Three Zeros Environmental Initiative

Getting to Zero Forum

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

April 18, 2018

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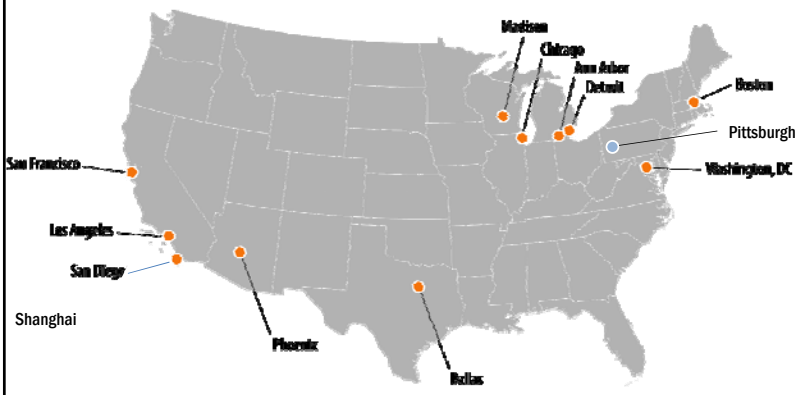

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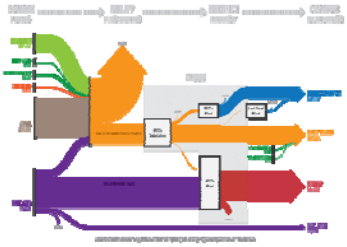

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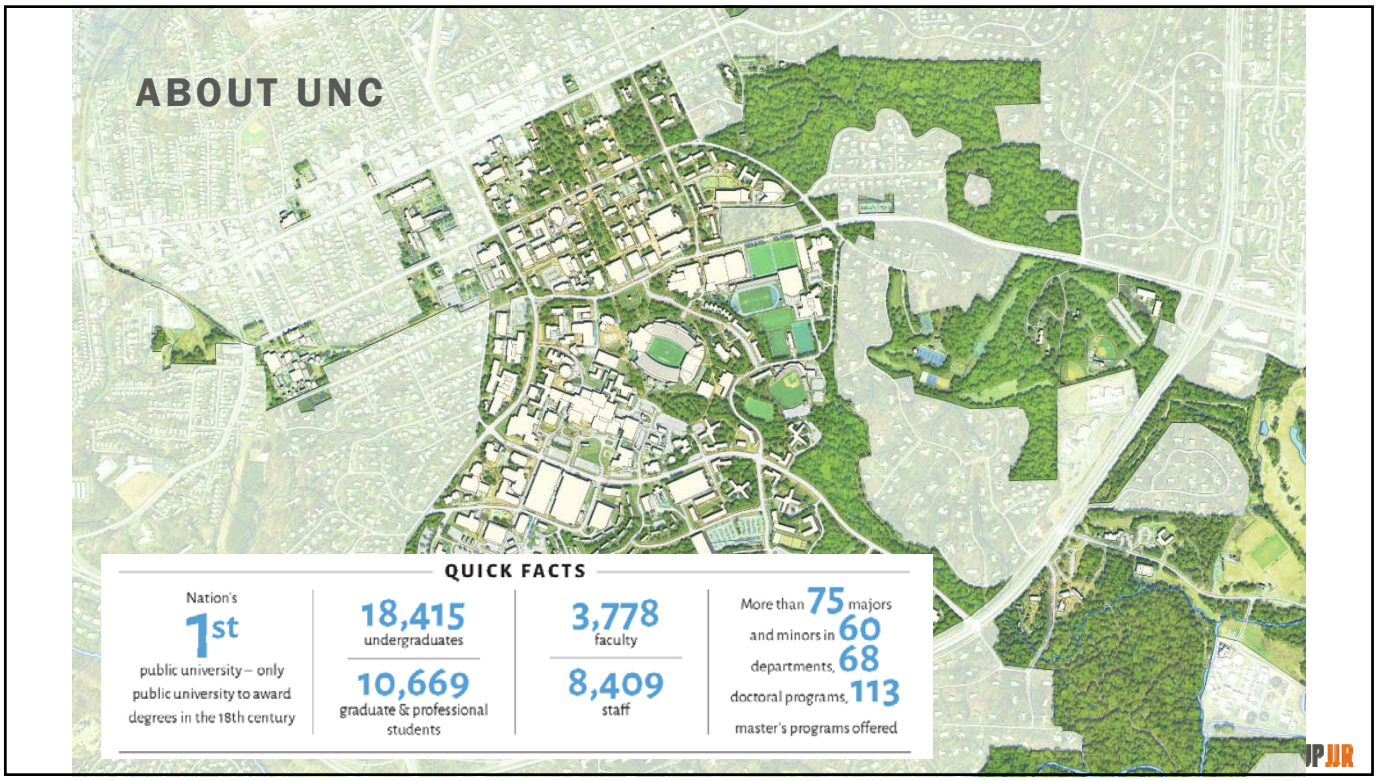
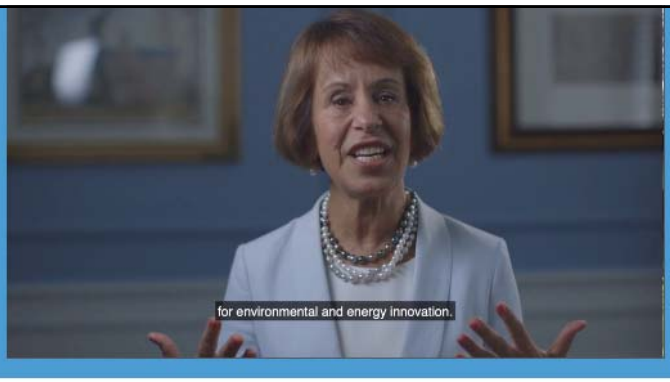


CHANCELLOR FOLT'S VISION

Reinvent the great, global, public research university.



Latest News

Three Zeros Day 2017: Photos

September 27, 2017

UNC Three Zeros Day 2017 featured organizations from across campus who

Three Zeros Day: Celebrating Sustainability at Carolina

September 27, 2017

At the first Three Zeros Day: A Celebration of UNC Sustainability, more than 30

Watch the Three Zeros Day Video Trailer

September 19, 2017

September 25, 2017, is Three Zeros Day at UNC Chapel Hill, a Celebration of UNC

#UNCThreeZeros Photo Campaign

September 11, 2017

On September 8, 2017 the Three Zeros Environmental Initiative, in partnership

STRATEGIC SUSTAINABILITY PLAN

Lead Facilitator and Planner

THREE ZEROS ENVIRONMENTAL INITIATIVE

Technical and Engagement Lead

COMPREHENSIVE MASTERPLAN

Energy, Water, Waste Infrastructure

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Zero GHG
Climate neutral

Zero Water
Water neutral

Zero Waste
Zero waste to landfills

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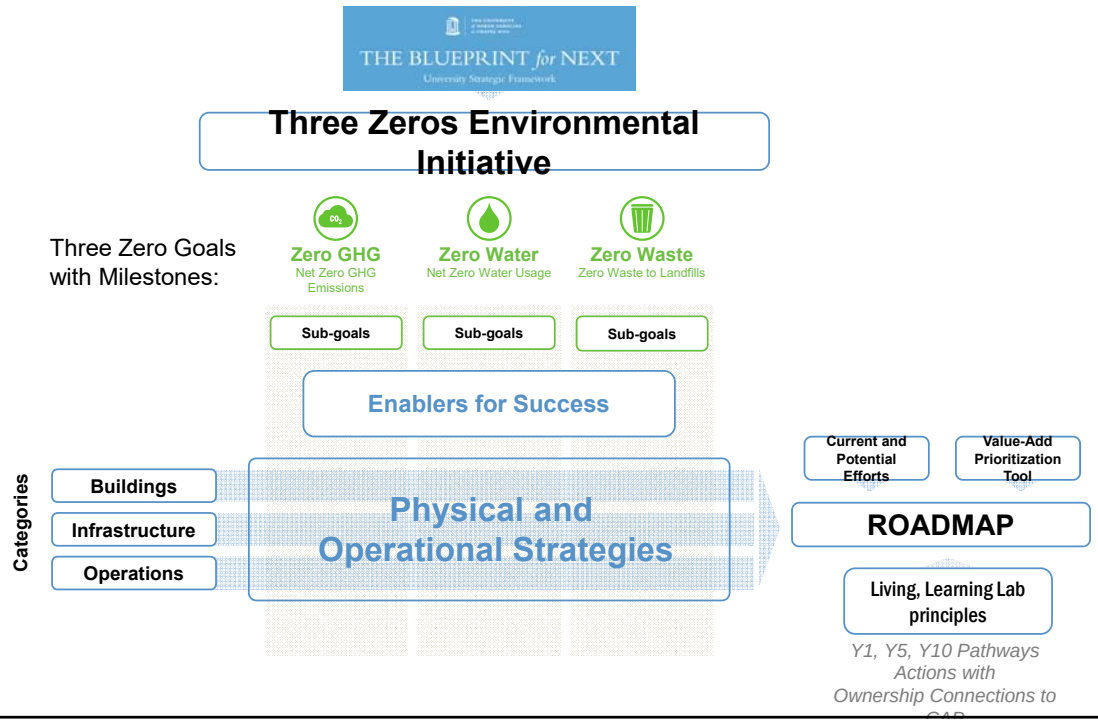

Enablers for Success

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

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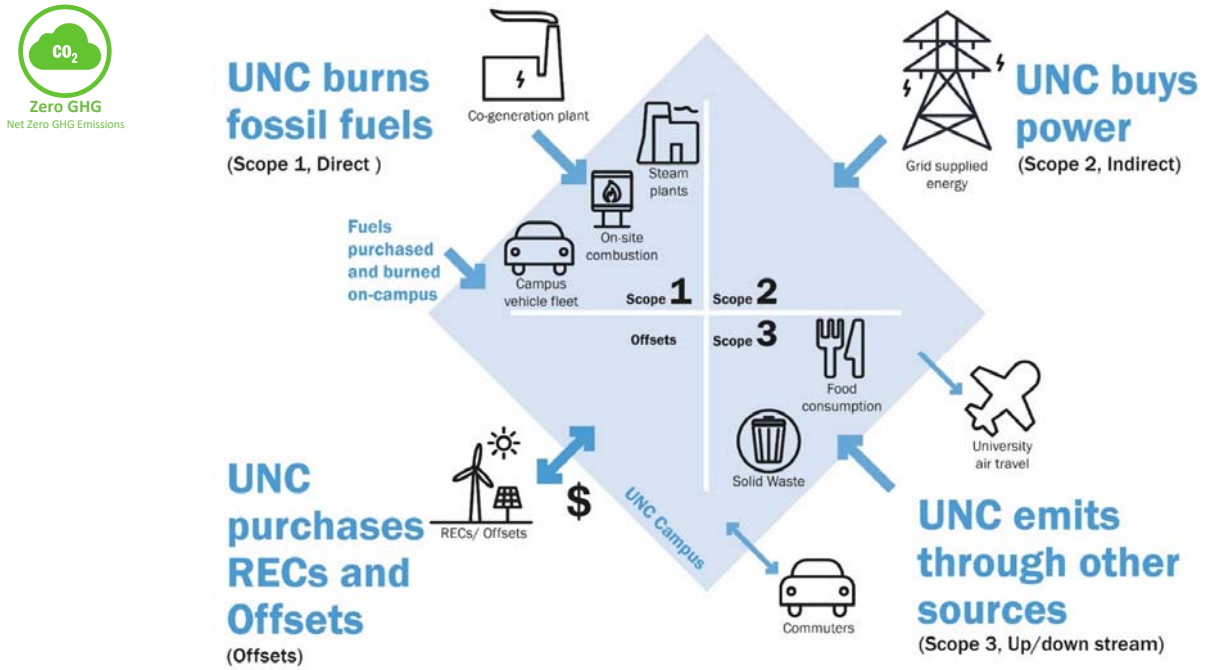
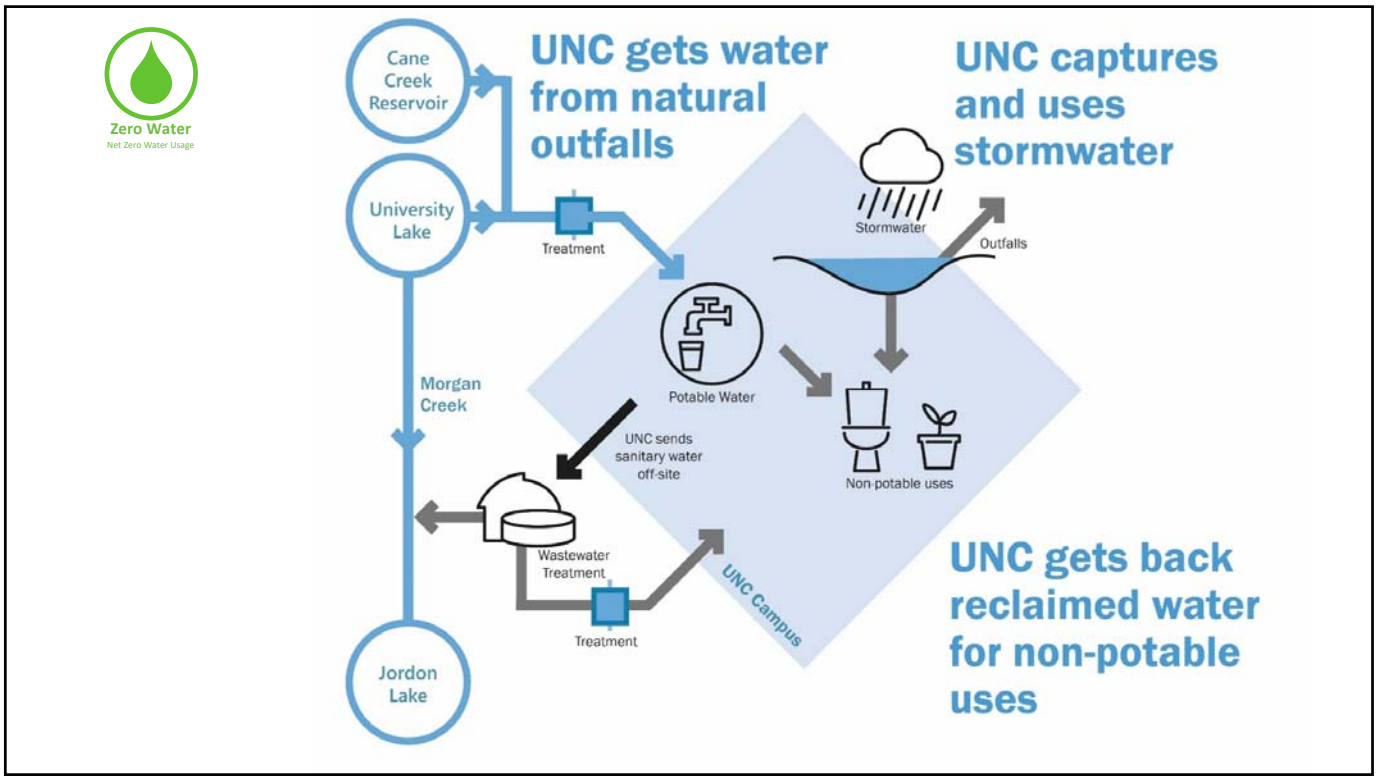
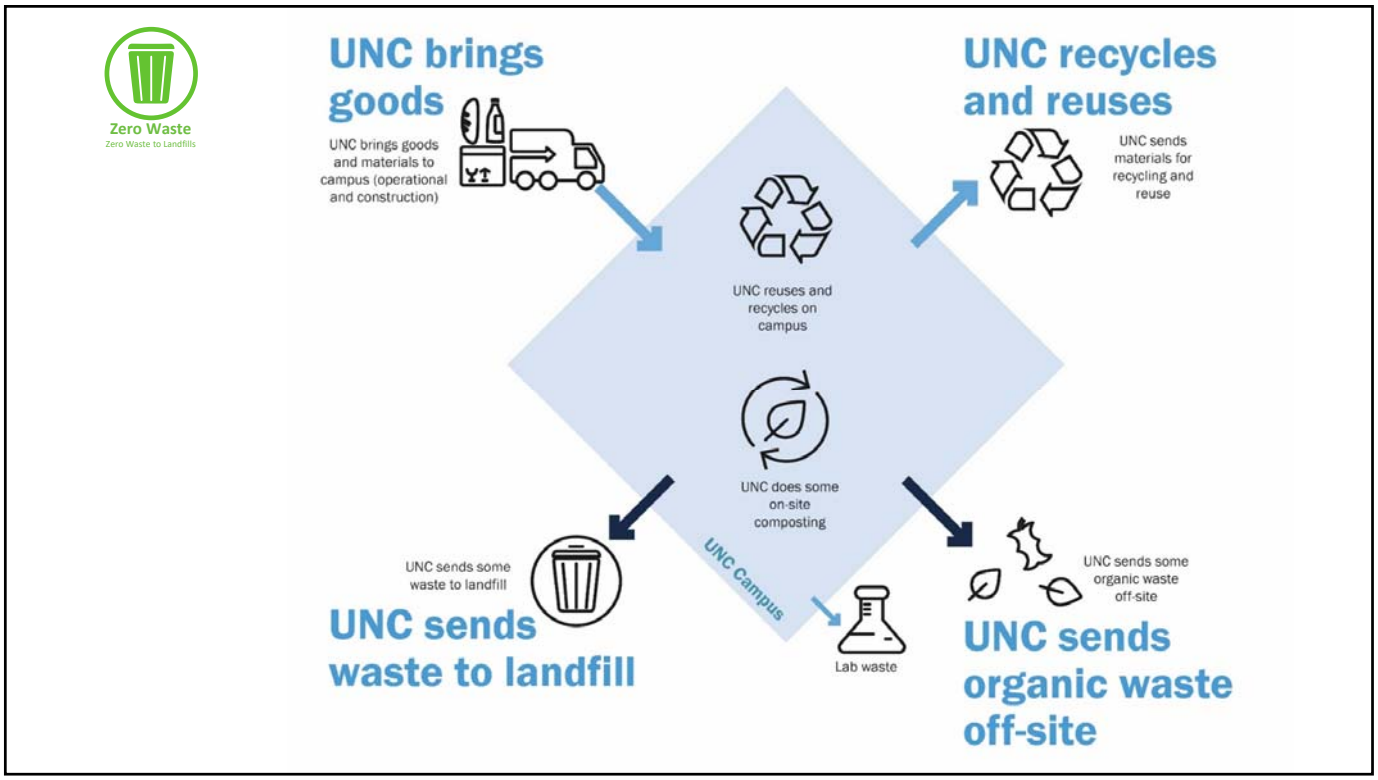



Zero Water
Net Zero Water Usage
Cane Creek Reservoir
University Lake
Morgan Creek
Jordon Lake
UNC gets water from natural outfalls
Treatment
UNC captures and uses stormwater
Stormwater
Outfalls
Potable Water
Non-potable uses
UNC sends sanitary water off-site
Wastewater Treatment
Treatment
UNC Campus
UNC gets back reclaimed water for non-potable uses


Zero Waste
Zero Waste to Landfills
UNC brings goods
UNC brings goods and materials to campus (operational and construction)
UNC recycles and reuses
UNC sends materials for recycling and reuse
UNC reuses and recycles on campus
UNC does some on-site composting
UNC Campus
UNC sends some waste to landfill
UNC sends waste to landfill
Lab waste
UNC sends some organic waste off-site
UNC sends organic waste off-site

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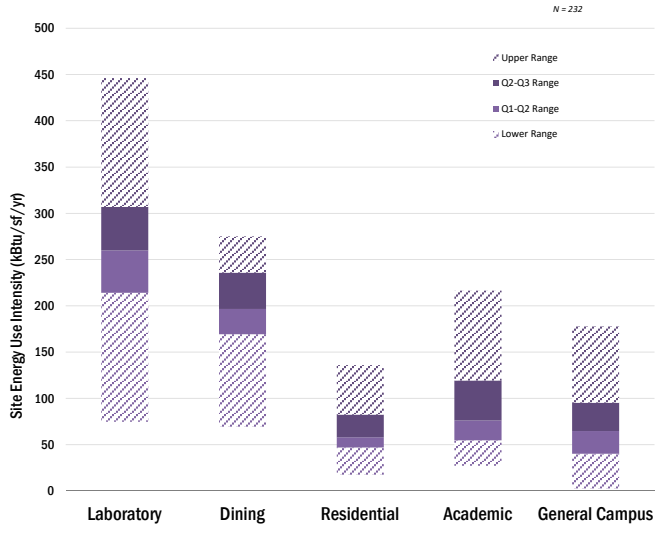
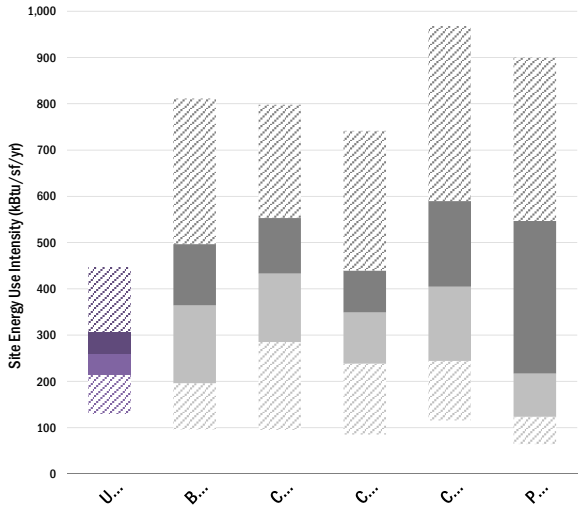
Building Energy Use Intensity
2016 Median Site EUI (kBtu/sf/yr) by Use Tier



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



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

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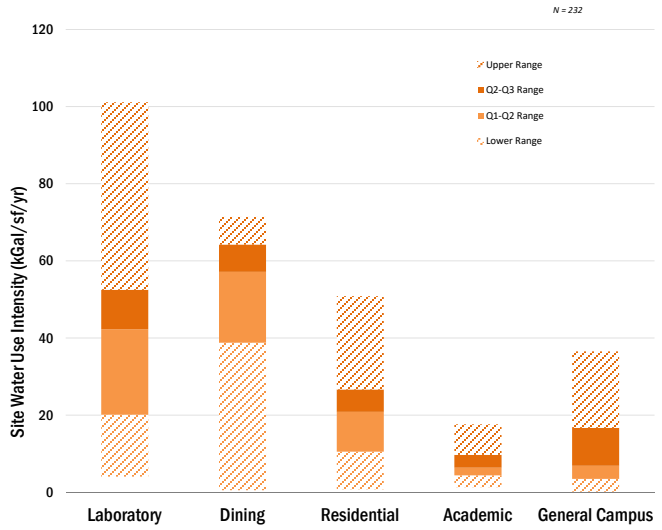
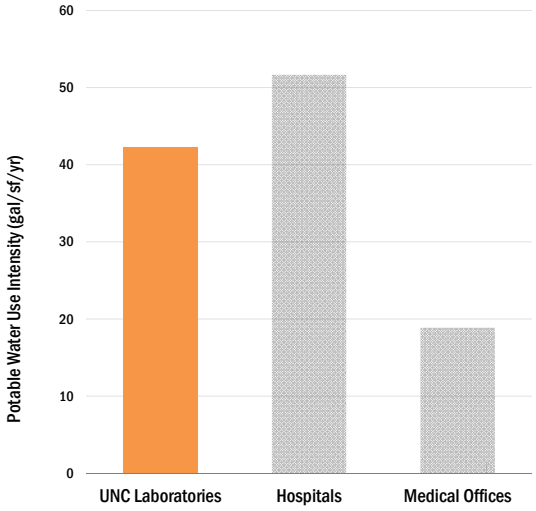
Building Water Use Intensity
2016 Median Site WUI (kGal/sf/yr) by Use Tier



Laboratories
Potable WUI (gal/sf/yr) Benchmarks



Source: UNC Data; Energy Start Portfolio Manager, Data Trends: Water Use Tracking (2012); BurHappold Analysis

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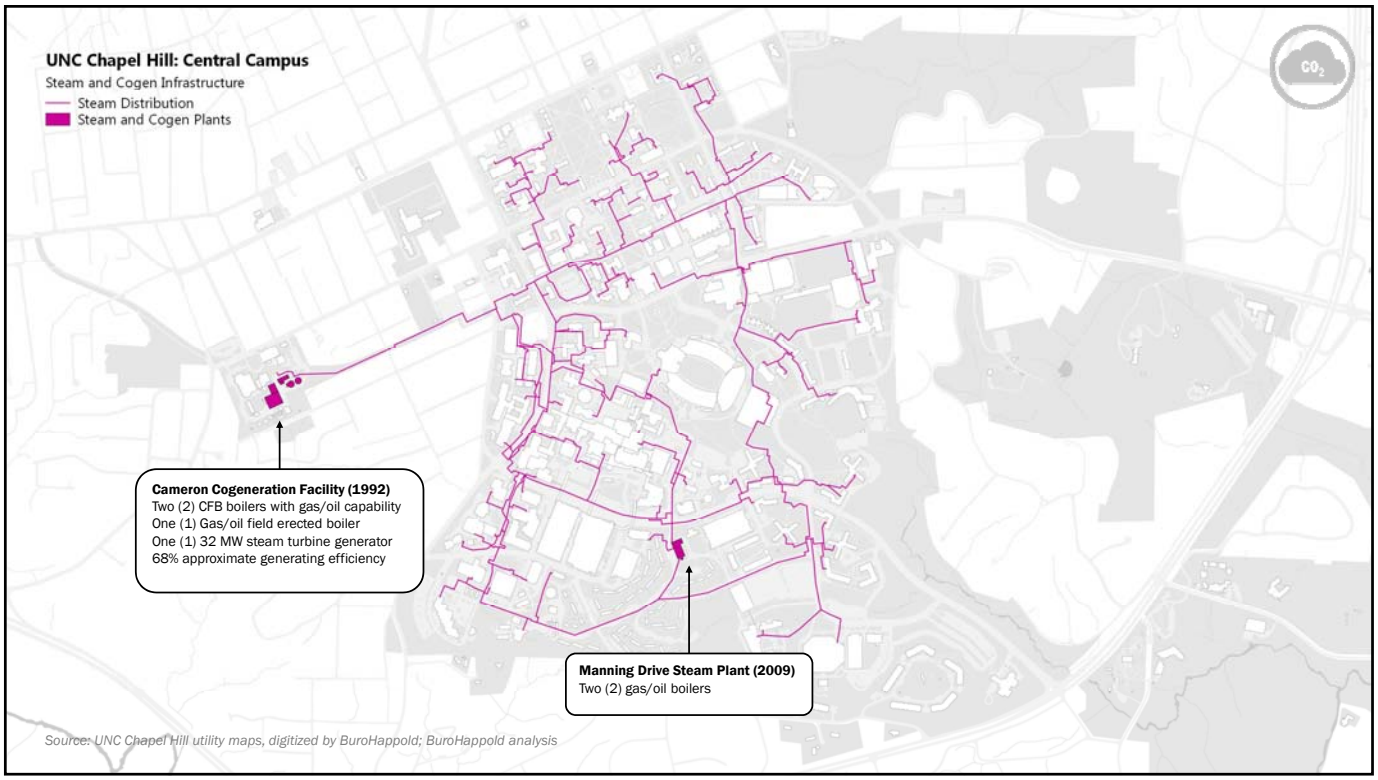
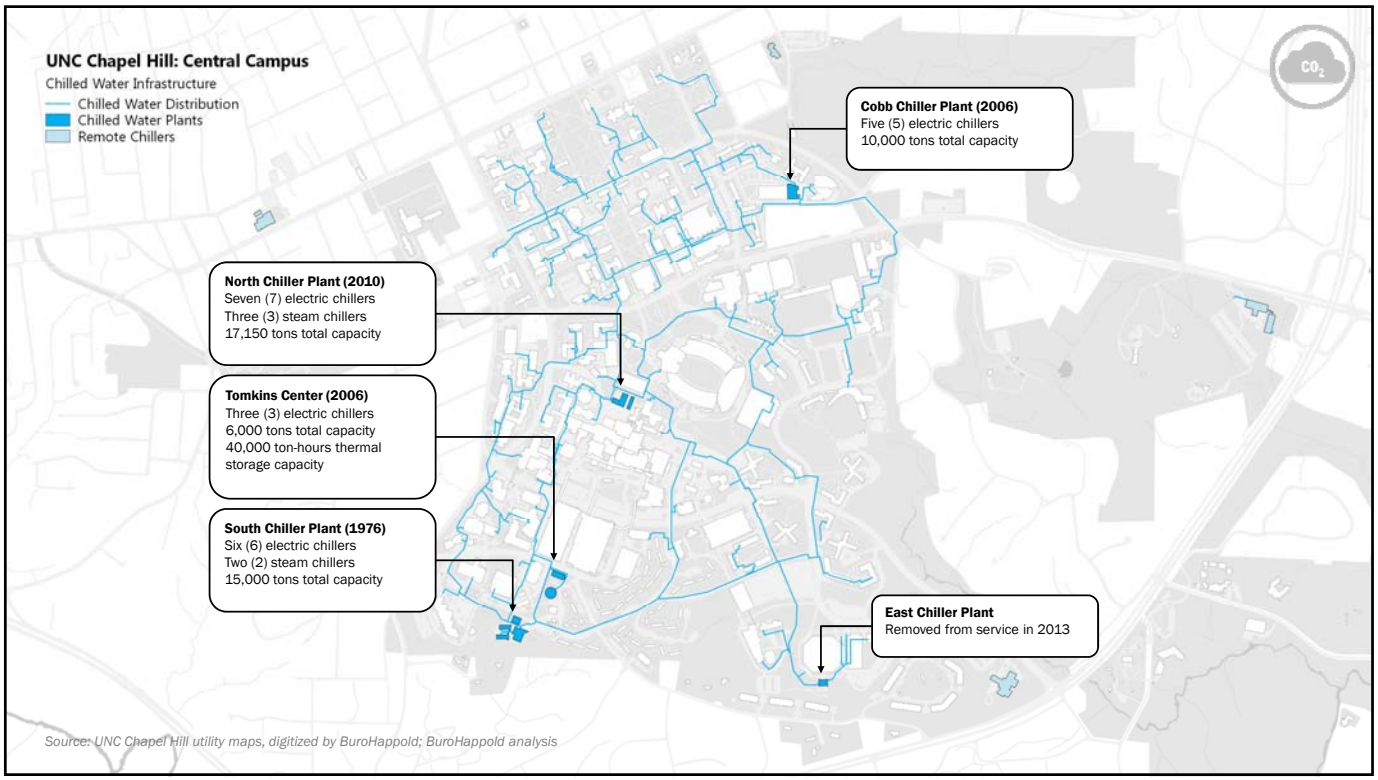
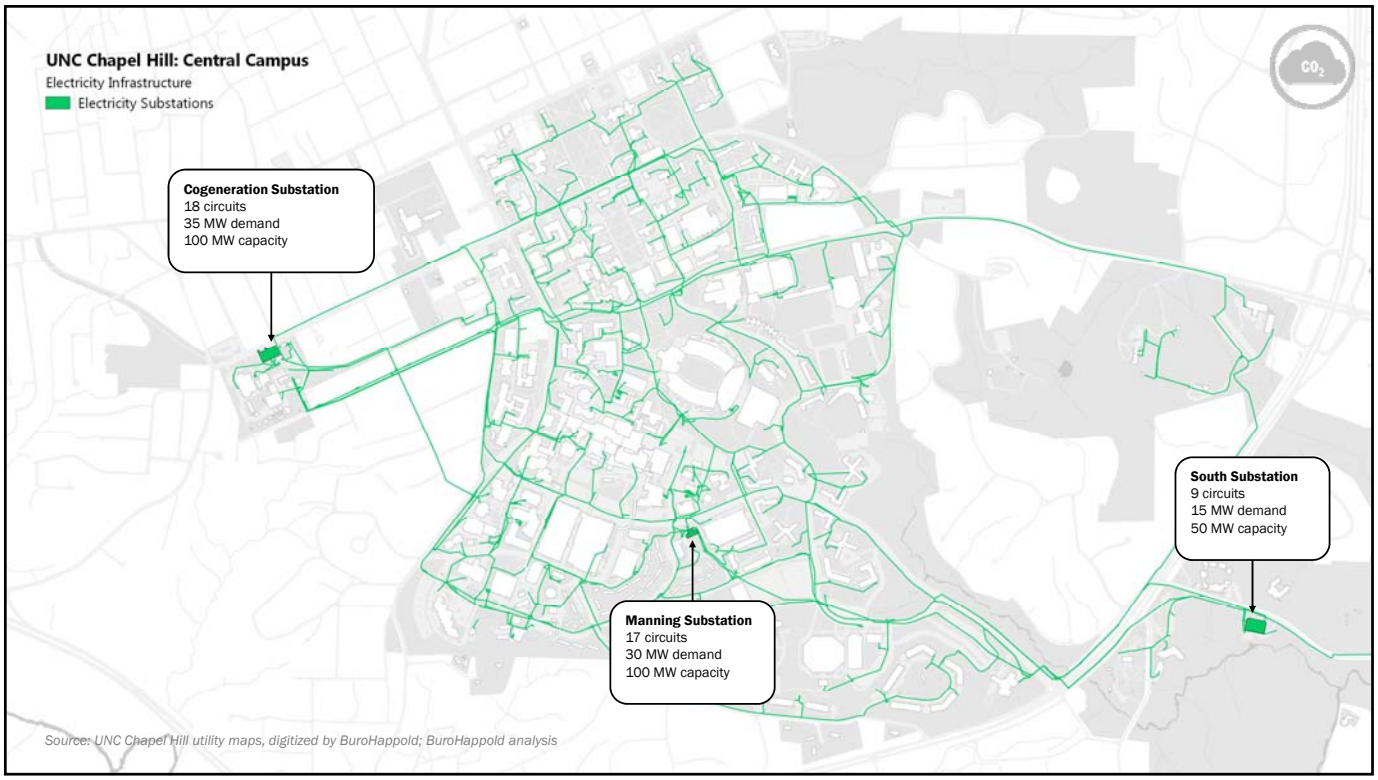


Source: UNC Chapel Hill utility maps, digitized by BuroHappold; BuroHappold analysis


UNC Chapel Hill: Central Campus
Chilled Water Infrastructure
Chilled Water Distribution
Chilled Water Plants
Remote Chillers
Cobb Chiller Plant (2006)
Five (5) electric chillers
10,000 tons total capacity
North Chiller Plant (2010)
Seven (7) electric chillers
Three (3) steam chillers
17,150 tons total capacity
Tomkins Center (2006)
Three (3) electric chillers
6,000 tons total capacity
40,000 ton-hours thermal storage capacity
South Chiller Plant (1976)
Six (6) electric chillers
Two (2) steam chillers
15,000 tons total capacity
East Chiller Plant
Removed from service in 2013
Source: UNC Chapel Hill utility maps, digitized by BuroHappold; BuroHappold analysis


UNC Chapel Hill: Central Campus
Electricity Infrastructure
Electricity Substations
Cogeneration Substation
18 circuits
35 MW demand
100 MW capacity
South Substation
9 circuits
15 MW demand
50 MW capacity
Manning Substation
17 circuits
30 MW demand
100 MW capacity
Source: UNC Chapel Hill utility maps, digitized by BuroHappold; BuroHappold analysis

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)

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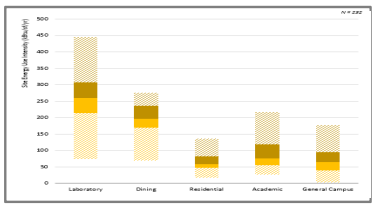
Engage, educate, and understand

Think at scales

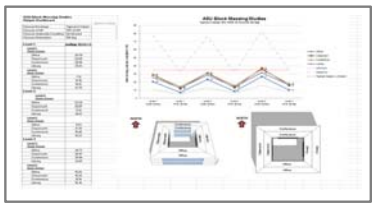
Embrace people-first solutions and operational outcomes

Appreciate resources needed to drive the mission



Reinforce goals in every decision

Integrate, model and analyze



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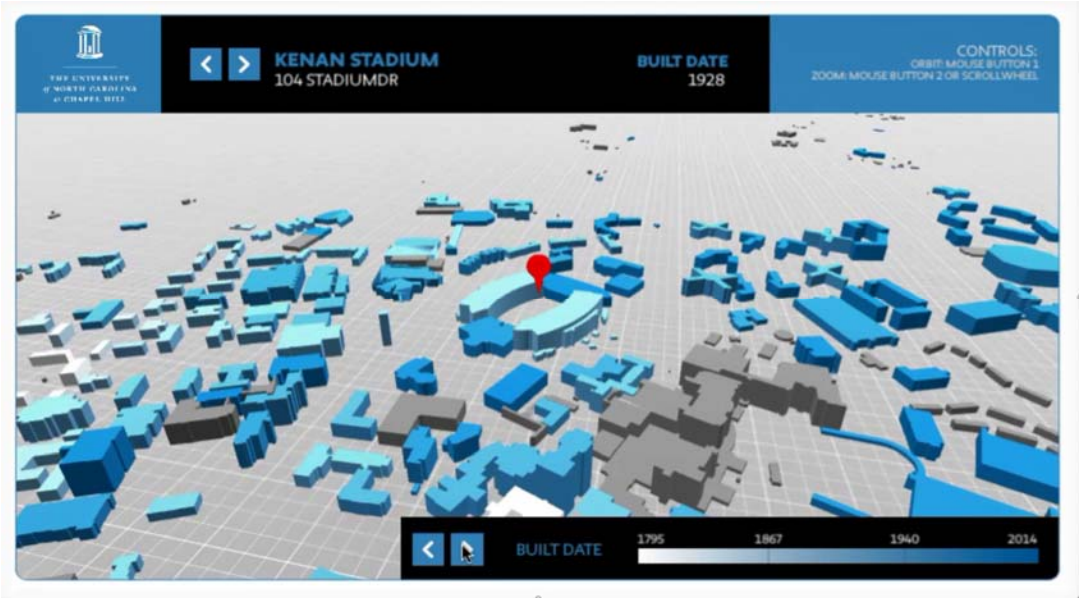

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