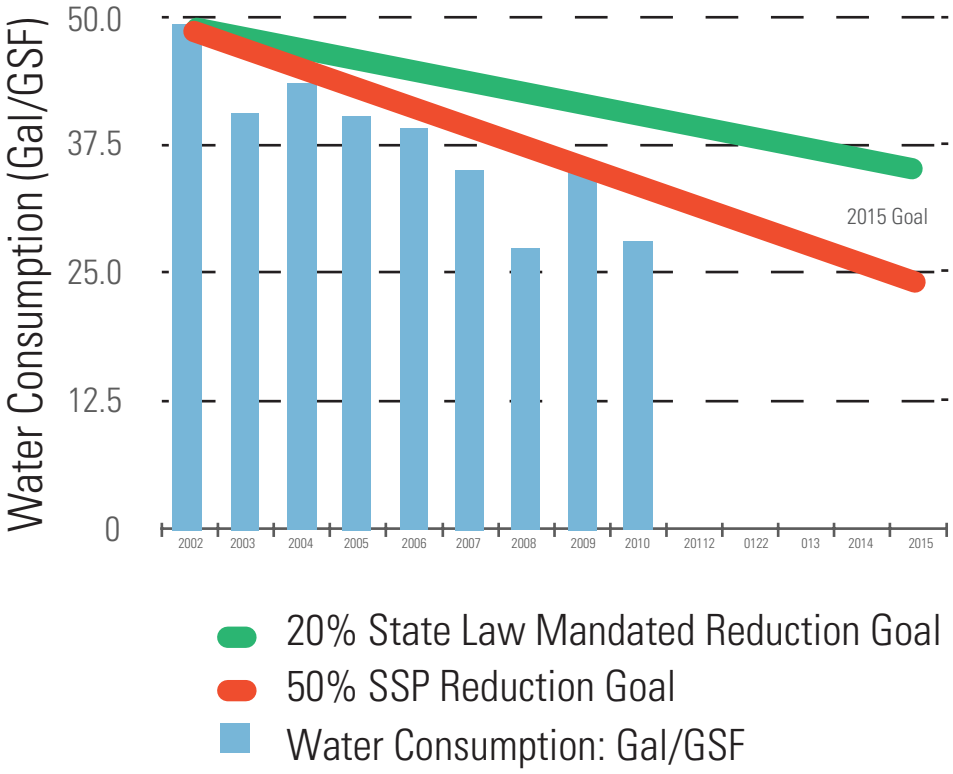

Figure 6

Water consumption in gallons (Gal) per gross square foot (GSF) of building space showing the that the university has met the 2015 state law levels and the levels of reduction needed to achieve the SSP water reduction goal.

5. STRATEGIC GOALS FOR SUSTAINABILITY

The near-term, five-year, strategies to advance sustainability affect all facets of university activity. The strategies in the SSP provide a coordinated approach that encompasses near-term actions of the 40-year Climate Action Plan and the five-year Strategic Energy Management Plan.[6] The organization of the strategies reflects the blending of the Climate Action Plan wedges and the CEST focus areas. The strategies for implementation that follow, reflect a systems view approach to sustainability and will provide real impact toward advancing sustainability.

5.1. *Academics and Research*

1. Develop the scholarship, including the courses, curricula, and research needed for students to become literate about energy, environment, and sustainability.

2. Explore the concepts underlying sustainability in courses and curricula to build the case for sustainable practices.

3. Engage in the discussions for advancing sustainability, to optimize the use of energy, water, buildings, land , transportation, and existing space through participation in the CEST working groups.

4. Use the physical campus as a classroom and research facility to demonstrate and explore sustainability principles and practices.

5. Promote research to advance sustainability including the discovery of new technologies that advance sustainability, securing patents, and employing new workers that align with a new energy economy.

6. Engage faculty researchers in sustainable practices to increase the resource use efficiency of research equipment and spaces needed to conduct state-of-the-art research.

7. Provide opportunities for service learning that bridge education, research, and the practical application of sustainability.

[6] *NC State Strategic Energy Management Plan. Energy Management, Utilities and Engineering Services, Facilities Operations. September 17, 2010. http://sustainability.ncsu.edu*

Photo Credit: Roger Winstead

5.2. *Engaging the Community*

1. Adopt, promote, and adhere to a sustainability policy.

2. Report sustainability information on a national scale to work towards becoming a national leader in sustainability.

3. Support opportunities to obtain funding for sustainability including grants, university campaigns, a student fee, and seed money.

4. Implement a comprehensive sustainability education and awareness program, which utilizes peer-to-peer networks.

5. Create a network among the local sustainability community that includes universities, governments, corporations, and non-profits.

6. Grow the Campus Environmental Sustainability Team as a cross-campus team of faculty, staff, student, and community members engaged in campus sustainability.

7. Establish annual campus events to imbed sustainability as a part of the campus culture

8. Create incentives and provide recognitions and rewards to promote sustainability across campus.

5.3. *Energy and Water Conservation*

1. Achieve a 30% reduction in building energy consumption by 2015 against the 2003 baseline.

2. Achieve a 50% reduction in building water consumption by 2015 against the 2002 baseline.

3. Improve energy data management capabilities and make data-driven decisions utilizing enhanced energy data.

4. Train and educate staff and building end-users to properly operate and maintain building systems in an energy efficient manner.

5. Ensure a cost-effective and reliable energy supply by developing business scenarios and strategies for diversifying fuel sources.

6. Evaluate utility financial structures that create incentives for saving energy.

7. Implement green standards and practices for information technology and computing.

5.4. *Green Development*

1. Update the Campus Physical Master Plan to integrate and coordinate transportation, land use, utilities, buildings, and storm water planning.

2. Adopt a sustainability vision statement and include it as part of the scope statement for all major building projects.

3. Integrate sustainable strategies for all new construction and renovation projects including publicly owned, privately owned, and leased or partnership properties.

4. Exceed NC State's established minimum commitment to achieve LEED silver certification.

5. Give priority to holistic building and property modifications that maximize efficient and effective resource use.

6. Design new buildings and utilize existing facilities as long-term resources through adherence to life cycle cost evaluations and total cost of ownership analysis.

7. Enhance utilization and management of campus and building space to increase efficiency and to reduce the need for new construction.

8. Create pedestrian-friendly, mixed-use neighborhoods to reduce the distance between necessary services and to avoid single occupant vehicle use.

9. Increase the acreage of campus open spaces.

10. Increase the percentage of undergraduate students living on campus to reduce transportation needs and to enhance retention.

11. Create and administer a Storm Water Master Plan for campus in conjunction with the NC State Storm Water Programs and the comprehensive Campus Master Plan

12. Improve and enhance campus open spaces, natural areas, and habitats.

13. Create and implement a tree conservation plan for each urban campus precinct.

14. Develop a land management plan for Lake Raleigh Woods.

15. Employ best practices for sustainable operation of campus buildings and grounds such as integrated pest management, biodiversity, green cleaning, composting, recycling, and water reuse.

5.5. *Purchasing and Waste Reduction*

1. Instill the values of total cost of ownership and total life cycle cost in purchasing and decision-making.

2. Achieve a 60% landfill diversion rate by 2015.

3. Implement source reduction and environmentally-preferable purchasing initiatives to decrease waste before it occurs.

4. Promote the purchase of environmentally-and socially- responsible materials.

5. Implement sustainable purchasing guidelines in accordance with the sustainability policy .

6. Develop a program to capture, compost, and utilize organic waste.

7. Enhance the outdoor recycling program to capture additional recyclable materials and remove them from the waste stream.

8. Optimize waste and recycling collection concepts and practices to streamline services, improve capacity, and increase operational efficiencies, and improve customer service.

9. Achieve a 10% increase in local and organic food purchases and track progress against the 2010 baseline.

5.6. *Transportation*

1. Develop a long-term campus vision addressing alternative transportation, parking, campus connectivity, and congestion in coordination with the comprehensive Campus Master Plan.

2. Reduce the consumption of, and demand, for petroleum products in the university fleet.

3. Increase alternative fuel and low-emitting vehicles in the university motor pool and departmental fleets.

4. Reduce single occupancy vehicle trips to, from, and around campus.

5. Reduce traffic congestion on campus thoroughfares.

6. Integrate infrastructure and programs that promote additional bicycling and pedestrian trips between and among campuses.

7. Promote and increase use of the Wolfline, Triangle Transit, and Capital Area Transit services to campus, integrating operating schedules and coordinating transfers to and from Wolfline bus routes wherever possible.

8. Develop sustainable parking policies that reduce or limit parking requirements to reduce commuting and single occupancy vehicle trips.

9. Develop and promote free and low-cost campus perimeter parking facilities geared towards commuters.

10. Evaluate permit pricing and parking space/access incentives for expanding the number of Low Emitting Vehicles (LEV) brought to campus.

11. Develop and promote communications technology such as teleconferencing and video conferencing to reduce the need for travel.

6. PLAN IMPLEMENTATION & REPORTING PROGRESS

The SSP is a living document that will change and evolve over time. To implement the plan, CEST and working groups will create a Sustainability Tactical Plan for achieving the strategies. Working groups will be providing detailed information on each strategy such as:

- **Responsible units/departments for implementation**
- **Performance metrics that indicate the direction of the strategy**
- **Position for regular tracking of the strategy**
- **Major tactical steps to implement the strategy**

Each major tactic will have additional information including:

- **Position responsible for coordinating the implementation of the tactic**
- **Milestones that indicate if the tactic is on track**
- **Tools and needs to make the tactic successful (policies, overcoming specific barriers, additional staff, new funds, other)**

The SSP and the accompanying Tactical Plan will be reviewed annually and on a five-year, formal review cycle. To coordinate the SSP implementation, the CEST will continue to meet on a monthly basis. The CEST working groups will continue to welcome new participants and meet as needed. The University Sustainability Office will support the CEST in monitoring and implementing these plans.

The university's Annual Sustainability Report, coordinated by the University Sustainability Office, will evolve into the NC State University State of Sustainability, which will be published annually and report progress on the Strategic Sustainability Plan, as well as ongoing campus projects. In addition, NC State University will continue to establish and track metrics and report the university's status nationally.

Appendices

A. Contributors

Thank you to the over 150 students, faculty members, staff members, and community partners that helped make this planning process a success. The individuals represent approximately 65 campus and community departments and units that participated in the process. Individuals participated by commenting on a select piece of or the entire SSP. Below are the campus and community members who contributed to the planning processes.

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B. SUSTAINABILITY LAWS & COMMITMENTS APPLICABLE TO NC STATE

State of North Carolina Laws

Executive Order 156 - State Government Environmental Sustainability

Reduction of solid waste, and procurement of environmentally preferable products. Set goal of diverting 40% of solid waste from the landfill. Requires annual reporting of solid waste and recycling rates to the NC Division of Pollution Prevention and Environmental Assistance.
www.p2pays.org/ref/03/02221.pdf

NC General Statute 130A-309.14 – Collection of Recycling

Requires state agencies to establish a program for the collection of all recyclable materials generated in state offices throughout North Carolina.
http://www.ncga.state.nc.us/enactedlegislation/statutes/html/bysection/chapter_130a/gs_130a-309.14.html

NC General Statute 130A-309.10 – Landfill Bans

Bans the following items from disposal in landfills: used oil, yard waste, white goods, antifreeze (ethylene glycol), aluminum cans, whole scrap tires, lead-acid batteries, beverage containers, Motor vehicle oil filters, recyclable rigid plastic containers that have a neck smaller than the body of the container, and that accept a screw top, snap cap, or other closure, wooden pallets, and oyster shells
http://www.ncleg.net/EnactedLegislation/Statutes/HTML/BySection/Chapter_130A/GS_130A-309.10.html

NC General Statute 143-64 (Senate Bill 668) - Energy Conservation in State Buildings

States energy consumption in all existing State buildings will be reduced by 20% by the year 2010, and 30% by the 2015 relative to fiscal year 2002-03. All new State buildings will be 30% more efficient than ASHRAE standard 90.1-2004. All State agencies will develop a comprehensive plan to manage and report their utilities each fiscal year to the State Energy Office and Department of Administration. New water systems shall be designed and constructed to use a minimum of 20% less potable water than indoor water use baseline calculated for the building after meeting the fixture performance requirements by the 2006 North Carolina Plumbing Code.
http://www.ncleg.net/Sessions/2007/Bills/Senate/HTML/S668v6.html

NC Session Law 2005-276 – Petroleum Reduction

States a 20% petroleum reduction by Jan 1, 2010
www.ncleg.net/Sessions/2005/Bills/Senate

NC Session Law 2010-196 (HB1292)

Provides energy savings realized by constituent institutions of the University of North Carolina institutions shall remain available to the institution and a portion of those energy savings shall be use for other energy conservation measures
http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1292v6.pdf

University of North Carolina General Administration Policies

UNC General Administration Sustainability Policy 600.61
Calls for action in the areas of master planning, design and construction, operations and maintenance, climate change mitigation and renewable energy, transportation, recycling and waste management, and environmentally preferable purchasing.
http://www.northcarolina.edu/policy/index.php?pg=vs&id=5606

NC State University Commitments

American College and University Presidents Climate Commitment
Commitments NC State to working toward climate neutrality
www.presidentsclimatecommitment.org/

LEED Silver buildings
Commitments all new NC State construction and major renovations over 20,000 square feet will be a minimum of LEED silver certified
www.usgbc.org

Energy Star Partnership
Encourages purchase of Energy Star equipment and appliances
www.energystar.gov/index.cfm?c=partners.pt_index

NC State Guiding Documents Impacting Sustainability

Physical Master Plan
www.ncsu.edu/facilities/physical_master_plan/index.htm

Campus Life Master Plan
www.ncsu.edu/facilities/publications/master_planning_studies/pdfs

Centennial Master Plan
www.centennial.ncsu.edu/masterPlan/index.html

Design and Construction Guidelines
www.ncsu.edu/facilities/con_guidelines/

NC State Commitment to Environmental Sustainability (May 1999)
www.ncsu.edu/sustainability/history.php

2006 Campus Environmental Sustainability Assessment
www.ncsu.edu/sustainability/publications.php

2008 NC State University Greenhouse Gas Inventory
http://www.ncsu.edu/sustainability/publications.php

NC State University Climate Action Plan
http://www.ncsu.edu/sustainability/strategicplan.php

NC State University Strategic Energy Management Plan
http://www.ncsu.edu/sustainability/strategicplan.php

C. CAMPUS INPUT ORGANIZATIONS & PROMOTION

To gain additional input, the CEST presented the SSP to the nearly 30 campus organizations noted below. Throughout the campus input process, the draft SSP was available online for comment. To reach a diverse group of campus constituencies, two open town hall sessions were held in person with live streaming available; one sponsored by the CEST and Student Government and the second sponsored by the CEST, Faculty Senate, and Staff Senate. Both town halls were recorded and posted online for those unable to attend a group presentation or town hall.

Additional means of encouraging input into the draft SSP included announcements in the Technician, on Facebook, Twitter, WKNC and campus LCD screens, and utilizing campus email lists. Tabling stations were set up in key campus areas such as the Brickyard and Talley Student Center during high traffic times.

Organizations to which the SSP was presented:

- Alumni Relations
- Buildings and Properties Committee, Board of Trustees
- Campus Activities
- Campus Communicators
- Campus Enterprises
- Energy Council
- Environmental Health and Safety
- ES 200 – Climate Change and Sustainability course
- Executive Officers
- Facilities Operations
- Facilities Team Leadership
- Faculty Senate
- Finance and Audit Committee, Board of Trustees
- Finance and Business
- Forestry and Environmental Resources
- Human Resources Connections
- Inter-Residence Council
- Libraries
- NC Solar Center
- Office of Information Technology
- Physical Environment Committee
- Staff Senate
- Student Affairs
- Student Health
- Town Hall – Centennial Campus (sponsored by the CEST, Faculty Senate, and Staff Senate)
- Town Hall – Central Campus (sponsored by the CEST and Student Government)
- University Council
- University Dining
- University Housing
- Utilities and Engineering

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EQUAL OPPORTUNITY STATEMENT

NC State University is dedicated to equality of opportunity. The University does not condone discrimination against students, employees or applicants in any form. NC State commits itself to positive action to secure equal opportunity regardless of race, color, creed, national origin, religion, sex, age or disability. In addition, NC State welcomes all persons without regard to sexual orientation.