Three Zeros Environmental Initiative
Getting to Zero Forum

April 18, 2018
ABOUT UNC

CHANCELLOR FOLT’S VISION

Reinvent the great, global, public research university.
STRATEGIC SUSTAINABILITY PLAN

Lead Facilitator and Planner

THREE ZEROS ENVIRONMENTAL INITIATIVE
Technical and Engagement Lead

COMPREHENSIVE MASTERPLAN
Energy, Water, Waste Infrastructure
Three Zero Goals with Milestones:

- Zero Water
  - Net Zero Water Usage
- Zero Waste
  - Zero Waste to Landfills
- Zero GHG
  - Net Zero GHG Emissions

**Categories**

- Buildings
- Infrastructure
- Operations

**Physical and Operational Strategies**

- Enablers for Success
- Current and Potential Efforts
- Value-Add Prioritization Tool

**ROADMAP**

- Living, Learning Lab principles
- Y1, Y5, Y10 Pathways Actions with Ownership Connections to CAP
Enablers for Success

1. Organize leadership, teams and roadmap.
2. Communicate framework and roadmap clearly and consistently
3. Engage the full campus community and key participants in advancing the goals
4. Educate UNC communities on initiatives and roles in success
5. Align to other planning and development projects
6. Measure performance (quantify value!)
7. Celebrate successes (and qualify value!)
8. Synergize through opportunities across scales and “Zeros”
9. Demonstrate through visible strategies for educational value
10. Partner with external entities with mutual benefit to advance goals

Zero GHG  
Net Zero Greenhouse Gases

UNC burns fossil fuels  
(Scope 1, Direct)

UNC purchases RECs and Offsets  
(Offsets)

UNC buys power  
(Scope 2, Indirect)

UNC emits through other sources  
(Scope 3, Up/down stream)
Sub-Goals

- Reduce electricity demand in [academic, administrative, and residential] buildings
- Reduce heating/cooling demand in [academic, administrative, and residential] buildings
- Improve energy efficiency and conservation in laboratories
- Transition purchased energy to cleaner fuel sources
- Transition campus generation facilities to cleaner fuel sources
- Reduce transport-related emissions

- Meet all non-potable water demand on campus with non-potable sources
- Treat all stormwater discharge leaving campus
- Reduce excess potable water demand from academic, administrative, and residential buildings
- Improve water efficiency and conservation in laboratories

- Reduce waste packaging from in-bound materials
- Increase diversion of non-landfill waste
- Facilitate organics composting on campus
- Increase campus material reuse
- Reduce waste generation and increase waste diversion during campus events
- Reduce waste generated by campus buildings

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Building Energy Use Intensity
2016 Median Site EUI (kBtu/sf/yr) by Use Tier

Source: UNC Data; Labs21 Benchmarking (Climate Zone 4A); BuroHappold analysis

Laboratory Comparison
Site EUI (kBtu/sf/yr) Benchmarks

Source: UNC Data; Labs21 Benchmarking (Climate Zone 4A); BuroHappold analysis
South Chiller Plant (1976)
- Six (6) electric chillers
- Two (2) steam chillers
- 15,000 tons total capacity

Tompkins Center (2006)
- Three (3) electric chillers
- 6,000 tons total capacity
- 40,000 ton-hours thermal storage capacity

North Chiller Plant (2009)
- Seven (7) electric chillers
- Three (3) steam chillers
- 17,150 tons total capacity

Cobb Chiller Plant (2006)
- Five (5) electric chillers
- 10,000 tons total capacity

East Chiller Plant
- Removed from service in 2013

Cogeneration Substation
- 18 circuits
- 35 MW demand
- 100 MW capacity

Manning Substation
- 27 circuits
- 30 MW demand
- 100 MW capacity

South Substation
- 9 circuits
- 15 MW demand
- 50 MW capacity
Quantifying Impacts
Spectrum of ways to qualify and quantify strategies

MORE RIGOR AND RESOURCE

- Anecdotal and qualified impacts
- Gathering exiting studies - listening and adapting
- Proxies and precedents
- Desktop analysis with deep bench of technical SMEs at SGJJR
- Spreadsheet models (sounds assumptions and engineering rigor)
- Life-Cycle Costs Analysis (LCCA) and full Total Costs of Ownership (TCO)
- Techno-economic analysis (with compounded benefits)

Engage, educate, and understand

Think at scales

Embrace people-first solutions and operational outcomes

Appreciate resources needed to drive the mission

Reinforce goals in every decision

Integrate, model and analyze