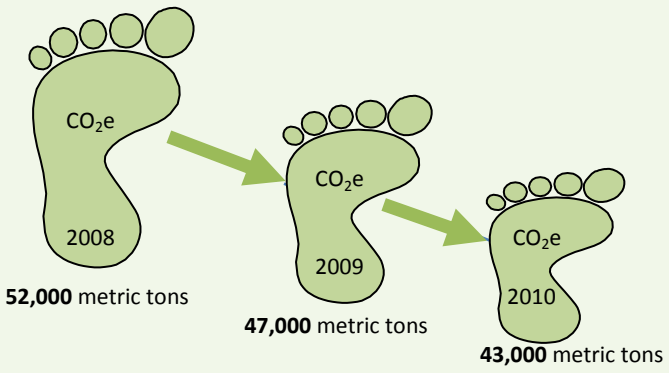
2010 Carbon Footprint

The Department of Environment and Natural Resources (DENR) developed its Strategic Energy Plan in response to mandates calling for reductions in energy and fossil fuel consumption. The mandates include *General Statute 143-64.10-12 Conservation of Energy, Water, and Other Utilities in Government Facilities* and the Utilities Savings Initiative (USI) established by the Governor's Efficiency Commission. These programs require that energy consumption in state facilities be reduced by 20 percent by 2010 and 30 percent by 2015 from the 2003 base year. In addition, Section 19.5 of Session Law 2005-276 requires a 20 percent reduction in the use of petroleum products by state vehicle fleets by 2010 from the 2004 base year to 2010.

As part of these initiatives, DENR collected and analyzed data on building energy and vehicle petroleum use. Using these data, DENR developed a greenhouse gas (GHG) emissions inventory and quantified carbon emissions associated with our operations. DENR developed a calendar year 2008 baseline GHG emissions inventory for each division and program office, and that is used to show changes in emissions over time. This report summarizes DENR's energy and petroleum use and carbon footprint for 2008, 2009 and 2010.

More importantly, DENR is leading by example by implementing energy efficiency and conservation projects that save electricity and fuel costs and reduce our carbon footprint. Projects include more efficient lighting, programmable thermostats, increased use of teleconferences and webinars, employee outreach programs and building specific projects. (See DENR Strategic Energy Plan and Petroleum Displacement Plan for specific examples.) These projects have led to a 22 percent reduction in building energy use and a 27 percent reduction in vehicle petroleum use since FY 2004.

Through these efforts, DENR hopes to lead by example



How much is 43,000 metric tons?

- Annual GHG emissions from 4,300 homes
- GHG emissions from burning 195 railroad cars of coal – that's almost a 2-mile long train
- GHG emissions from burning 4.6 million gallons of gasoline

"It is our hope that through education and enhanced infrastructure, DENR will be able to become more sustainable and be able to achieve meaningful reductions in our energy usage and carbon footprint."

Secretary Dee Freeman

For more information:

http://www.climatechange.nc.gov/

Boundaries of Our Footprint *

- 18 divisions, eight administrative divisions, 13 special program areas, as well as seven regional offices, and 19 district offices
- 4,137 employees
- 29 state parks, two state forests, three aquariums, one museum, and one zoo
- 2,450,000 square feet owned and leased by DENR including offices, exhibits, storage facilities, and ranger stations
- Over 2,500 owned and leased road vehicles
- Over 1,000 pieces of off-road equipment, 30 aircraft, eight helicopters, and 146 boats

* Forestry, Soil Conservation and Environmental Health were part of DENR during this time but are no longer in the department

What are greenhouse gases?

Gases that absorb and re-emit heat in the atmosphere are referred to as GHGs. The principal GHGs are listed below. Some GHGs occur due to human activity (anthropogenic) while other sources are natural (biogenic). CO_2 emissions from biofuels are considered biogenic and are reported separately. This table gives the contribution of each GHG compund to DENR's total carbon footprint.

Greenhouse Gas	Formula	CO_2 Equivalent Emissions (Metric Tons CO_2e)
carbon dioxide	CO_2	41,992
carbon dioxide (from biofuels)	CO_2	301
methane	CH_4	37
nitrous oxide	N_2O	341
hydrogenated chlorofluorocarbons	HCF	307
Total Metric Tons of CO_2e		**42,978**

The various compounds are converted in this report to **CO_2 equivalent** (CO_2e) emissions. This normalizes the data to reflect the global warming potential of each compound with CO_2 as a baseline. For example, methane has 21 times the warming potential of CO_2.

A metric ton is equal to 2,205 pounds.

Development of the Inventory

DENR develops the inventory using *The Climate Registry General Reporting Protocol Version 1.2*. This is a "bottom up" approach to estimating emissions. Emissions are estimated for a variety of sources such as building heat, vehicle use and refrigerant leaks. Activity data such as kilowatt-hours used, therms of natural gas used, and gallons of fuel used are collected for individual sources. Fugitive emissions from refrigerant leaks also are estimated. DENR voluntarily submits this data each year to **The Climate Registry** (TCR).

Climate Registered™

2010 Energy Use

Electricity

47,000 kWh

Building Heat

95,000 MMBtu

On-road Vehicle Use

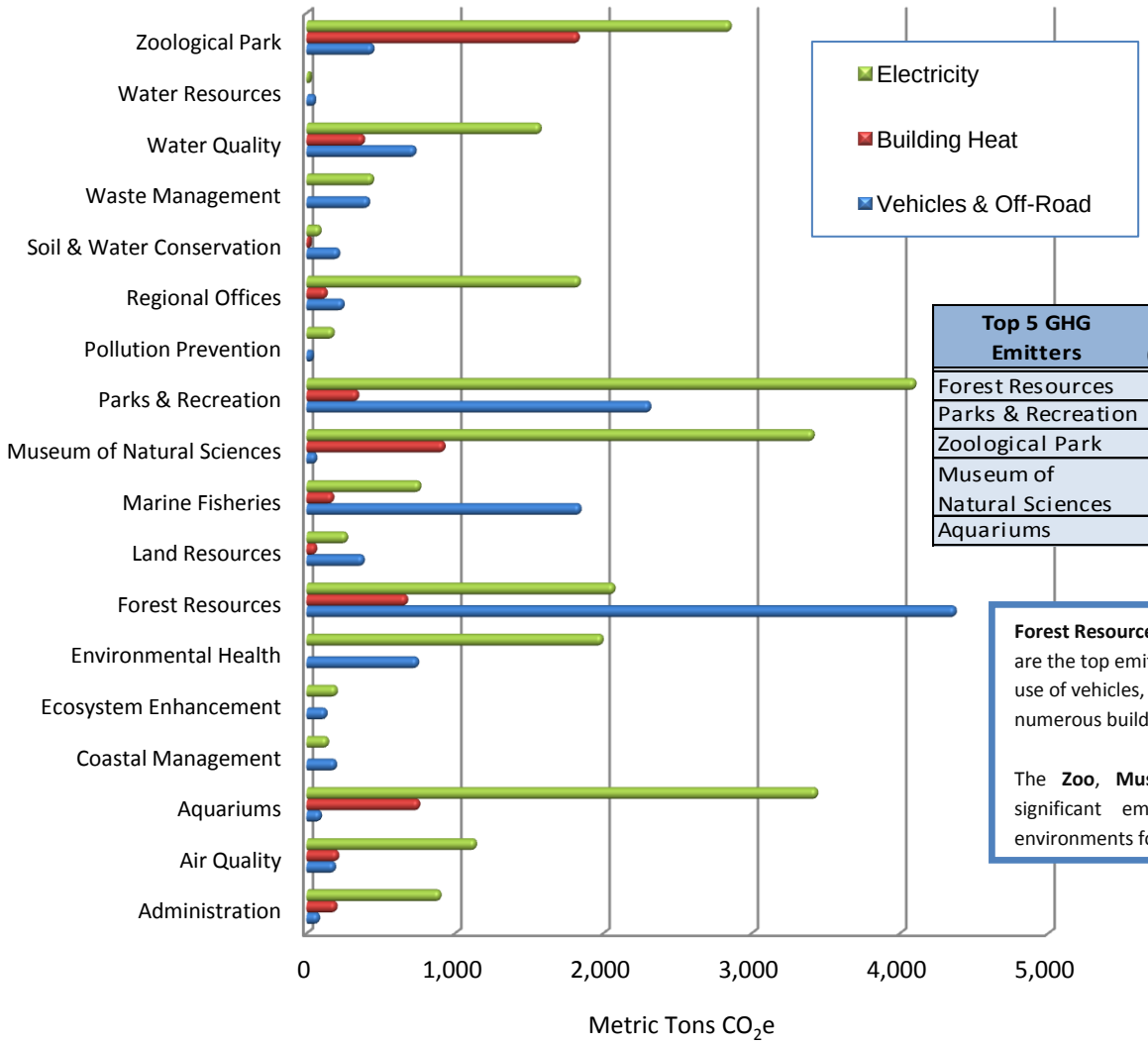
1,500,000 gallons

Off-road Use

215,000 gallons

DENR spent $3.6 million on electricity and $1.1 million on building heat in 2010.

2010 CO_2e Emissions by Division *

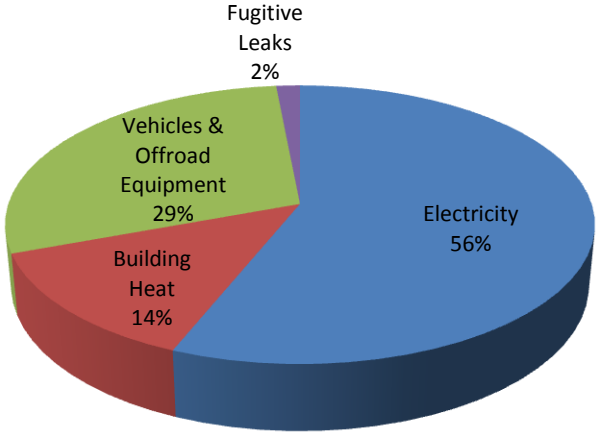


Top 5 GHG Emitters	CO_2e (metric tons)	Percentage of Total
Forest Resources	7,133	16%
Parks & Recreation	6,754	15%
Zoological Park	5,130	12%
Museum of Natural Sciences	4,399	10%
Aquariums	4,286	10%

Forest Resources and **Parks & Recreation** are the top emitters primarily due to the use of vehicles, off-road equipment, and numerous buildings.

The **Zoo**, **Museum** and **Aquariums** are significant emitters due to controlled environments for exhibits.

*Forestry, Soil Conservation and Environmental Health part of DENR during this time but are no longer in the department



2010 Greenhouse Gas Emissions by Sector

43,000 Metric tons CO_2e

What Does Each Sector Represent?

ELECTRICITY –Emissions from electricity use in leased and owned spaces and by DENR equipment.

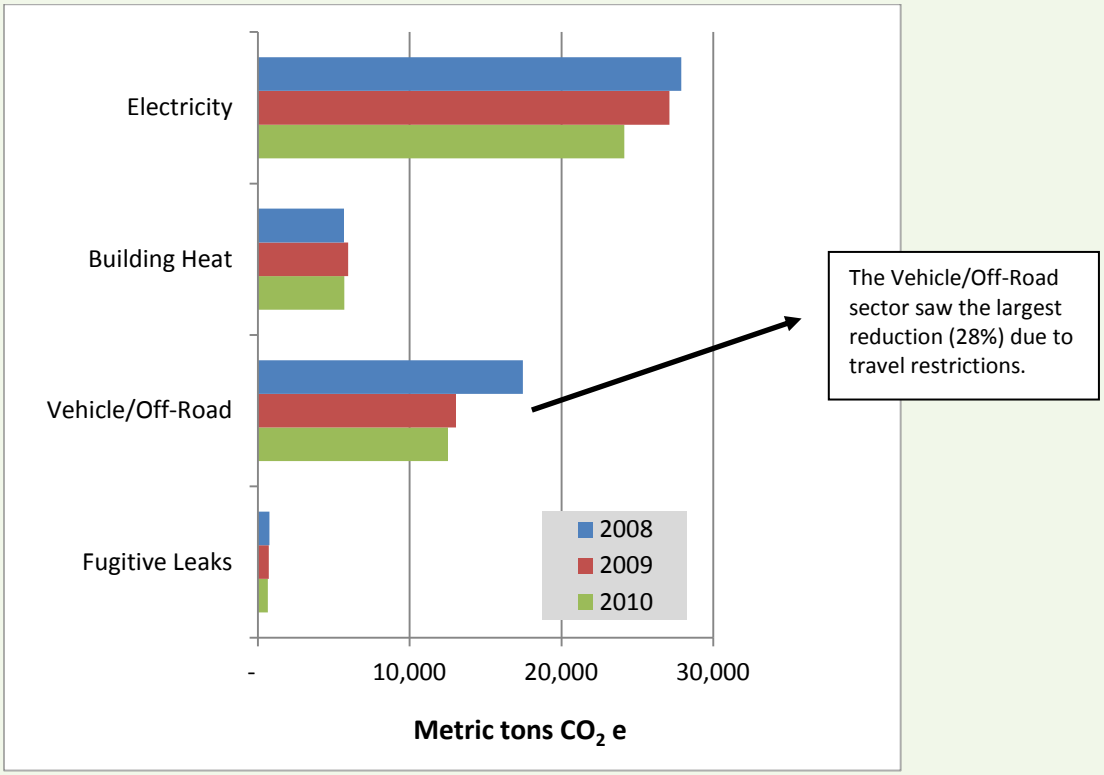
BUILDING HEAT – Emissions from combustion devices that burn natural gas, propane or fuel oil to provide building heat, hot water and/or steam.

VEHICLES & OFF-ROAD EQUIPMENT– Emissions from on-road vehicles. Off-road equipment includes boats, aircraft, construction equipment and utility vehicles. This sector does not include commuter miles.

FUGITIVE LEAKS – Refrigerant leaks from vehicle and building air conditioner systems. This sector also includes estimates for emergency generators and fire pumps.

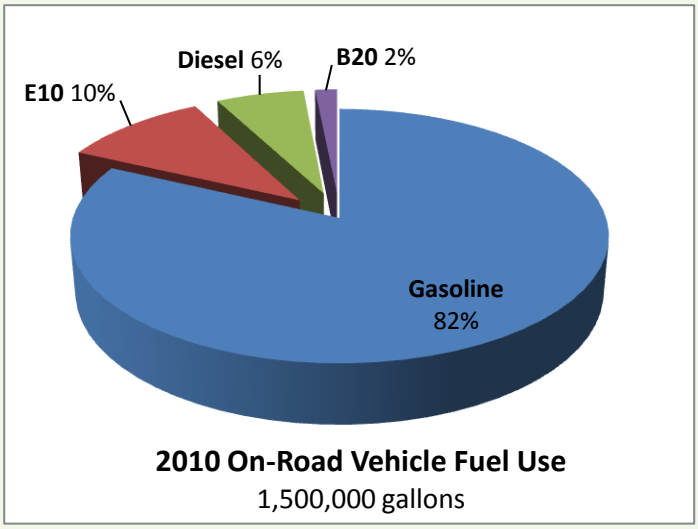
Understanding Emissions by Sector

Collecting detailed energy use data for each sector allows DENR to understand changes in energy use and cost over time. We can use these data to identify energy conservation measures for specific activities, buildings, and operational policies that will reduce energy costs, as well as GHG emissions.

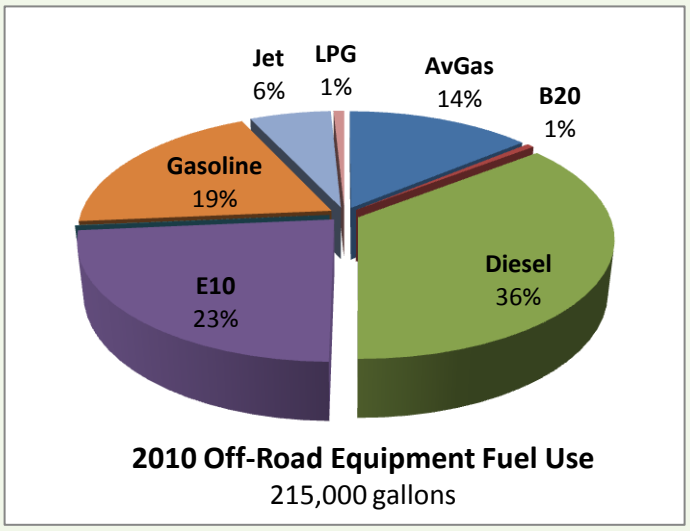


2010 Vehicle & Off-Road Fuel Use

DENR has approximately 2,500 on-road vehicles, making it the fifth largest fleet operated by the state. The on-road fleet also consumes the fifth highest amount of fuel. In addition, DENR operates approximately 1,000 pieces of off-road vehicle equipment including landscaping equipment, construction equipment, fire equipment, boats, planes and helicopters.



2010 On-Road Vehicle Fuel Use
1,500,000 gallons



2010 Off-Road Equipment Fuel Use
215,000 gallons

Future Inventories

DENR has already begun collecting data for the 2011 inventory. We do not anticipate changes to our data collection procedures or estimation methodology. However, a new baseline must be established due to the departure of Forestry, Soil Conservation and Environmental Health and our move to Green Square.

Acknowledgements

The DAQ has been spearheading the DENR Green House Gas Emissions Inventory effort with representatives from 25 divisions and program offices forming the DENR Climate Change Work Group. Financial assistance was provided from the NC State Energy Office to enable independent evaluation of DENR's data gathering, analysis, and management procedures. A list of individuals who have contributed to the 2008-2010 inventories is given below.

Janine Nicholson – Secretary's Office
Shelia Holman- Air Quality
Sushma Masemore - Air Quality
Amy Simes - Administration
Pattie Hower – Administration
Pamela Witt - Administration
Paula Hemmer – Air Quality
Melissa Sebastian - Coastal Management
Jeannie Betts – Controller's Office
Maureen Hollins – Controller's Office
Eric Ellis - Ecosystem Enhancement
Edith McKinney - Environmental Education
Barbara Grimes - Environmental Health
Lucia Woodlief – Environmental Health
Craig Clarke - Forest Resources
Bill Swartley - Forest Resources
Tracy Davis – Land Resources
Justin Harcum- Land Resources
Sally McKinney - Land Resources
Ron Allison - Motor Fleet Management
Anthony Nelson - Marine Fisheries
Gene Greene - Marine Fisheries
Tiffany D. Frazier - Marine Fisheries
Jan Weems - Museum of Natural Sciences
Alvin Braswell – Museum of Natural Sciences
Jeremy Jones - Museum of Natural Sciences
Karen Giroux. - Museum of Natural Sciences
Michael Burch - Museum of Natural Sciences
Dean Carpenter - Natural Resources Planning
Joanne Harcke - NC Aquariums
Summer Gerrell – NC Aquariums
Brian Strong - Parks and Recreation
Jerry Howerton- Parks and Recreation
John Seymour – Pollution Prevention
Denise Young - Regional Offices
Lisa Lewis - Regional Offices
David Harrison - Soil and Water Conservation
Sharon Brinkley - Waste Management
Krystal Moody - Water Resources
Linda West - Water Quality
Bob Langston - Zoological Park