



The University of North Carolina at Chapel Hill

# 2021 Climate Action Plan

## The Road to Today

In 2007, The University of North Carolina at Chapel Hill (Carolina) became a charter signatory of [the American College and University Presidents' Climate Commitment](#). In 2009, Carolina published its first Climate Action Plan. In [this first plan](#), Carolina pledged to be carbon neutral by 2050 and established 15 near-term strategies to reach this goal.

Over the past decade, Carolina has implemented 75% of the near-term strategies from the 2009 Climate Action Plan. These strategies, along with other actions, have resulted in a 40% decrease in greenhouse gas emissions, despite a 27% increase in campus square footage and a 9% increase in the campus population.

In 2019, both the [Intergovernmental Panel on Climate Change](#) and the [U.S. Federal Government](#) issued reports emphasizing the need for immediate climate action and the potential consequences of not taking action. The responsibility of being a leader in climate action has never been greater for Carolina than it is now. The 2021 Climate Action Plan represents the first step of our renewed commitment to sustainability, together.

A static report released every 5-10 years is not the most effective way to plan for carbon neutrality. Because the technologies, ideas, and resources available to Carolina can change quickly, the Climate Action Plan should be able to as well. For these reasons, Carolina has created this web-based Climate Action Plan that can be updated as our progress and plans evolve.

## 2009 Climate Action Plan

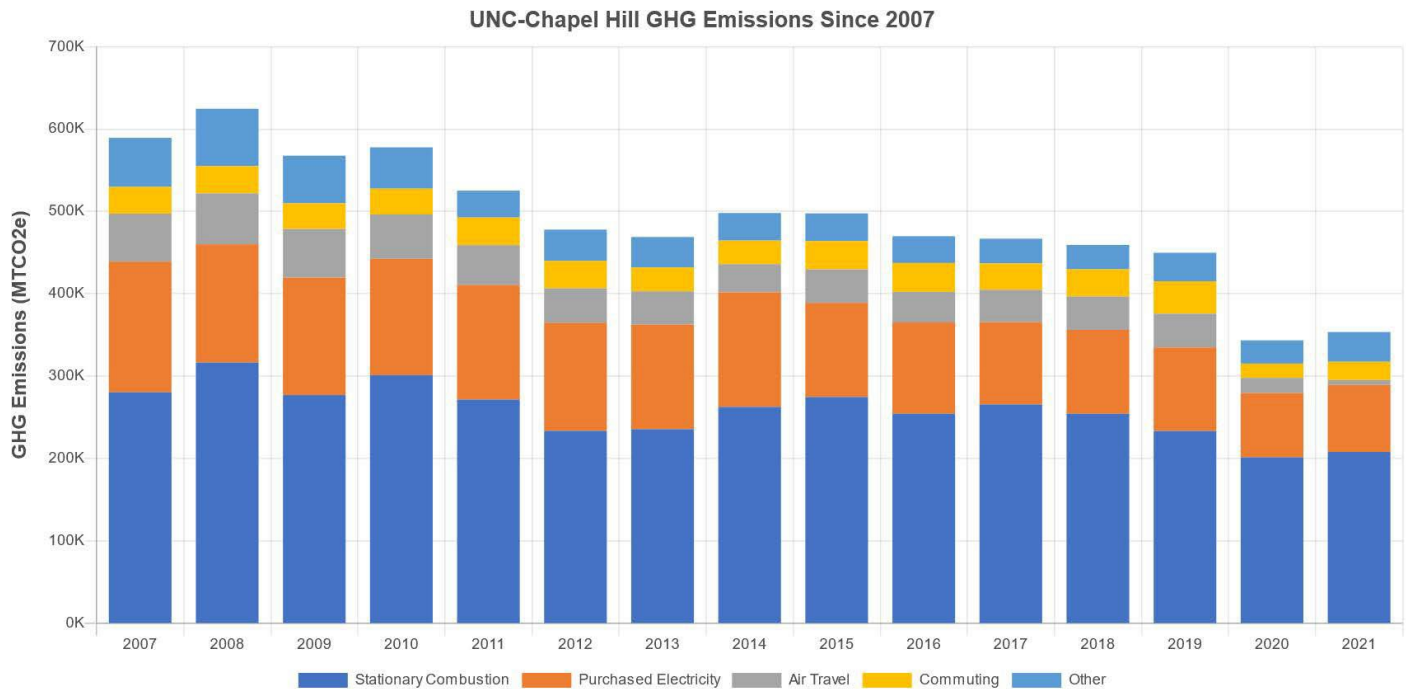
Carolina's [2009 Climate Action Plan](#) contained 15 near-term strategies and several mid- to long-term strategies. The table below describe the status and results of each strategy.

Strategy	Status
<p><b>Thin Client Computers</b>  <i>Description:</i> Utilize low-energy, longer lasting web-based computers for libraries and other applications.  <i>Result:</i> Over 100 thin-clients are currently in use. Replacements are expected to have similar or smaller electricity demands.</p>	Complete
<p><b>Duplex Printing</b>  <i>Description:</i> Make double-sided printing the default for campus printers.  <i>Result:</i> Duplex printing is standard. Due to this, and more paperless processes, paper use fell 76% between 2009 and 2021.</p>	Complete
<p><b>Computer Standby</b>  <i>Description:</i> Manage computer sleep and standby modes for campus computers.  <i>Result:</i> Established a standard policy that sets screens, hard drives, and standby times to save energy.</p>	Complete
<p><b>Commercial Mail</b>  <i>Description:</i> Reduce the amount of junk mail or undeliverable mail sent to campus.  <i>Result:</i> In 2016, Carolina adopted a <a href="#">Waste-Free Mail Program</a> to reduce junk and undeliverable mail.</p>	Ongoing
<p><b>Chiller Efficiency</b>  <i>Description:</i> Three projects to replace or upgrade chillers to more efficient models.  <i>Result:</i> Many chiller efficiency projects have been completed. Emissions from chilled water operations fell 56% ('09 to '21).</p>	Complete
<p><b>Heat-Recovery Chillers</b>  <i>Description:</i> Capture heat from chiller condensing unit for HVAC use, rather than venting.  <i>Result:</i> Heat recovery chillers have been installed, assisting in the 59% decrease in chilled water emissions.</p>	Complete
<p><b>Behavioral Initiatives</b>  <i>Description:</i> Outreach and training to encourage occupants in energy savings.  <i>Result:</i> Carolina continuously engages the community through several different outreach programs.</p>	Ongoing
<p><b>Energy Conservation Measures (ECMs)</b>  <i>Description:</i> Improve energy efficiency in existing buildings using Energy Conservation Measures.  <i>Result:</i> Due to the completion of many energy efficiency projects, Carolina's energy use intensity fell 37% since 2003.</p>	Ongoing
<p><b>Green Building</b>  <i>Description:</i> Adhere to <a href="#">NC Senate Bill 668</a> energy efficiency requirements (30% below ASHRAE standards).  <i>Result:</i> Ongoing improvements in building energy efficiency and retrofit projects have decreased EUIs across campus.</p>	Ongoing
<p><b>Vehicle Fleet</b>  <i>Description:</i> Increase fuel efficiency of campus fleet based on <a href="#">CAFÉ standards</a>.  <i>Result:</i> Due to mileage reduction, use of efficient vehicles, and increased biofuel use, fleet emissions fell 30% ('09 to '21).</p>	Ongoing

<p><b>Composting</b>  <i>Description:</i> Extend composting to additional campus dining facilities and residence halls.  <i>Result:</i> By expanding to more food service sites, compost collection increased 62% from 2009 to 2019.</p>	Ongoing
<p><b>Landfill Gas</b>  <i>Description:</i> Capture and combust landfill methane.  <i>Result:</i> System was installed in 2012. As of July 2021, the system had achieved ~330,000 MTCO<sub>2</sub>e in emission reductions.</p>	Ongoing
<p><b>Business Travel</b>  <i>Description:</i> Improve teleconferencing facilities to decrease air travel.  <i>Result:</i> Teleconferencing facilities and technologies have improved, and air miles decreased 15% between 2009 and 2019. Air miles reduced significantly during the pandemic, as well.</p>	Unknown Results
<p><b>20% Coal Substitute</b>  <i>Description:</i> Replace 20% of coal with torrefied wood.  <i>Result:</i> This strategy was adopted under certain assumptions about torrefied wood and wood pellet technologies that failed to materialize. Wood pellets were tested in 2010 and 2011. Carolina is currently researching other biofuels, electric boilers, and carbon capture technologies to lower emissions.</p>	Incomplete
<p><b>Commuter Travel</b>  <i>Description:</i> Avoid parking construction and increase public transportation (light rail).  <i>Result:</i> This strategy hinged on the completion of <u>the Durham-Orange Light Rail Transit project</u> which has been indefinitely suspended. More commuters drove to campus in 2019 than in 2009, but emissions remained flat due to commuters living closer to campus and using more efficient vehicles. A Bus Rapid Transit project is currently under development.</p>	Incomplete

## Progress

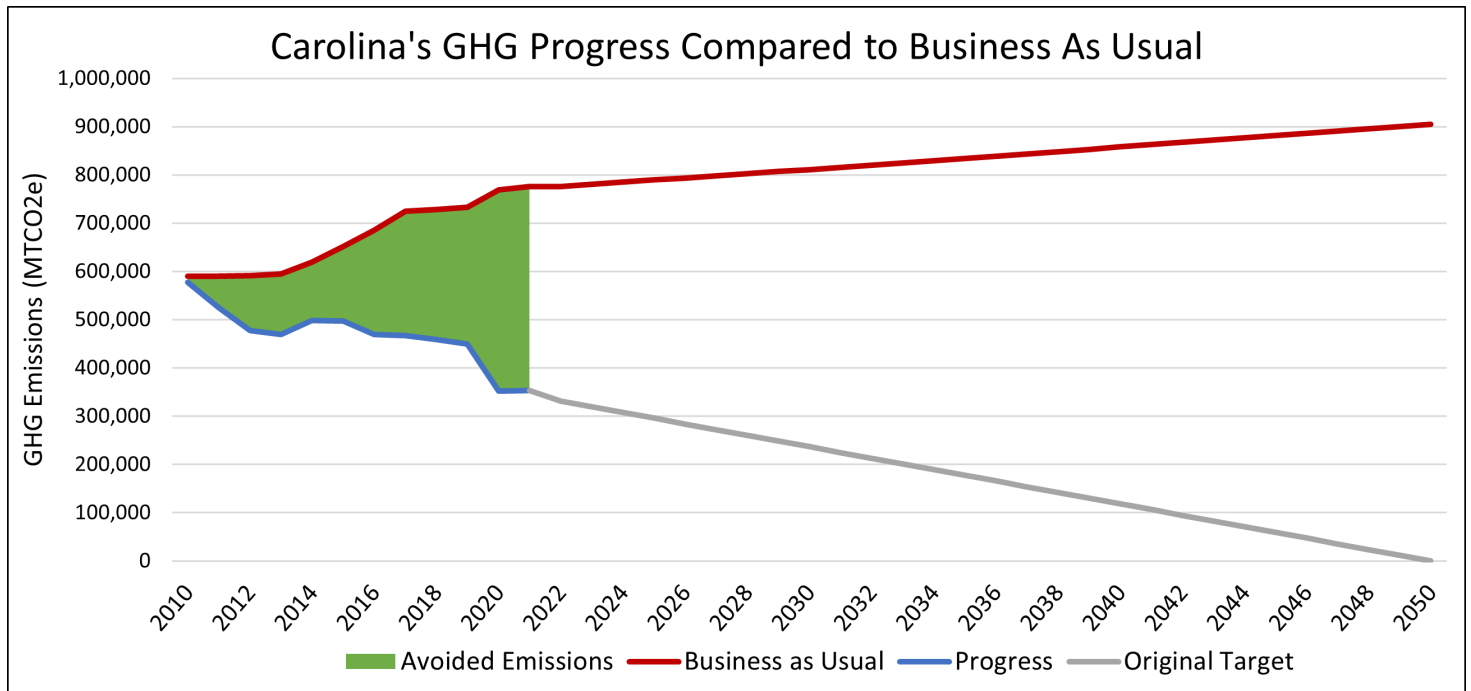
Since signing Second Nature’s Climate Commitment in 2007, Carolina has completed an exhaustive annual GHG inventory and reduced its GHG emissions by 40% despite significant campus growth. This decrease was achieved with emission reductions in every category except for refrigerants and commuting. The graph below illustrates Carolina’s emissions since 2007. For a detailed trend report, please [visit our SIMAP Emissions Reporting page](#).



Since 2007, Carolina’s largest GHG emission reductions have come from:

- **Energy Efficiency** – Despite a 27% increase in square footage and a 9% increase in population since 2007:
  - Campus steam use per square foot has fallen by 36%.
  - Campus electricity consumption per square foot has fallen by 23%.
- **Stationary Combustion** – Carolina reduced its coal use at the cogeneration plant by 54% since 2007.
- **Purchased Electricity** – Due to efficiency projects and a cleaner grid, emissions have fallen 49% since 2007.

In the 2009 Climate Action Plan, a business-as-usual scenario was modeled to predict future emissions with no action. With predicted increases in campus and population sizes, this scenario forecasted emissions rising to almost 800,000 MTCO<sub>2</sub>e by 2020 and over 900,000 MTCO<sub>2</sub>e by 2050. However, due to the actions described above and COVID-19 pandemic-related disruptions to campus use, Carolina's actual 2021 emissions were 54% lower than predicted, and nearly 2.5 million metric tons of CO<sub>2</sub>e emissions have been avoided since 2010. The graph below illustrates avoided emissions.

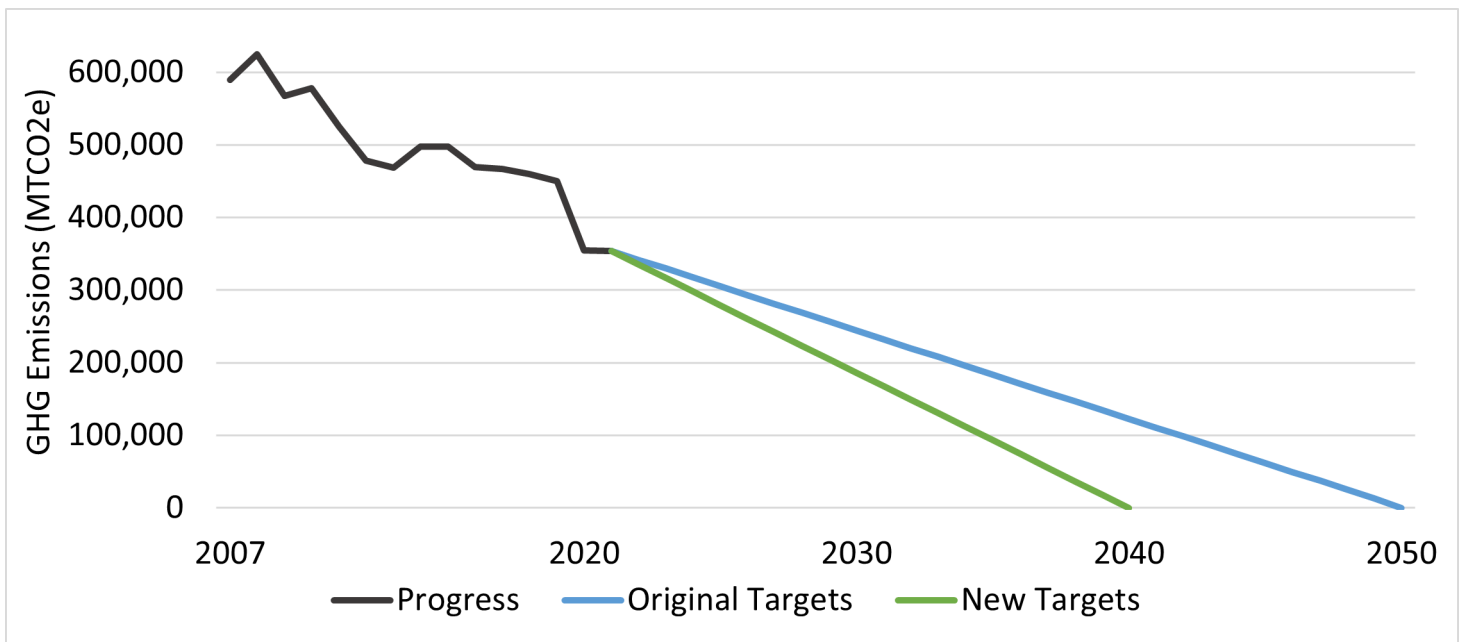


# Goals

Because of the urgent and immediate need for climate action, Carolina has set new, more ambitious greenhouse gas goals. These goals include:

1. Carolina aspires to comply with [Governor Roy Cooper’s Executive Order 80](#) which calls for a 40% statewide reduction of greenhouse gas emissions by 2025 and Executive Order 246 which calls for a 50% statewide reduction by 2030.
2. Carolina will strive to achieve net-zero greenhouse gas emissions by 2040 instead of 2050.

To reach these aggressive targets, the University needs the input and support of its campus community. Carolina is committed to transparency in our progress, successes, and limitations. By challenging circumstances that may preclude projects or change priorities, Carolina will maintain openness as progress towards these goals continues. The graph below illustrates progress made since 2007 as well as our more ambitious targets for achieving carbon neutrality.



# The Path to 2040

To meet the goals listed above, Carolina must take many actions over the next 20 years. Some actions have been identified, and many more are yet to be realized. The sections below detail Carolina's project selection criteria and strategies being considered over the next ~5 years.

## Project Prioritization

To utilize Carolina's resources as efficiently as possible, all potential strategies and initiatives are evaluated based on the following criteria. These criteria are not weighted and considerations of current budgets, needs, and priorities will factor into final decisions.

### Lowens Greenhouse Gas Emissions

While projects of all sizes will be considered, Carolina will prioritize projects that have the potential for large greenhouse gas reductions. As these projects are completed or ruled out, smaller projects will be elevated.

### Co-Benefits

Projects with environmental, social, and equity benefits will be prioritized.

### Technically Feasible

Regardless of the impact and benefits, projects must be technically feasible to be considered. While Carolina strives to be innovative in its approach, technologies must be at least semi-proven.

### Financially Feasible

Carolina seeks to meet carbon neutrality in the most cost-effective way. The net present value of each project is compared to the emission reduction potential to get a NPV/MTCO<sub>2e</sub> figure. This figure is used to compare the financial viability of each project. Projects with positive net present values will be prioritized. The capital cost (relative to the emission reduction) will also be considered.

### Practically Feasible

A project's practical feasibility is determined by factors such as climate, geography, infrastructure, etc.

### Excitement

It is important to get the campus community excited about efforts to reduce greenhouse gas emissions. Projects that are highly visible and draw attention to the effort are more attractive.

### Living Learning Lab Impact

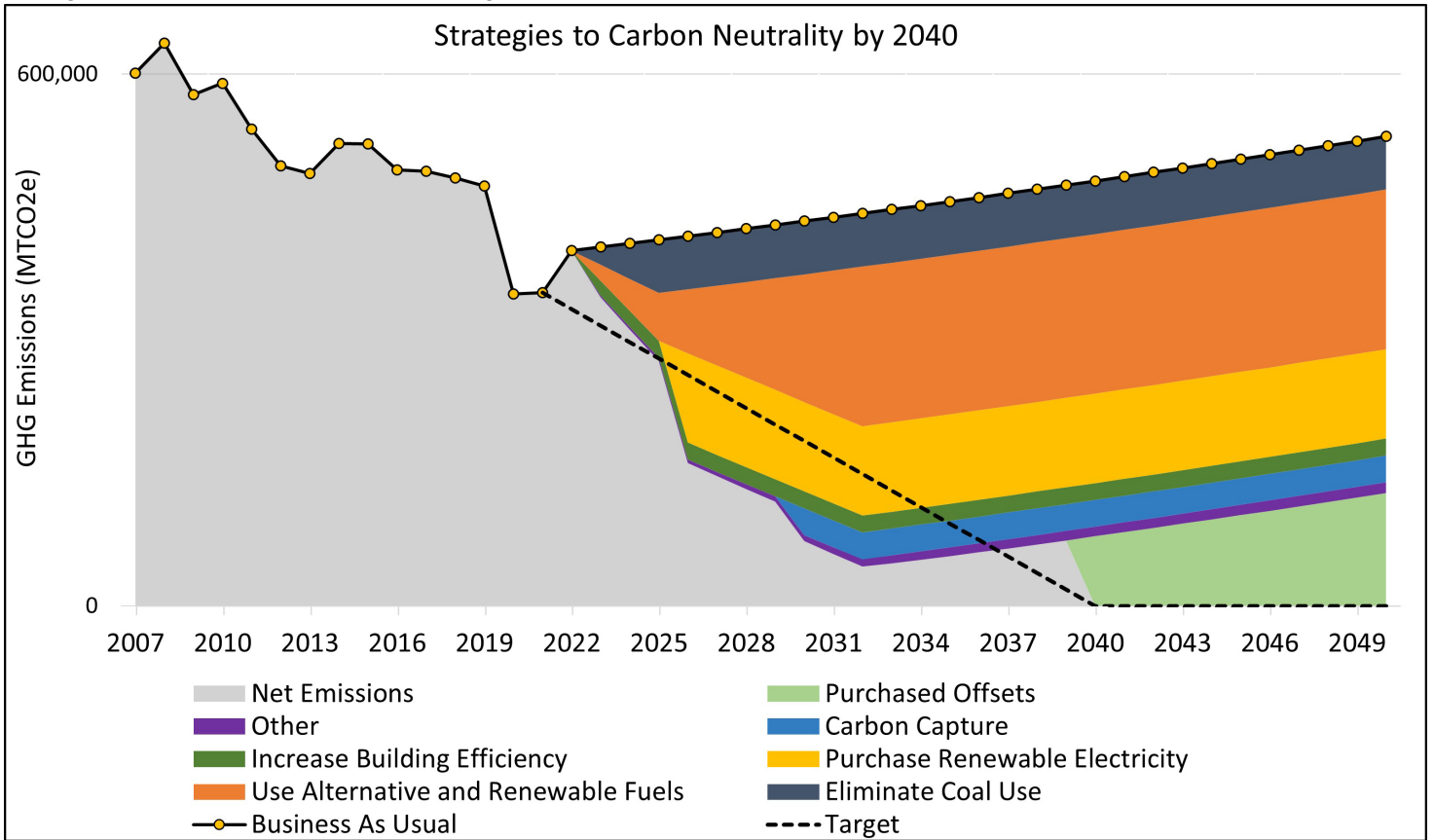
Due to Carolina's mission as an institution of higher learning, projects that allow students, faculty, and staff to explore, research, and learn are prioritized.



# Strategies

Carolina has identified 23 strategies to reduce greenhouse gas emissions. These strategies could reduce emissions by 79% compared to the 2007 baseline. The diagram below shows the high-level strategies for reducing greenhouse gas emissions.

## Projected GHG Emissions Graph



# Energy Strategies

## Energy Efficiency

Due to the size of campus, the amount of intensive research being conducted, and the steam needs of labs and UNC Hospitals, Carolina uses a lot of energy every year. Some of this energy comes from onsite sources such as the cogeneration facility, and some is purchased from Duke Energy. While both Carolina and Duke Energy are working to lower the greenhouse gas emissions associated with energy production, much of the energy used still comes from fossil fuels and releases greenhouse gases. Each year, the energy used in buildings on campus directly and indirectly contributes to roughly 70-75% of Carolina's greenhouse gas emissions.

Reducing emissions from campus energy use can be done in two general ways: reducing energy use and using cleaner energy. The table below describes the strategies for both using less energy and utilizing renewable and clean energy sources.

Reducing energy use on campus is the first step to decreasing energy-related emissions. By reducing energy use in buildings, Carolina lowers the associated greenhouse gas emissions while creating financial savings and possibly improving occupant comfort.

Carolina's [Energy Management](#) team constantly works to increase the energy efficiency of existing buildings and new builds. Thanks to these efforts, Carolina's energy use intensity, the energy used per square foot, has fallen 37% since FY2003.

Strategies
Continue Energy Conservation Measures Program
Continue Building Optimization Program
Update Design Guidelines

## Stationary Combustion

Not only does Carolina have a high demand for steam, the supply must be extremely reliable to keep the hospital running and maintain sensitive research. The repercussions of campus energy outages can be immense, including loss of life or lifesaving research. To meet the campus steam demand, and maintain extremely high levels of reliability and resilience, Carolina needs to have multiple fuel options and be able to store fuel on site. Unfortunately, this means that Carolina currently uses fossil fuels to create steam.

Carolina is working to move the cogeneration facility away from coal as quickly as is technically and financially feasible. Currently, the University has increased natural gas use. While transitioning to natural gas is significantly lowering campus emissions, Carolina is still researching better long-term solutions. Until an alternative fuel source is found to minimize emissions while also generating the necessary steam output, Carolina utilizes the following strategies to reduce emissions in the short term while planning for a long-term sustainable solution.

Strategies
Eliminate Coal Use
Explore Next Generation Fuels
Explore Carbon Capture

## Purchased Electricity

Carolina's cogeneration facility produces roughly 15-20% of the University's annual electricity use. The remaining electricity is purchased from Duke Energy and typically accounts for 20-25% of Carolina's annual GHG emissions. Other than energy efficiency, mentioned above, there are three ways Carolina can continue to reduce purchased electricity emissions: onsite renewable generation, renewable energy purchases, and Renewable Energy Certificate (REC) purchasing.

Strategies
Increase On-Campus Renewable Energy
Procure Renewable Energy
Purchase Renewable Energy Certificates

# Transportation Strategies

## Commuting

Commuting is one of the few upward-trending emission categories, with the exception of 2020 and 2021. This increase is largely driven by the fact that more employees and students are driving alone to campus rather than using more efficient forms of transportation. Reducing commuting emissions relies heavily on influencing individuals to make sustainable commuting decisions.

Strategies
Encourage and aid Chapel Hill Transit (CHT) in transition to Electric Buses
Increase use of the Commuter Alternative Program
Study Parking Pass Structure
Expand Electric Vehicle Charging

## Air Travel

Air travel, both domestic and international, is a large part of being a [global research university](#). Carolina's faculty, staff, and students fly over 80 million miles every year for research, conferences, and studies. While this travel is often essential in making Carolina a leader in research, it is normally responsible for 10% of Carolina's GHG emissions.

Strategies
Explore Green Air Travel Program
Explore voluntary or mandatory air travel carbon offsets

## Fleet

Carolina's fleet, which consists of around 900 vehicles, produced roughly half a percent of Carolina's total emissions in 2021. Since 2007, fleet emissions fell 23%, primarily due to decreased fuel consumption and increased use of alternative fuels B20 and E85. The University is currently pursuing the strategies below to further reduce emissions.

### Strategies

Optimize Vehicle Choice

Increase Use of Biofuels

Expand Use of Vehicle Telematics

## Education and Research Strategies

As an institution of higher learning, simply reducing greenhouse gas emissions is not good enough. Carolina has a responsibility to educate and engage its community members to ensure that climate action occurs both on and off campus. With almost 30,000 students, and over 12,000 employees, this is a huge task, and equally large opportunity. Meeting Carolina's sustainability goals will be much easier and impactful with full campus engagement.

### Strategies

Create a peer-to-peer sustainability program

Increase engagement in New Student Orientation, Week of Welcome, and throughout the year.

Launch Green Office certification program

## Other Strategies

Greenhouse gases are sometimes used as part of operations including in switchgear and as refrigerants. In the case of switchgear, newer technology is available that doesn't require the use of greenhouse gases for insulation. For refrigerants, climate-friendly alternatives may be available depending on the equipment being used. Carolina will continue to substitute when feasible.

### Strategies

Replace SF6 switches with solid-state dielectric switches

Replace refrigerants with climate-friendly alternatives

## Sustainable Together

The challenge of reducing greenhouse gas emissions to reach carbon neutrality and meet our climate goals requires collaboration across all levels of Carolina. With ambitious plans for climate action also comes the need for funding. While most of the strategies and ideas outlined in this Climate Action Plan rely on decisions made at the institutional level, individual behaviors adopted by the Carolina community will be the key to realizing our ambitions.

As opportunities to connect and collaborate on individual behavior change continue to develop, Sustainable Carolina will facilitate these efforts. For ideas on the actions you can take to reduce emissions and create a more sustainable campus, please visit the "[What Can I Do?](#)" web page. This web page also includes a feedback form where you can send your idea for emissions reduction strategies to us.

By learning about the quantified emissions impacts of everyday choices, communicating greenhouse gas messaging to peers, and staying aware of new tools that shrink greenhouse gas footprints, the Carolina community moves toward our new ambitious climate goals together.

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## Acknowledgments

Developing this Climate Action Plan required a campus-wide collaboration. Thank you for all of the help in developing this. The following groups provided data or insights that helped form this plan: [Carolina Dining Services](#), [Energy Management](#), [Energy Services & Sustainability](#), [Fleet Services](#), [Office of Waste Reduction and Recycling](#), [Study Abroad](#), [The Town of Chapel Hill](#), [Transportation and Parking](#), and [Travel Services](#).

# Progress Tracking

As progress is made towards our carbon neutrality goal, we will continue to update the contents of the plan. For detailed climate action progress, follow [this link to our progress spreadsheet](#) or see the appendix.

## Key

Emission Impact	Estimated Cost	Time Horizon
High: >10% of total emissions	Low: <\$100,000	Short Term: <5 years
Medium: 1 to 10% of total emissions	Medium: \$100,000 to \$1,000,000	Mid Term: 5 to 10 years
Low: <1% of total emissions	High: >\$1,000,000	Long Term: >10 years

Appendix: Progress Tracking

Strategy Category	Project	Responsible Party	Project Description	Emission Impact	Estimated Cost	Time Horizon	Project Status
Energy Efficiency	Continue energy conservation measures	<a href="#">Energy Management</a>	Carolina's Energy Management team will continue to identify, fund, and execute energy efficiency projects such as steam reductions, LED retrofits, and airflow reductions to reduce campus energy use.	Medium	Low	Short Term	<a href="#">Ongoing</a>
Energy Efficiency	Continue building optimization program	<a href="#">Energy Management</a>	UNC Energy Management's Building Optimization Program ensures that campus buildings are working correctly. By ensuring proper functioning, energy is saved, and occupants are more comfortable.	Medium	Low	Short Term	<a href="#">Ongoing</a>
Energy Efficiency	Update building design guidelines	<a href="#">Facilities</a>	Carolina is in the process of revising its building design guidelines to reflect the most current targets, strategies, and technologies. By setting aspirational design guidelines, emissions of future buildings can be reduced.	Medium	Low	Short Term	<a href="#">Ongoing</a>
Stationary Combustion	Eliminate Coal Use	<a href="#">Energy Services</a>	Carolina is committed to eliminating the use of coal as quickly as is technically and financially feasible. Currently that includes increasing natural gas use at the cogeneration facility to reduce coal use.	High	High	Mid Term	<a href="#">Ongoing</a>
Stationary Combustion	Explore Next Generation Fuels	<a href="#">Energy Services</a>	Because natural gas is a temporary fuel solution, alternative fuels will be researched and tested until Carolina finds an alternative that is clean, renewable, reliable, and affordable.	High	High	Short to Mid Term	Ongoing
Stationary Combustion	Explore Carbon Capture	<a href="#">Energy Services</a>	Regardless of the fuel used, combustion results in carbon dioxide emissions. Carbon capture and storage technologies can be used to mitigate these emissions, regardless of the source.	High	High	Long Term	<a href="#">Ongoing</a>
Purchased Electricity	Increase On-Campus Renewable Energy	<a href="#">Energy Services</a>	Carolina currently has 73.5 kW of rooftop solar panels and ongoing projects that will increase this capacity. Carolina will continue to increase the amount of solar PV on campus as budgets allow. Installing solar on all suitable sites could offset up to 5% of all electricity consumption.	Medium	Medium	Short Term	<a href="#">Ongoing</a>
Purchased Electricity	Procure Renewable Energy	<a href="#">Energy Services</a>	In North Carolina, third party sales of electricity are prohibited, meaning Carolina must purchase all electricity from Duke Energy. Duke Energy currently has three programs for renewable energy purchasing. Unfortunately, none of these programs work well for Carolina in their current forms. Carolina is currently analyzing potential ways to make these programs work or create new programs that would allow Carolina to procure renewable energy.	High	High	Short Term	<a href="#">Ongoing</a>
Purchased Electricity	Purchase Renewable Energy Certificates	<a href="#">Energy Services</a>	If Carolina were unable to procure renewable energy through Duke Energy, renewable energy certificates could be purchased. Renewable energy certificates will only be used if Carolina cannot purchase renewable electricity.	High	High	Long Term	Exploring options



Commuting	Encourage and aid CHT in adoption of electric buses	<a href="#">Chapel Hill Transit Public Transit Committee</a>	In 2019, Carolina's student-run RESPC helped fund three electric buses for Chapel Hill Transit (CHT). Carolina will continue to work with CHT to encourage/aid the adoption of electric buses.	Low	High	Short Term	<a href="#">Ongoing</a>
Commuting	Increase the use of the Commuter Alternative Program	<a href="#">Transportation and Parking</a>	The Commuter Alternative Program offers numerous public transit benefits to members who use alternative transportation, including free bus passes, discounts at local businesses, and more.	Medium	Low	Short Term	<a href="#">Ongoing</a>
Commuting	Study parking pass structure and alternatives	<a href="#">Transportation and Parking</a>	Redesigning the parking pass structure to favor low-emission vehicles and flexible day schedules could reduce commuting emissions. A study of the parking pass structure and potential alternatives will be done to determine potential changes.	Medium	Medium	Short Term	Ongoing
Commuting	Expand electric vehicle charging	<a href="#">Transportation and Parking</a>	Charging infrastructure can be a limiting factor in electric vehicle adoption. Carolina will continue to add electric vehicle charging stations as funding allows to encourage electric vehicle adoption.	Low	High	Short Term	<a href="#">Ongoing</a>
Air Travel	Explore green air travel program	<a href="#">Travel Services</a>	Carolina will work to research and develop green air travel programs that use education and travel alternatives to reduce air travel emissions without compromising Carolina's ability to be a global institution.	Medium	Low	Short to Mid Term	Not yet started
Air Travel	Research voluntary and mandatory air travel offsets	<a href="#">Travel Services</a>	Carolina is currently researching many travel-specific carbon offset programs to determine whether these would be feasible and effective.	High	Low	Short to Mid Term	Ongoing
Fleet	Optimize vehicle choice	<a href="#">Fleet Services</a>	Many vehicles on campus have a primary use different than their intended purpose. Fleet Services works with departments to select vehicles that are the correct size, type, and fuel.	Low	Low	Short Term	<a href="#">Ongoing</a>
Fleet	Increase use of biofuels	<a href="#">Fleet Services</a>	Carolina's fleet has been increasingly using ethanol and biodiesel in its fleet when feasible. These fuels will continue to be used and expanded.	Low	Low	Short Term	95% of fleet fuel is some biofuel blend
Fleet	Expand the use of vehicle telematics	<a href="#">Fleet Services</a>	Carolina uses telematics in many of its vehicles and is expanding this program to more departments. The current telematics program has helped to reduce annual fuel use by roughly 28,000 gallons.	Low	Medium	Short Term	<a href="#">Ongoing</a>
Education and Research	Create a peer-to-peer sustainability program	<a href="#">Sustainable Carolina</a>	Through programs such as "peer-to-peer sustainability", sustainability challenges, and engagement and outreach, Carolina will increase its efforts to involve students in the initiatives to become a more sustainable campus.	Low	Low	Short Term	The program will launch in 2023.
Education and Research	Increase engagement in student orientation, week of welcome, etc.	<a href="#">Sustainable Carolina</a>	Sustainable Carolina is involved in these programs but will increase its involvement to reach more students and drive awareness.	Low	Low	Short Term	<a href="#">Ongoing</a>

Education and Research	Launch Green Office certification program	<a href="#">Sustainable Carolina</a>	Carolina is developing a Green Office certification program that will help offices improve their sustainability through checklists and guidance on sustainability initiatives. In 2022 Sustainable Carolina began piloting the program.	Medium	Low	Short Term	<a href="#">Launched</a>
Other	Replace SF6 switches with solid-state dielectric switches	<a href="#">Facilities</a>	Sulfur Hexafluoride (SF6) is an extremely powerful greenhouse gas that is used in electric switchgear. Carolina is working to reduce leakage from its SF6 switches and is planning to replace aging switches with solid state dielectric switches, that do not produce fugitive emissions, as budgets allow.	Low	Medium	Short to Mid Term	Ongoing
Other	Replace refrigerants with climate-friendly alternatives	<a href="#">Facilities</a>	Carolina is working to reduce refrigerant leaks and attempts to use refrigerants with low environmental impacts.	Low	Low	Short Term	Ongoing