



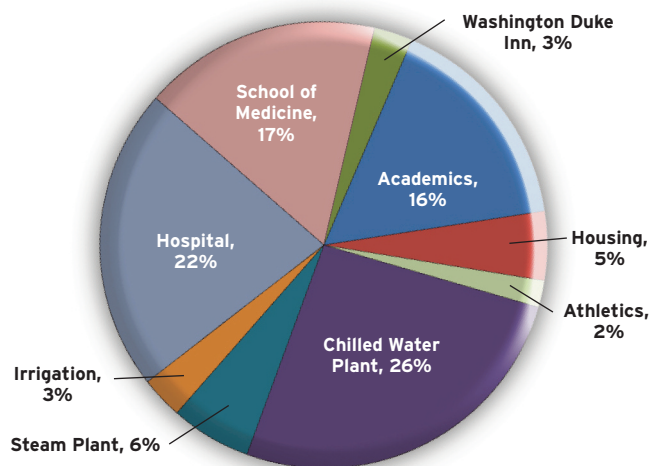
Water & Stormwater Management Sustainability Facts

Overview

Duke University obtains all its potable water from the City of Durham, which receives its raw water supply from the Lake Michie Reservoir and the Little River Reservoir. There are a number of alternative sources to supplement this supply including the Teer Quarry and allocations from neighboring towns.

Water conservation and efficiency have always been a goal of Duke, but this was especially key in October of 2007 when the North Carolina Drought Management Advisory Council listed Durham County, along with 54 other counties, in the highest category of D4-Exceptional Drought. Through the dedicated efforts of everyone on campus, Duke reduced its water use by 50 percent month over month from the previous year with an estimated sustained decrease of 30 percent. In FY 2011, Duke's annual water usage was 448 million gallons.

Duke Water Consumption by Management Center FY2011



Existing Sustainability Initiatives

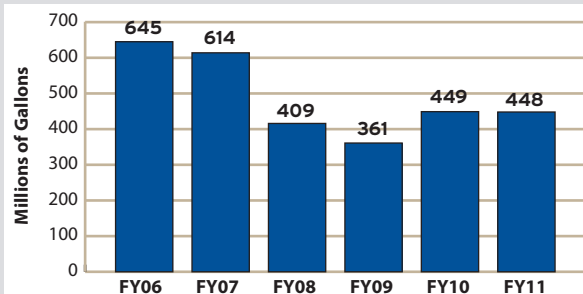
- SWAMP Site
- Take back the Tap
- Non-potable water use at Williams Field
- Campus wide upgrade of bathroom fixtures
- Rainwater Cisterns
- Reducing the number of once through cooling systems in labs
- Expediting the connection of buildings to more efficient, centralized chiller plants

Stormwater Regulation

Stormwater is one of the five central utilities operated by the University. The City of Durham is the monitoring agency, which charges a monthly stormwater fee based on the amount of impervious surface on campus. Duke's campus lies in two different watersheds, the Cape Fear (Main & Central) and Neuse (East), complicating management of this utility.

Stormwater regulations in Durham have become increasingly strict over the past several years. Prior to 2009, city requirements for stormwater differed in each watershed. The Cape Fear focused mainly on the quantity of stormwater leaving campus, while the Neuse had a water quantity and water quality component. With the 2009 update, the city implemented a common ordinance across both basins with a focus on the quality of stormwater leaving campus. It is expected that another update will be released in 2012, again tightening water quality requirements.

Total Campus Water Use



Water and Stormwater Management Statistics Fiscal Year 2011

Score on AASHE STARS Water Section	10.25/10.25
Amount of Potable Water Used	448 million gallons
Amount of Non-Potable Water used by Chiller Plant 2	~40 million gallons
Amount of Rainwater Storage Cisterns on Campus	150,000 gallons*
Total Acres of Campus (Modeled for Stormwater Analysis)	1700
Acres of Impervious Surface (Modeled for Stormwater Analysis)	405
Amount of Water Used for Irrigation	~15 million gallons
Percent of Water Used for Irrigation that is Non-Potable	~10-15%
Number of Campus Water Meters	232†
Number of Buildings on Campus with Water Use Allocated	253‡
Percent of Buildings that are Individually Metered for Water	53%

* CIEMAS 70,000 gal, Center for Athletic Excellence | † 13 City, 62 irrigation, 22 allocated by square feet, 21,000 gal, Williams Field 60,000 gal | 135 individual building

‡ Not including Marine Lab, Central Campus Housing, or Separate Housing Quad Buildings



Water & Stormwater Management Sustainability Facts

Before 2007

- Duke began analyzing stormwater on a regional basis
- Duke's Stream and Wetland Assessment Management Park (SWAMP) site Phase 1 implemented
- Fitzpatrick Center completed with 70,000 gallon underground rain water cistern

2007

- The North Carolina Drought Management Advisory Council listed Durham County, along with 54 other counties, in the highest category of D4- Exceptional Drought
- Duke formed a drought response team for campus water, and water use on campus dropped over 50% month over month from the previous year
- Duke distributed 10,000 free low-flow showerheads to employees and off-campus students

2008

- Washington Duke Golf Course reduced fertilizer and potable water use by 30%
- 250 new ultra-high efficiency front load washing machines installed in residence hall laundry rooms
- Began implementation of alternative water sources for make-up water at Chiller Plant 2

2009

- Environmental Alliance began Duke's Take Back the Tap campaign with water taste tests on The Plaza
- Two rainwater cisterns installed to provide irrigation water for Williams Field
- City of Durham adopted new stricter stormwater ordinance

2010

- City of Durham again updated stormwater ordinance

2011

- West Campus Water Reclamation Pond feasibility study and proposal presented to the Board of Trustees



Energy Sustainability Facts

Utilities Overview

The Duke Facilities Management Department (FMD) provides utilities to both University and Medical Center facilities on and around East and West Campus. FMD manages the complex utility infrastructure that includes chilled water, steam and electricity distribution. Chilled water, used for cooling, and steam, used primarily for heating, dehumidification and sterilization, are the two main centralized utilities produced at Duke. Duke has two campus steam plants that typically use natural gas and fuel oil and two main, centralized chilled water plants that use electricity.

While FMD manages the high voltage electricity distribution system on campus, all electric power is purchased from Duke Energy. Duke Energy is working to reduce the carbon content of its utility plant fleet but currently the main fuel sources used to produce electricity in the Carolinas are coal and nuclear.

Buildings Overview

Designing buildings that are surrounded by green space is a guiding principle of campus planning at Duke. The University has demonstrated a strong commitment to infill building while preserving and creating open space. With regard to building planning, Duke has made significant commitments to sustainable design and construction, including a commitment that all new construction and major renovations will achieve Leadership in Energy and Environmental Design (LEED) Certification standards, with a goal of LEED Silver. Duke currently has 22 LEED certified buildings and 12 buildings registered with LEED for future certification.

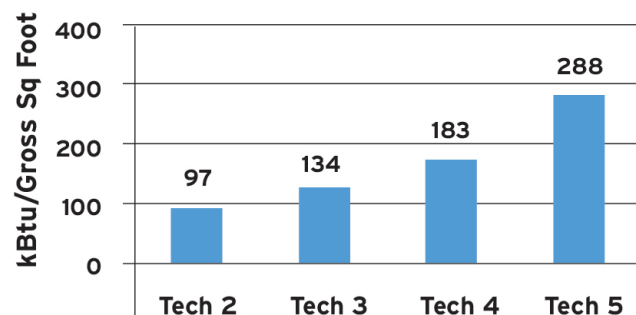
The total square footage of LEED projects at Duke is over 4.8 million gross sq. feet.



Existing Sustainability Initiatives

- Getting off coal
- Temperature and scheduling policy
- Solar thermal on Bryan Center
- Solar PV on Research Drive parking garage
- LEED+ policy for all new buildings
- Energy conservation measures study
- Centralized utility plant energy measures
- Meter upgrades
- Energy Star Policy

FY11 Average Building Energy Use by Building Type



Buildings at Duke are classified by the complexity of systems or "Tech Rating." Buildings with complex and more energy intensive systems have higher tech ratings while buildings with simpler and less energy intensive systems have lower tech ratings. For example, most laboratories are considered "Tech 5" buildings, while offices, classrooms, and housing are typically considered "Tech 3" buildings. Energy Use Indexes should generally increase as tech ratings increase.

Total Energy Consumed at Duke (Durham + Marine Lab)

	Electricity (kWh)	Chilled Water (ton hrs)	Steam (lbs)	Coal (tons)	Nat Gas (MMBtu)	Fuel Oil (gal)	Propane (gal)
FY08	460,803,600	83,620,524	1,209,469,641	53,605	98,360	52,835	0
FY09	452,282,720	95,518,648	1,094,534,021	46,061	409,755	166,951	0
FY10	441,458,010	101,620,473	1,054,961,612	31,712	739,130	152,360	103,600
FY11	457,314,082	111,174,138	1,047,379,532	13,486	1,183,064	245,704	9,030



Energy Sustainability Facts

Timeline

1993

- Duke adopted Campus Design Guidelines incorporating sustainability elements.

1996

- Facilities Management Department (FMD) established an Energy Management team with an initial \$3.5 million loan by the University for efficiency projects.

1998

- FMD is awarded Rebuild America's National Energy Champion Award.

2000

- Duke started to focus on development of a centralized chilled water system with the construction of Chiller Plant #1. The central production and distribution of chilled water is the most efficient and economical method to provide the cooling needs for Duke University's campus including the School of Medicine and Medical Center.

2002

- FMD is awarded Rebuild America's National Energy Champion Award.
- Environmental Alliance (EA), the main undergraduate student environmental group, established Eco-Olympics, an energy, waste and water reduction competition between dorms on East Campus.
- EA partnered with FMD to establish a light bulb exchange for first year students to upgrade to compact fluorescent light bulbs during Eco-Olympics.
- Kilgo Quad Residence Hall became Duke's first LEED certified building and the first LEED certified residential renovation at an American university.

2003

- Duke adopted a formal campus LEED policy that all new construction and major renovations would achieve LEED standards with a goal of silver certification.

2005

- Duke adopted an Energy Star Policy.

2008

- FMD established an Energy Management office and hired a campus Energy Manager
- Duke's Home Depot Smart Home became the first LEED Platinum certified residence hall in the country. This project began as the vision of a Duke electrical and computer engineering student. The goal of The Home Depot Smart Home is to serve as a living laboratory focused on sustainable living and technology integration.

Climate Action Plan Energy Goals

Energy use at Duke has a significant impact on the environmental footprint of the university and comprises approximately 75 percent of the campus greenhouse gas emissions. With the adoption of the Climate Action Plan (CAP) in 2009, Duke committed to move forward on the following recommendations to reduce the overall impact of energy use on campus.

- Push beyond the current LEED building policy to establish green building energy consumption standards and an approval protocol for building energy consumption review.
- Implement, beginning in 2010, energy conservation measures in existing buildings with the goal to realize a 15% reduction in energy use over a 20 year period.
- Discontinue the use of coal as soon as possible in campus steam plants.
- Continue to urge, monitor and review Duke Energy's progress towards emissions reductions while exploring on-campus electricity generation options.
- Leverage research into alternative technologies and explore and implement conversion to biogas, solar PV, solar thermal, combined heat and power or other technologies by 2030.
- Pursue plant efficiency improvements with tactics such as: distribution system upgrades, thermal storage, chilled water expansion and upgrade, and boiler plant heat recovery.

2009

- The Duke Board of Trustees endorsed the Duke University Climate Action Plan to achieve carbon neutrality by 2024.
- Duke's Research Drive Parking Garage is completed as the nation's first single-use, stand-alone LEED certified parking facility.

2010

- The abandoned East Campus Steam Plant is re-commissioned as a high efficiency natural gas plant. Duke began the design and planning for the conversion of the West Campus steam plant to a natural gas/oil plant.
- A campus Temperature and Scheduling Policy is implemented in buildings with centralized control systems resulting in significant energy and financial savings.

2011

- Duke burned last amount of coal in the West Campus Steam Plant.
- A solar thermal hot water system is installed at the Bryan Center.



Recycling & Waste Management Sustainability Facts

Overview

Duke Recycles was established in 1989 by The Environmentally Concerned Organization of Students (ECOS) with a truck and four pick-up locations. Since then, Duke Recycles has been incorporated into a permanent part of the Facilities Management Department. Duke Recycles collects traditional recyclables, handles special events recycling and composting, as well as provides bins for office cleanouts. Duke Sanitation is responsible for collection of all waste sent to the landfill by the University and the Medical Center. Although the Duke Sanitation and Recycling Office handles most recycling and waste management services for the University, the Procurement Department and the Occupational and Environmental Safety Office also play a role in the collection of certain materials.

Existing Sustainability Initiatives and Awards

- Move out for Charity
- Recycle for the Children
- Electronics recycling and donation
- Battery recycling
- Free Store
- Waste Free Events
- Environmental Management Action Committee (EMAC) & EMAC Awards
- Carolina Recycling Association's Outstanding College and University Award Winner 1998, 2009
- Durham Earth Day Award Winner 2000, 2002

Primary Materials Recycled at Duke

- Office paper
- Newspaper and magazines
- Chipboard
- Cardboard
- Glass
- Plastics #1-7
- Aluminum
- Steel/Tin cans
- Electronics
- Universal waste – ex. batteries, florescent light bulbs

For additional details – visit the Duke “What Can be Recycled” website



Recycling and Waste Management Statistics Fiscal Year 2011

Score on AASHE STARS Waste Section	5.18/12.5
Electronics Recycled (University and Medical Center)	112.6 tons
Confidential Paper Shred Recycled – University, School of Medicine and Health System	194 tons
Amount of Traditional Recyclables – Duke Recycles	986 tons
Amount of Traditional Recyclables – School of Medicine	40.5 tons
Amount of Traditional Recyclables – Duke University Health System	344.4 tons
Total Amount of Material Recycled – University, School of Medicine, and Health System	1677.5 tons
Total Amount of Material Sent to the Landfill– University, School of Medicine, and Health System	9512.1 tons
Amount of Batteries Recycled	2 tons
Amount of Fluorescent Light Bulbs Recycled	19.8 tons



Recycling & Waste Management Sustainability Facts

1989

- Duke Recycles was established by a group of students. These students took on the task of recycling at Duke beginning with four pickup locations, seven collection items, and one truck.

1991

- Duke Recycles, as an administrative department within Facilities Management, began providing service to nearly every academic and administrative building on campus

1996

- The Recycling Advisory Committee (now the Environmental Management Action Committee) was formed

2007

- Procurement began central oversight of surplus property program and storage program
- Retail surplus store closed
- Donation – Only business model for surplus property implemented
- Formalized Electronic Waste program began

2008

- Duke University Health System recycling program began
- Pipette tip box recycling program piloted

2009

- Duke Recycles began providing recycling bins in Cameron Indoor Stadium
- Duke won the Carolina Recycling Association's Outstanding College and University Award for its success with the Recycle for the Children program

2010

- Duke's Free Store opened a new location in the Bryan Center as a place for students, faculty, and staff to donate and/or take any gently used office supplies, dorm supplies, books, kitchen supplies, or other miscellaneous items
- Comprehensive School of Medicine recycling program began

2011

- Pipette tip box recycling program with VWR, primary lab supply vendor for Duke, was implemented



Carbon Offsets Sustainability Facts

Overview

Although Duke has made major strides towards reducing campus greenhouse gas emissions, the University will not be able to meet its climate neutrality goal in 2024 without carbon offsets — emission reductions achieved off-campus that Duke can count as its own. To meet this need the Duke Carbon Offsets Initiative (DCOI) was created. DCOI works to develop a portfolio of carbon offset projects that will help the campus meet its emission targets while putting Duke's knowledge to the service of society. The offsets Duke needs equal over half of the university's total projected emissions baseline, or some 180,000+ tons of carbon dioxide equivalents. The DCOI is the first university-sponsored carbon offsets program in the country.

In addition to helping Duke meet its annual climate neutrality goals in 2024 and beyond, the DCOI has begun to make offsets available for purchase by students, faculty, staff, and departments that wish to offset their carbon emissions prior to 2024. DukeEngage participants and the Fisheries Leadership and Sustainability Forum are among the first purchasers from the DCOI.

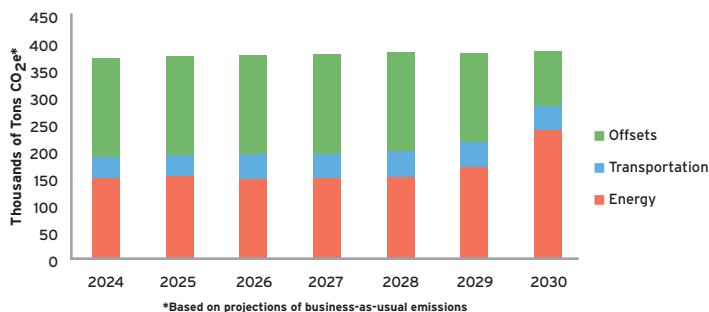
First Offsets Project On-Line May 2011

The DCOI's first full-scale carbon offsets project went live in May 2011 at the Loyd Ray Farms in Yadkinville, NC. The project, a collaboration between Duke University, Duke Energy, and most recently Google, facilitates the capture of methane from swine waste in an anaerobic digester. A 65-kW microturbine uses the gas to generate enough electricity to power the waste management system and five of the farm's nine barns, which results in significant cost savings for the farmer.

The project has many benefits beyond GHG reductions and electricity generation, including being the first anaerobic-digestion-based system to meet NC's stringent environmental performance standards for nutrients, pathogens, ammonia, odors and discharge of waste to surface and groundwater. It also has the potential to increase farm income by improving animal health and opening up land for cash crops. If all swine farms in NC were converted to innovative systems, a total of 4.3 million tons CO₂e of emissions would be saved and 1.1 million MWh of electricity would be generated annually.

The project is the first of its kind in NC to generate offsets and renewable energy certificates (RECs) from swine waste to be classified by the NC Division of Water Quality as an Innovative Waste Management System. The offsets will be registered and verified to Climate Action Reserve standards, while Duke Energy will apply the RECs toward its Renewable Energy Portfolio Standard swine waste requirements.

Duke University Expected Emission Reductions between 2024 and 2030



A Portfolio Approach to Carbon Offsets

The DCOI plans to include a variety of project types in Duke's offsets portfolio. Projects currently being evaluated include:

- Additional swine waste methane-capture projects
- Energy efficiency improvements to NC homes and businesses
- Reforestation and forest conservation
- Coastal wetland restoration, a.k.a. "Blue Carbon"
- Anaerobic digestion of food waste and combined food and swine waste anaerobic digestion



Learning by Doing: Loyd Ray Farms provides examples of innovation and opportunities for research. Nicholas School Energy Club at the Loyd Ray Farms, September 2011.



Carbon Offsets Sustainability Facts

2007

- President Brodhead signs the American College and University Presidents' Climate Commitment, committing Duke to develop and plan to achieve carbon neutrality.

2008

- Offsets feasibility study released, authored by Sustainable Duke and the Nicholas Institute for Environmental Policy Solutions. Feasibility Study recommends locally and regionally generated offsets as an appropriate and attractive source for Duke's offset needs.

2009

- With financial assistance from The Duke Endowment, Office of the Executive Vice President establishes the Duke Carbon Offsets Initiative (DCOI) to develop, facilitate, and catalyze projects in North Carolina and the southeast to help meet Duke's demand for offsets.
- Board of Trustees endorses the Duke University Climate Action Plan to achieve carbon neutrality by 2024.
- DCOI co-hosts Carbon & Renewable Energy Markets Producer Forum in Kenansville, NC, approximately 200 stakeholders attend.

2010

- DukeEngage partners with DCOI and Sustainable Duke to offer offsets to summer 2010 DukeEngage participants.
- USDA Natural Resources Conservation Service and NC Lagoon Conversion Program award the Loyd Ray Farms project \$500,000 to construct an innovative swine waste management system.

- DCOI recruits Dr. Marc Deshusses of the Pratt School of Engineering to lead research effort for Loyd Ray Farms project.
- With federal and state funds secured, DCOI negotiates agreement between Duke University, Duke Energy and Loyd Ray Farms for 10-year waste-to-energy carbon offsets project that will allow for evaluation and refinement of the system.
- Loyd Ray Farms project breaks ground.

2011

- DCOI and Fisheries Leadership and Sustainability Forum, an academic and policy partnership of the Nicholas Institute, complete forward purchase of carbon offsets.
- Construction completed and operations begin at the Loyd Ray Farms waste-to-energy carbon offsets project.
- DCOI negotiates an agreement with Google, Inc., by which Google will provide support to the Loyd Ray Farms project in return for a portion of the carbon offsets achieved.
- Executive Vice President Tallman Trask issues a university-wide directive encouraging all departments and individuals to purchase carbon offsets internally through the DCOI.
- Loyd Ray Farms Open House attracts federal and state officials, as well as public and private interest. Event and completion of construction garner interest from several news outlets, including Charlotte Observer, News 14 Carolina, and the Los Angeles Times.
- The Nicholas Institute agrees to purchase credits from DCOI to offset its emissions, including those associated with energy use, travel, and employee commuting.
- DCOI begins to investigate energy efficiency-based offsets, forest offsets, blue carbon and emission reductions from Duke Hospital.

Carbon Offsets Statistics Fiscal Year 2011

Duke's estimated offsets need in 2024	~180,000 CO ₂ e
Estimated offsets potential of Loyd Ray Farms project	5,000 tons CO ₂ e per year
Emissions saved in number of cars by Loyd Ray Farms project	900 per year
Estimated Renewable Energy Certificate (REC) potential of Loyd Ray Farms project	500 MWh per year
Number of homes that could be powered for a year by the system at Loyd Ray Farms	35
Total potential emissions reductions from all North Carolina swine farms	4.3 million tons CO ₂ e per year
Total potential electricity generation from all North Carolina swine farms	1.1 million MWh per year
Current price of DCOI offsets available to the internal Duke community	\$10/ton
Total number of offsets requested for purchase to date by the internal Duke community	275 tons



Overview

Duke's parking and transportation system manages supply and demand while providing employees and students options that balance price and convenience. With a robust alternative transportation program, reliable on-campus transportation services, an appropriate mix of on-campus student and employee parking, and off-campus park and ride lots, there is a transportation option for most every need.

With thousands of visitors, 30,000 employees and over 14,000 students, Duke encourages staff, faculty and students who commute to campus to explore alternative transportation options. Duke offers many options to save on fuel and parking fees while helping Duke contribute to its mission of creating a more sustainable campus.

How Duke Employees Get to Work (based on TTA and PTS survey data)

Mode	GHG Effects	Percent
Drive Alone	<div>Most Impacting</div> <div>↓</div> <div>Least Impacting</div>	73%
Carpool (2+)		6%
Vanpool		1%
Motorcycle/Moped		0.4%
Bus		3%
Bike		1%
Walk		1%
Other*		14%

*Telecommute, compressed schedule, regular day off, etc.

Existing Sustainability Initiatives

Bikes

- Registered Bike Commuters
- DukeBikes Rentals
- Outpost Bike Repairs
- BikeDuke.com
- Duke Bike Rack Map
- Existing Bike Lanes and Scheduled Painting Improvements



Alternatives to Single Occupancy Vehicles

- Carpool Parking Passes
- Rideshares
- Priority for Low Emissions Vehicles
- Vanpool Program
- WeCar
- Telecommuting

Transit

- GoPass
- Bull City Connector
- Ultra-low Sulfur Diesel Fuel Buses
- Articulated Hybrid Buses
- Housing Map using the Bus System

Climate Action Plan Transportation Goals

The overall objective of Duke's transportation demand management effort is to reduce the number of single-occupancy vehicles coming to and moving throughout campus on a daily basis and "green" the campus fleet. The existing recommendations in the CAP to meet this objective include:

Commuter Travel

- Duke should develop a comprehensive Transportation Demand Management program that utilizes the following tactics: carpool incentives; park and ride sites; and marketing, data collection, and analysis on commuter patterns.
- Duke should study whether an affiliated housing program is feasible to incent commuters to chose location based on individual carbon footprint reductions.
- Duke should engage on regional transportation issues such as regional transit, light rail/bus rapid transit (BRT) service and regional bike routes.

Campus Fleet

- Duke should replace 10 buses to take advantage of efficiency gains of sixty-foot articulating, hybrid buses.
- Duke should encourage the utilization of local/regional transit through tactics such as: transit pass subsidy, advocating for improved local transit service and eliminating redundant service
- Duke should establish a "Green Policy" for fleet replacement to achieve vehicle efficiency/emissions improvements and right-size the Duke fleet with the goal to achieve 50% emissions reductions (factoring fuel efficiency gains)

Transportation Statistics FY11

Duke's GHG emissions that are transportation related	27%
Employees with individual parking permits	18,869
Employees registered as a part of a rideshare	122
Employees in registered vanpools	31
Registered carpoolers at Duke	664 (393 students, 271 employees)
Registered bike commuters at Duke	521 (321 students, 200 employees)
Employees regularly commuting using the Bull City Connector	107 (51% of ridership are Duke employees)
Employees using monthly bus pass	776
Employees regularly commute using the GoPass	724



Transportation Sustainability Facts

Timeline

1995 <ul style="list-style-type: none"> Duke employees began using Triangle Transit Authority's Vanpool Program. 	<ul style="list-style-type: none"> Duke hired its first Transportation Demand Manager. The Duke GreenRide website was improved with messaging and calendar functions. An online map of bike racks on campus was launched. New bike lanes were added to Anderson Street Duke began work on a GPS tracking system for campus buses. Duke and the City of Durham invested in the Bull City Connector to begin providing service between campus and downtown Durham. Duke and the City of Durham were awarded the Outstanding Project in the Public-Private Partnership Category at Downtown Durham Inc. for their collaboration on the Bull City Connector.
2007 <ul style="list-style-type: none"> Duke Buses began using ultra-low sulfur diesel due to significant maintenance issues with clean-burning biodiesel. DukeBikes, a free bike loan program, was launched. 	
2008 <ul style="list-style-type: none"> Duke Transit launched the LaSalle Loop to service off-campus students living in apartments between Erwin Road and Hillsborough Road. Duke enhanced its carpool program for staff and faculty by offering new incentives including free parking for groups of 4 or more and 24 individual daily parking passes for participants who share a ride with at least one other person. Duke GreenRide, a website where Duke commuters can find carpooling partners, was launched. Student carpool spaces added to Blue Zone Parking Lot. 	
2009 <ul style="list-style-type: none"> The Chapel Drive stop was added to the Raleigh-Durham Triangle Transit Authority routes. A ZipCar program was launched at Duke. DukeList added a "Ride and Airport Cab Share" category to allow members of the Duke Community to connect and set up cost-saving, carbon reducing rideshares for one-time trips. 	2011 <ul style="list-style-type: none"> Duke received two awards at the eighth annual Triangle Commuter Awards for its efforts to grow its alternative transportation program. BikeDuke.com, a website of information for commuters who bike to Duke and in Durham, was launched. An online housing map with detailed bus route information was launched. The Tour de Duke Bike Parade, organized by several Nicholas School Students, was held on Earth Day. Duke began giving out free GoPasses to Duke Students and Employees. WeCar replaced ZipCar at Duke. Four electric, Chevrolet Volts are included in the car-sharing fleet. The first 2 articulated hybrid buses were added to the Duke fleet.
2010 <ul style="list-style-type: none"> The LEED Silver certified Sand's parking garage, the first LEED certified parking garage in the US, opened next the Duke University Eye Center. 	