Climate Action Plan 2012

FAYETTEVILLE STATE UNIVERSITY

A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA

JUNE 2012
TABLE OF CONTENTS

CONTENTS

Executive summary .................................................................................................................. 1
Introduction ............................................................................................................................... 2
Greenhouse gas emissions ....................................................................................................... 4
  Business-as-usual forecasting .............................................................................................. 8
  Goal setting .......................................................................................................................... 8
  Demand side reduction strategies ....................................................................................... 9
  Supply side reduction strategies ......................................................................................... 9
  Offset strategies .................................................................................................................. 10
Conclusions ............................................................................................................................ 12

FIGURES

Figure 1 | FY 2009 GHG Emissions by Source Type
Figure 2 | FY 2011 GHG Emissions by Source Type
Figure 3 | Business-as-Usual Emissions Projections
Figure 4 | Stabilization Wedge Diagram

TABLES

Table 1 | Summary of GHG Emissions
Table 2 | Summary of Proposed Energy Conservation Measures
This Climate Action Plan (CAP) was developed as part of Fayetteville State University’s (FSU’s) participation in the American College & University Presidents’ Climate Commitment (ACUPCC). It will serve as an action plan to reduce FSU’s greenhouse gas (GHG) emissions. We have made sustainability a core value of our institutional operations and planning, capital construction and purchasing practices. We have organized our sustainability plan and initiatives into eight primary categories which are in alignment with other existing strategic planning and operations documents:

- Systematic integration of sustainability principles
- Master planning
- Design and construction
- Operations and maintenance
- Climate change mitigation and renewable energy
- Transportation
- Recycling and waste management
- Environmentally preferable purchasing

This CAP will serve as a roadmap to guide the development and implementation of FSU’s sustainability initiatives. **FSU has adopted a climate neutrality (no net GHG emissions) target date of 2050**, which is aligned with the target date adopted in the 2009 University of North Carolina (UNC) system-wide sustainability policy. **In addition, FSU has established an interim goal of total net GHG emissions of 25,000 metric tons of carbon dioxide equivalent (MTCO$_2$E) by 2025**, which would represent a reduction of 17,000 MTCO$_2$E (40%) from the “business as usual” forecast, and 4,000 MTCO$_2$E (14%) from FY 2009 emissions.

FSU will utilize a portfolio of strategies to mitigate its GHG emissions. FSU has implemented the stabilization wedges approach, which is used to sub-divide GHG emission reductions into small, actionable components. For the purposes of this CAP, FSU has focused on energy conservation measures (ECMs) and behavior change actions as the primary actionable components to begin the trend toward climate neutrality through 2025. Future projects (2025 and beyond) will be governed by priorities established through future cost-benefit analyses, emergence of new and improved technologies, and future funding opportunities. The framework of FSU’s CAP is aligned with our Strategic Plan 2009-2014, and comprises four guiding commitments:

- Energy and climate
- Education and awareness
- Diversity and opportunity
- Communication and engagement

Through the implementation of this CAP, FSU will be a sustainability leader in the community by addressing the social, environmental, and economic challenges of a global society, and live up to the ACUPCC commitment by “providing students with the knowledge and skills needed to address the critical, systemic challenges faced by the world in this new century and enable them to benefit from the economic opportunities that will arise as a result of solutions they develop.”
Fayetteville State University (FSU) is committed to being a responsible environmental steward and manager of energy, water and other natural resources within the University’s control. FSU is also obligated to comply with all applicable local, state, and federal environmental laws and regulations. We have incorporated sustainability into our strategic plan. FSU became a signatory to the American College and University Presidents’ Climate Commitment (ACUPCC), committing to “modeling ways to minimize global warming emissions, and by providing the knowledge and the educated graduates to achieve climate neutrality.”

The following documents define the framework for FSU’s Climate Action Plan (CAP) required under the ACUPCC, and provide guidance and direction for the University as plans are made and strategies are implemented to reach our year 2050 climate neutrality goal:

- State of North Carolina- Executive Order 156 (1996, Governor Hunt)
- UNC System-Wide Sustainability Policy (2009)
- FSU’s Strategic Plan (2009)
- Signatory of the President’s Climate Commitment (2010)
- FSU’s Annual Strategic Energy & Water Plan (2011)
- FSU’s Sustainability Policy (2011)

The Chancellor appointed a group of FSU administrators, faculty, staff and students to serve on FSU’s Sustainability Coalition. The Coalition is responsible for oversight and evaluation of campus-wide sustainability initiatives. The Coalition includes a Steering Committee, which is responsible for managing and implementing campus-wide sustainability goals, including the CAP. The Steering Committee provides an annual report to the Sustainability Coalition, the Chancellor’s Cabinet and the Chancellor on the progress made in meeting the University’s sustainability goals. The key staff members responsible for the University’s sustainability initiatives are the Sustainability Officer, Sustainability Coordinator and Energy Manager.
This CAP has been developed within the approved ACUPCC timeline and includes:

- A target date for achieving climate neutrality
- Interim targets for goals and actions that will lead to climate neutrality
- Actions to make sustainability a part of the curriculum and educational experience for all students
- Actions to expand research or other efforts necessary to achieve climate neutrality and,
- Mechanisms for tracking progress on goals and actions.

Our sustainability efforts to date have been focused on building design and construction standards, operations and maintenance, transportation, waste management and recycling and community awareness. We have established the following guiding commitments, which are aligned with FSU’s Strategic Plan (2009-2014).

![Guiding Commitments Diagram]

These guiding commitments are intended to integrate sustainability into the cultural fabric of FSU. As discussed in the following sections, our guiding commitments include goals and objectives that describe what the University intends to do, and metrics that measure our progress and provide opportunities to make adaptive changes.
As described on its website, the ACUPCC is “a high-visibility effort to address global warming by garnering institutional commitments to neutralize greenhouse gas (GHG) emissions, and to accelerate the research and educational efforts of higher education to equip society to re-stabilize the earth’s climate.” Presidents of institutions signing the commitment are pledging to eliminate, over time, the GHG emissions on their campuses. This involves:

- Completing an initial GHG emissions inventory within 1 year of signature, and updating the inventory every other year thereafter
- Setting a target date and interim milestones to become climate neutral within 2 years of signature
- Taking immediate steps to reduce GHG emissions by implementing several short-term actions from a list provided in the ACUPCC Implementation Guidance
- Integrating sustainability into the curriculum and making it part of the educational experience
- Making the GHG inventory, this CAP, and progress reports publicly available
- Defining long term goals for climate action
- Evaluating an institution’s projected future climate impact
- Achieving carbon neutrality through the identification and prioritization of emission reduction projects and development of mechanisms to track progress

BASELINE GHG EMISSIONS AND TRENDS

FSU signed the ACUPCC in April 2010, and submitted its baseline GHG emissions inventory for fiscal year (FY) 2009 in May 2011. Development of the GHG baseline inventory was based on the organizational boundary of the university and includes emissions sources that are under its operational control. Specifically, FSU reports GHG emissions from sources that are metered or measured by the campus and for which future emission reductions actions can be implemented.

The baseline inventory is an integrated measure of FSU’s institution-wide energy and resource usage. The primary purpose of the baseline inventory is to establish a benchmark against which future progress towards carbon neutrality can be measured, and to help establish priorities with regards to the primary emission sources responsible for the majority of FSU’s emissions. FSU updated its GHG emission inventory for FY 2011, and intends to conduct biennial updates thereafter, to check progress and implement adaptive changes, as necessary.
Table 1 | Summary of GHG Emissions

<table>
<thead>
<tr>
<th>Scope Source</th>
<th>FY 2009</th>
<th>FY 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope 1 Emissions (MTCO(_2)E)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stationary Sources</td>
<td>4,059</td>
<td>4,094</td>
</tr>
<tr>
<td>Mobile Sources</td>
<td>146</td>
<td>142</td>
</tr>
<tr>
<td>Fugitive and Process Sources</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>Agriculture Sources</td>
<td>0.1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Gross Scope 1 Emissions</strong></td>
<td>4,285</td>
<td>4,291</td>
</tr>
<tr>
<td><strong>Scope 2 Emissions (MTCO(_2)E)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchased Electricity</td>
<td>14,911</td>
<td>14,924</td>
</tr>
<tr>
<td><strong>Total Gross Scope 2 Emissions</strong></td>
<td>14,911</td>
<td>14,924</td>
</tr>
<tr>
<td><strong>Scope 3 Emissions (MTCO(_2)E)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty/Staff Commuting</td>
<td>1,371</td>
<td>1,279</td>
</tr>
<tr>
<td>Student Commuting</td>
<td>5,642</td>
<td>4,899</td>
</tr>
<tr>
<td>Air Travel</td>
<td>1,272</td>
<td>884</td>
</tr>
<tr>
<td>Other Directly Financed Travel</td>
<td>41</td>
<td>89</td>
</tr>
<tr>
<td>Solid Waste</td>
<td>141</td>
<td>104</td>
</tr>
<tr>
<td><strong>Scope 2 Transmission &amp; Distribution (T&amp;D) Losses</strong></td>
<td>1,475</td>
<td>1,476</td>
</tr>
<tr>
<td><strong>Total Gross Scope 3 Emissions</strong></td>
<td>9,943</td>
<td>8,730</td>
</tr>
<tr>
<td><strong>Total Gross Emissions</strong></td>
<td>29,138</td>
<td>27,945</td>
</tr>
<tr>
<td><strong>Gross Square Footage (GSF)</strong></td>
<td>1,434,244</td>
<td>1,530,321</td>
</tr>
<tr>
<td><strong>Scope 1-3 Gross Emissions (MTCO(_2)E)</strong></td>
<td>5,382</td>
<td>5,116</td>
</tr>
<tr>
<td><strong>Total Gross Emission Intensity/1000 GSF</strong></td>
<td>20.3</td>
<td>18.3</td>
</tr>
<tr>
<td>Total Gross Emission Intensity/FTE</td>
<td>5.4</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Scope 1-3 Net Emissions (MTCO(_2)E)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchased Offsets</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Carbon Sequestration</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Net Emissions</strong></td>
<td>29,138</td>
<td>27,945</td>
</tr>
<tr>
<td><strong>Total Net Emission Intensity/1000 GSF</strong></td>
<td>20.3</td>
<td>18.3</td>
</tr>
<tr>
<td><strong>Total Net Emission Intensity/FTE</strong></td>
<td>5.4</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Note: The total gross and net emissions may vary slightly from the sum of individual emissions sources due to rounding. As indicated in the table, our total gross emissions from FY 2009 to FY 2011 decreased by approximately 1,200 MTCO\(_2\)E while the gross square footage on campus increased by approximately 100,000 GSF during that same period of time.

Four sources collectively account for approximately 90% of total emissions at FSU:

- Purchased electricity
- Stationary sources of combustion (e.g., boiler, generators, and hot water heaters)
- Student commuting
- Faculty/staff commuting

FSU’s FY 2009 and FY 2011 GHG emission inventories are publicly available on its [sustainability webpage](#), as well as the [ACUPCC reporting website](#). The emissions inventory results are presented graphically (broken down by emission source) for both inventories below as [Figures 1 and 2](#).
GREENHOUSE GAS EMISSIONS

**Figure 1: FY 2009 GHG Emissions (MTCO\textsubscript{2}E) by Source Type**

**Figure 2: FY 2011 GHG Emissions (MTCO\textsubscript{2}E) by Source Type**
FSU’s GHG emissions in FY 2011 are slightly lower than FY 2009. Of particular note is the decrease in emissions intensity from 20.3 MTCO$_2$E per 1,000 gross square foot (GSF) of building space in FY 2009 to 18.3 MTCO$_2$E in FY 2011. This trend indicates that the campus will likely move towards becoming more energy efficient as older buildings are replaced or renovated and newer more efficient buildings are constructed. In other words, our current building energy efficiency and conservation measures are working!

For reference, U.S. master’s colleges and universities’ average emissions per 1,000 GSF is 16.4, and the average emissions per full-time equivalent student (FTE) is 4.7 (FSU’s was 5.5 in FY 2011). Both emissions intensity metrics are improving and trending downward towards our peer group average.

**BUSINESS-AS-USUAL FORECASTING**

A primary objective of this CAP is to shift FSU from a “business-as-usual” (BAU) trajectory of increasing carbon emissions to a trajectory of decreasing emissions and carbon neutrality. Our BAU trajectory for FY 2009 thru FY 2050 is shown in Figure 3.

We used existing planning data projections for new building construction [Source: FSU’s Business & Finance and Facilities Management’s Campus Master Plan, Six-Year Appropriated and Non-Appropriated Capital Improvement Projects Plans and Allocations from the Repairs and Renovations Lists] and FTE student enrollment growth [Source: FSU’s Enrollment Management’s 10-Year Student Enrollment Projections] to forecast future GHG emissions. We layered FSU’s plans for campus expansion (through 2018) and enrollment growth (through 2021) onto our baseline GHG emissions. The forecasting period began with baseline year FY 2009 and applied baseline year emissions intensities to the projected planning data in future years. Beyond the near-term projections, we assumed linear growth to 3,000,000 GSF of building space and 12,000 FTE students in 2050. **Figure 3** shows FSU’s forecasted BAU emissions to be approximately 60,000 MTCO$_2$E by 2050.
GOAL SETTING

The CAP includes both long-term and interim goals that will serve as the basis for future emission reduction strategic planning. The following factors were considered when developing CAP goals:

- The emission reductions we will seek over varying time increments (e.g., by 2025, by 2050)
- The financial performance FSU will require (e.g. returns on investment in emission reduction initiatives)
- Critical facilities needs must be integrated with emission reduction goals (e.g. facility design, use, innovation)
- Essential academic goals are interwoven with FSU’s climate action steps (an element of Climate Action Planning recommended by the ACUPCC)
- Short-term process goals we will measure (e.g. the formation of action teams, the development of new academic programs) during the early years of the CAP when emission reduction initiatives will just be getting underway

FSU has targeted carbon neutrality by 2050, with an interim goal of total net GHG emissions of 25,000 MTCO₂E by 2025.
FSU will utilize a portfolio of strategies to mitigate its GHG emissions. FSU has implemented the stabilization wedges approach, which is used to sub-divide GHG emission reductions into small, actionable components. For the purposes of this CAP, FSU has focused on energy conservation measures (ECM’s) and behavior change actions as the primary actionable components to begin the trend toward climate neutrality through 2025. Future projects (2025 and beyond) will be governed by priorities established through future cost-benefit analyses, emergence of new and improved technologies, and future funding opportunities.

This CAP is aligned with FSU’s Strategic Energy and Water Plan, which is updated annually. The goals and objectives of the FY 2012 Annual Strategic Energy and Water Plan are:

1. Create organizational culture change for energy and water efficiency and conservation
   a. Educate the campus community about energy and water conservation and efficiency
   b. Create committees/groups and convene them regularly to champion culture change
   c. Host events both on and off campus to raise awareness and engage participants
2. Reduce campus energy and water consumption
   a. All new construction and major renovations are LEED-certified silver or equivalent
   b. Include building commissioning in all new construction and major renovation projects
   c. Identify ECMs to implement in facilities and operations
3. Reduce utility expenses by working with utility providers on rates, incentives and other strategies
   a. Ensure utility rates schedules are appropriate and billing is accurate
   b. Identify and participate in utility incentive programs
   c. Sub-meter campus facilities to inform strategies to reduce utility expenses

FSU’s emission reduction strategies can be grouped into three broad categories:

DEMAND SIDE REDUCTION STRATEGIES

Our GHG emissions are primarily generated by our use of electricity and natural gas to heat, cool and power FSU facilities and operations. Demand side strategies include applying changes in existing technologies and applications of new alternative technologies to reduce emissions. Changes in behavior and operational practices also play a major role in our demand side approach to reducing emissions.

SUPPLY SIDE REDUCTION STRATEGIES

The ACUPCC recognizes emissions generated by others to supply the needs of FSU’s facilities and operations. These supply side reduction strategies are focused on utilizing alternate fuels and power generation technologies. The Energy Manager is currently investigating third-party funded renewable energy projects – primarily solar domestic hot water and solar electric applications for university facilities.
OFFSET STRATEGIES

Though not currently under consideration for the purposes of this CAP, offsets [e.g., the purchase of renewable energy certificates generated by external GHG emission reduction projects] are an option available to achieve carbon neutrality. FSU may consider this strategy in future CAP updates.

Table 2 | Summary of ECMs Incorporated in FSU’s CAP

<table>
<thead>
<tr>
<th>ECM Designation</th>
<th>ECM Description</th>
<th>Comment</th>
</tr>
</thead>
</table>
| ECM-1: Student, Faculty/Staff Commuting Improvements | Promote and incentivize changes in FSU student, faculty/staff commuting habits | ■ 3% reduction in transportation mileage  
■ Savings applies to all students, faculty/staff  
■ Savings ramp up from 1.5% (2014) to 3% for students (2015) and to 5% for faculty/staff (2015) |
| ECM-2: LEED Building Standard | New buildings are a minimum of LEED-NB “Silver” rating | ■ 20% electrical and natural gas savings  
■ Savings applies only to projected new building space starting 2013 |
| ECM-3: Behavior Changes | Policy and behavior changes to reduce energy use in FSU facilities | ■ 10% electrical and natural gas savings  
■ Savings applied to all buildings starting in 2012  
■ Savings ramp up from 3% (2012) to 10% (2015) |
| ECM-4: FSU Performance Contract (PC) Program | Energy saving upgrades in existing buildings | ■ 15% electrical and natural gas savings  
■ Upgrades applied to 900,000 SF of FSU facilities  
■ Savings begin in 2014 |
| ECM-5: UNC-GA Performance Contract | UNC system-wide PC program to upgrade campus lighting. | ■ 20% savings of lighting system electrical  
■ Upgrades applied to 370,000 SF of FSU facilities  
■ Savings begin in 2014 |
| ECM-6: Continuous Re-Commissioning Program | Re-commission facilities to maintain efficiency as use and occupancy changes | ■ 10% electrical and natural gas savings  
■ Re-commission 10% of campus GSF annually  
■ Savings begin in 2016 following PC programs |
| ECM-7: Solar Photovoltaic (PV) Systems | Installation of solar PV systems to replace carbon fuel-generated electricity | ■ 1:1 offset of utility-generated electric emissions  
■ PV array area equal to 20% of campus GSF  
■ PV arrays ramp from 10% (2015) to 20% (2017) |
| ECM-8: Improved Space Utilization and Building Scheduling | Improve space utilization and scheduling to allow extended setback of building systems during non-occupied periods | ■ 12% electrical and natural gas savings  
■ Savings apply to all buildings  
■ Savings ramp up from 3% (2014) to 12% (2017) |
Figure 4 shows the impact of the ECM’s listed in Table 2 above. FSU emissions in 2025 are projected to be below 2009 levels. Based on the results shown in Figure 4, we have established an interim goal of 25,000 MTCO₂E by 2025, which represents a 17,000 MTCO₂E (40%) reduction from the BAU 2025 forecast and 4,000 MTCO₂E (14%) reduction from 2009.
Our approach in FSU’s initial CAP has been to focus on near-term (2025) projects and strategies where we have some measure of control, while doing our best to identify the scope and scale of the long-term challenge facing FSU to reach its carbon neutrality goal by 2050. In order to reach that goal, the University will need the cooperation of local and regional partners on a number of strategies listed below. We offer the following conclusions to the reader based on our work in March, April and May of 2012:

- Future technical breakthroughs in building system energy efficiency and renewable energy generation may contribute to further emission reductions – both near-term and long-term.
- Some combination of green power purchases and carbon-offset purchases may be required in the long-term to reach carbon neutrality.
- As the near-term building efficiency and behavioral change emission reductions are realized, emissions from faculty, staff, and student commuting will become a larger percentage of the remaining FSU emissions. These transportation emission reductions will likely require a mix of long term strategies and support from local partnerships:
  - Improved public transit in the communities surrounding FSU
  - Provision of other alternative transportation options (e.g., carpool/ride-share, bike/pedestrian trails)
  - Policy changes that expand tele-commuting options for faculty and staff
  - Increasing utilization of on-line instruction delivery
  - Improvements in average fuel efficiency of the petroleum-fueled U.S. vehicle fleet
  - Increased use of plug-in electric vehicles by FSU commuters

ACKNOWLEDGEMENTS

This Plan is endorsed by FSU Chancellor James A. Anderson, the Cabinet and Senior Administrators, the Sustainability Coalition and was a collaborative effort between the following FSU Stakeholders:

- Rudolph Cardenas, AIA, NCIDQ, Sustainability Officer and AVC for Facilities Management
- Jay Blauser, LEED Green Associate, Sustainability Coordinator
- Jon Parsons, PE, PEM, Energy Manager
- Members from the Offices of Academic Affairs and Enrollment Management

And the following consultants with O’Brien & Gere:

- Aniket Sawant, PhD, Senior Scientist
- John Boneberg, PE, LEED AP, Senior Project Manager
- Mark Wenclawiak, CCM, Project Manager
FSU’s LEED Silver Certified Science and Technology Building

A CONSTITUENT INSTITUTION OF THE UNIVERSITY OF NORTH CAROLINA

JUNE 2012