

BUNCOMBE COUNTY

# Energy Use and Carbon Emissions Report

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**Buncombe County General Services**

**9/13/2011**

# Executive Summary

The purpose of this report is to estimate and detail the total energy use and carbon emissions of Buncombe County Government for each year from 2005 to 2010.

## Energy Use

### Buildings

- 64,862.53 BTUs per square foot in 2010 steady reduction since 2006
- Utility Cost: \$1.09 per square foot 2010, down from \$1.317 in 2006

### Fleet

- Total between 6.7 and 6.9 million miles per year between 2006 and 2009
- 6.5 million miles traveled a reduction in travel of 227,207 miles in 2010 vs. 2009
- 14.20 mpg in 2006 13.11 mpg in 2010

### Mechanized Equipment<sup>1</sup>

- 89,849.7 gallons of fuel used in 2010

## Carbon Footprint

- Total of 26,096 MT<sup>2</sup> CO2 emitted in 2010

### Buildings

- 15,853 MT CO2
- 60.7% of total carbon emissions

### Employee Commute

- 4,815 MT CO2
- 18.5% of total carbon emissions
- Estimated 10.9 million miles of employee commute during 2010

### Fleet

- 4,529 MT CO2
- 17.4% of total carbon emissions

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<sup>1</sup> Revised from 2009 report due to mistake in calculation of fuel consumed

<sup>2</sup> MT- Metric Tons (2204lbs)

### Mechanized Equipment

- 899 MT CO<sub>2</sub>
- 3.4% of total carbon emissions

### **Water Consumption**

- 33,993,644 gallons of water consumed in 2010

## Introduction

Increased knowledge of energy consumption and methods for improved energy efficiency are of ever increasing importance for local governments. Administrations and managers around the country are in a constant search for new ways in which energy usage can be managed and ultimately reduced.

Buncombe County began taking steps toward improving its energy efficiency in the mid 1990s with forward thinking projects designed to reduce energy consumption. These initial projects were conceived during a period of economic growth and exemplified Buncombe County's commitment to operating all of its facilities efficiently, while minimizing their budgetary impact. In addition to easing budgetary concerns associated with rising energy costs, these efforts help put the county at the forefront of environmental stewardship in the region.

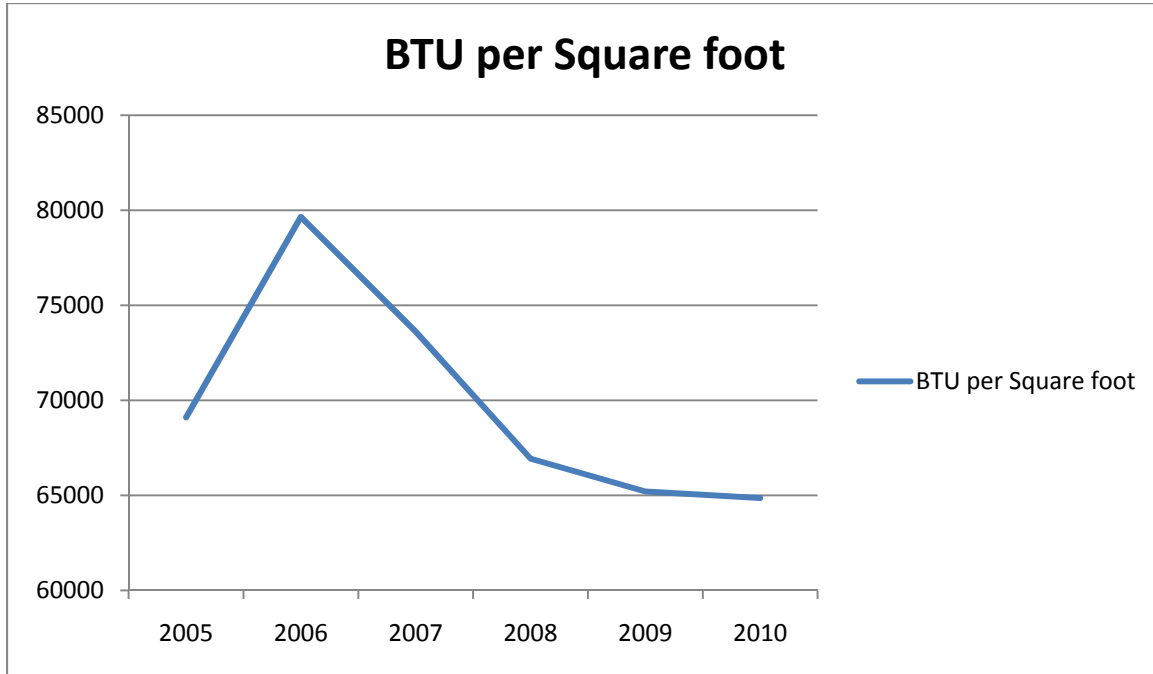
As Buncombe County continued to further its commitment to reduce energy consumption, the next logical step was rigorous effort to track its current energy use and develop a plan which delineated the county's energy goals. This manifested itself in the development and implementation of the county's *Sustainability Plan*. The plan outlines future objectives and performance metrics to measure the county's progress in moving toward its overall goal: reducing Buncombe County's energy consumption and carbon footprint to the greatest extent possible without adversely affecting the level of service provided to its citizens. The next step in the process was to determine benchmarks for energy consumption as a starting point for monitoring the positive impacts of the Sustainability Plan implementation. The *2<sup>nd</sup> Annual Energy Use and Carbon Emissions Report* serves to provide these benchmarks and to track our progress towards a more sustainable government. Additionally this report provides an opportunity to educate and inform citizens and staff of the county's current performance and the effect previous efforts have had in reducing its energy usage and carbon footprint. The report also introduces new performance metrics, such as BTU per square foot, which allow for comparison of all types of energy use with a single unit of measure.

County owned buildings are the largest single sector of energy consumption and carbon emissions, followed by vehicle fleet and finally mechanized equipment. Part I: Total Energy Use by Sector; details and explains the total energy consumption and associated costs. Part II: Carbon Footprint; delves into the county's effect on the surrounding environment and quantifies carbon emissions for each sector of government operations. Part III: Water Consumption, quantifies water purchased from the City of Asheville. Part IV: Project Review; explains completed projects that have succeeded in reducing both carbon emissions and energy consumption. Finally, Part V: Future Plans; paints a clear picture of the direction Buncombe County is headed.

# Part I: Energy Use by Sector

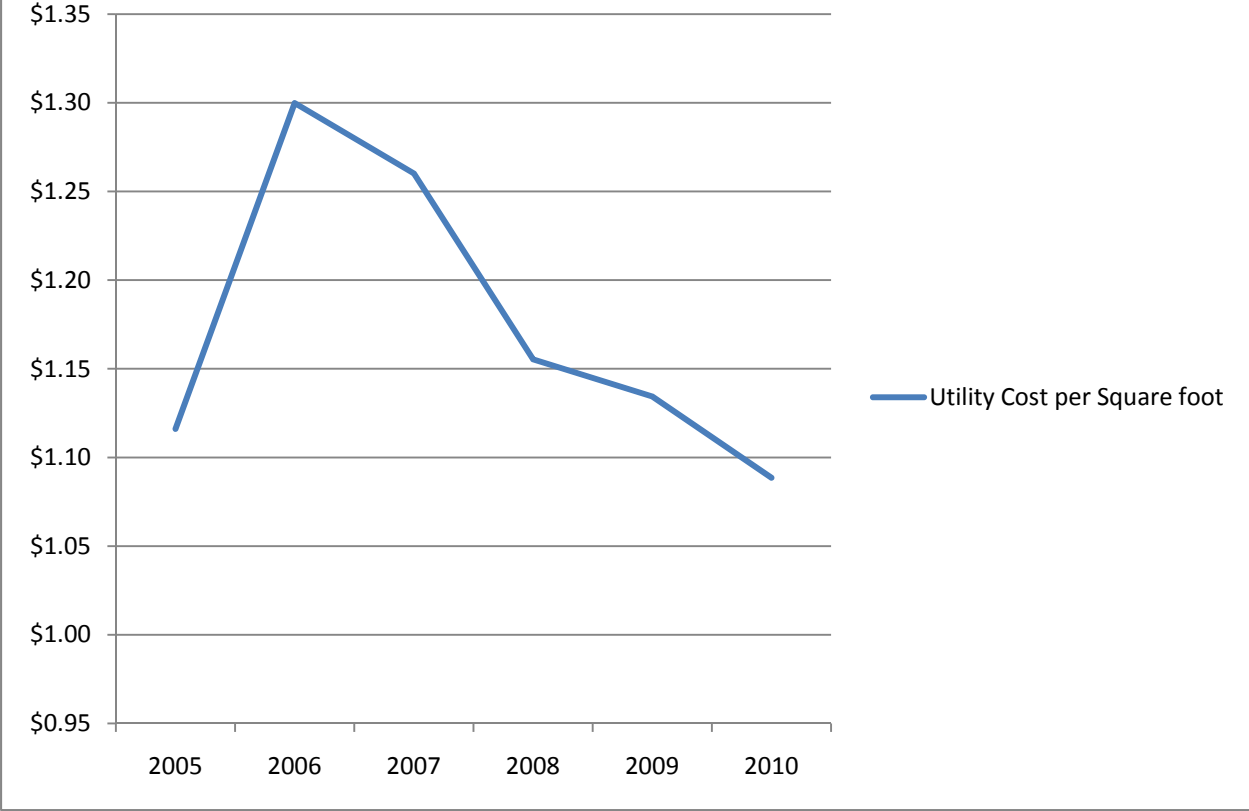
## Buildings

Buncombe County operates a wide array of facilities; from small restrooms at public parks to the County Court House and Detention Center. By the end of calendar year 2010, the county was responsible for the operation of over 1,537,808 square feet of building space.



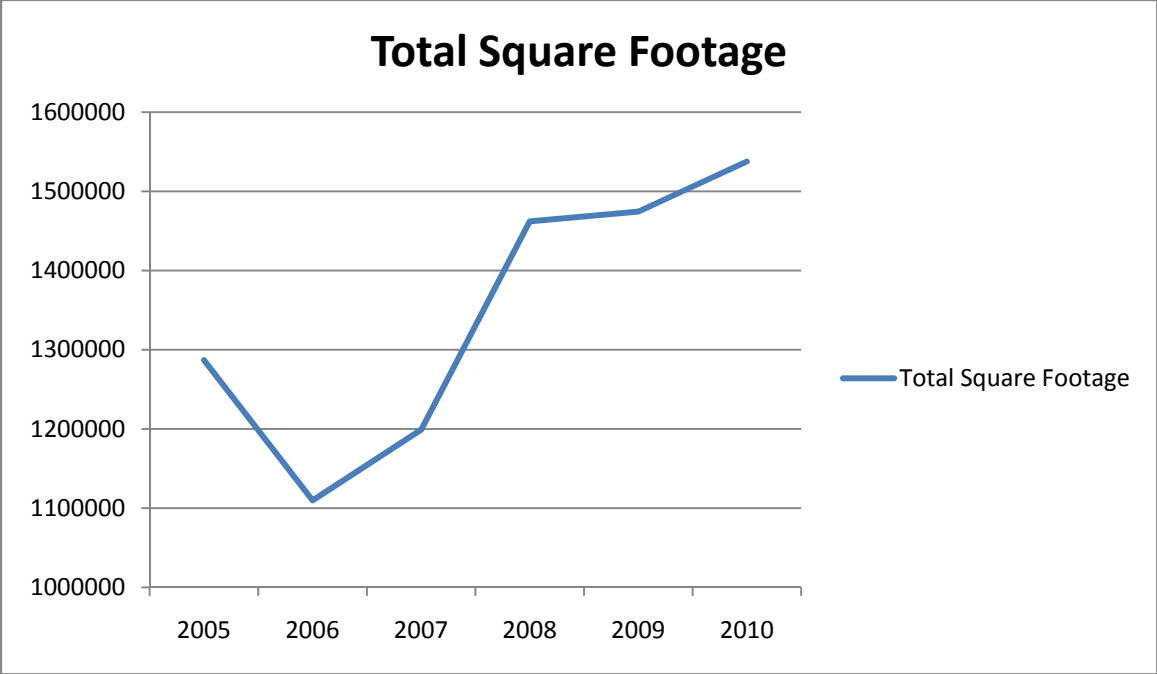
Calendar Year	BTU per Square Foot
2005	69,105
2006	79,651
2007	73,621
2008	66,930
2009	65,211
2010	64,863

### Utility Cost per Square foot



Calendar Year	Cost per Square Foot
2005	\$1.116
2006	\$1.300
2007	\$1.260
2008	\$1.155
2009	\$1.134
2010	\$1.089

Calendar Year	Total Utility Cost
2005	\$1,436,323.55
2006	\$1,442,739.35
2007	\$1,511,180.39
2008	\$1,689,357.72
2009	\$1,672,728.90
2010	\$1,673,963.72



Calendar Year	Total Square Footage
2005	1,286,967
2006	1,109,861
2007	1,199,142
2008	1,462,247
2009	1,474,531
2010	1,537,808

Analysis

It was determined that BTU per square foot and cost per square foot would be the two performance indicators used to track energy usage.

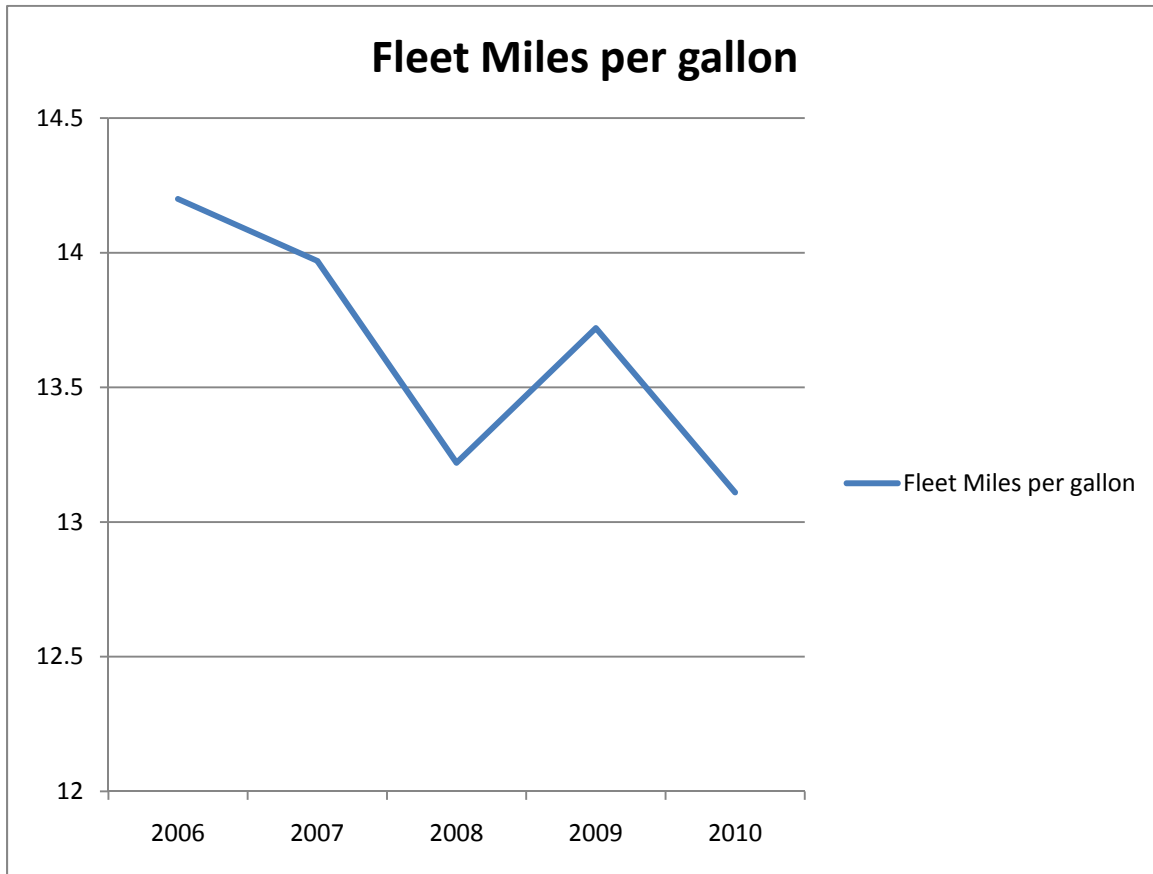
As evidenced in the chart above, there was what appears to be a sudden peak in energy use per square foot in 2006. This spike was due to the transfer of the operation of several facilities to the City of Asheville. While the transfer of these facilities caused a reduction in overall square footage, the facilities themselves were all recreation facilities that used a disproportionately small amount of energy when compared to a typical county building (i.e. McCormick Field). The overall trend is a reduction of energy use per square foot, which has helped to combat the rising prices of energy. The national average BTU per square foot is approximately 90,500. Buncombe County energy use for 2010 was approximately 28% lower. This can be attributed to both the many innovative energy projects from the past fifteen years and in part to the milder climate in

Buncombe County Compared to much of the country. The average consumption of North Carolina State owned buildings is approximately 135,000 BTU per square foot<sup>3</sup>.

**Fleet**

Buncombe County’s vehicle fleet consisted of 419 vehicles at the end of 2010. The fleet includes many types of vehicles from Sherriff’s Department patrol vehicles to

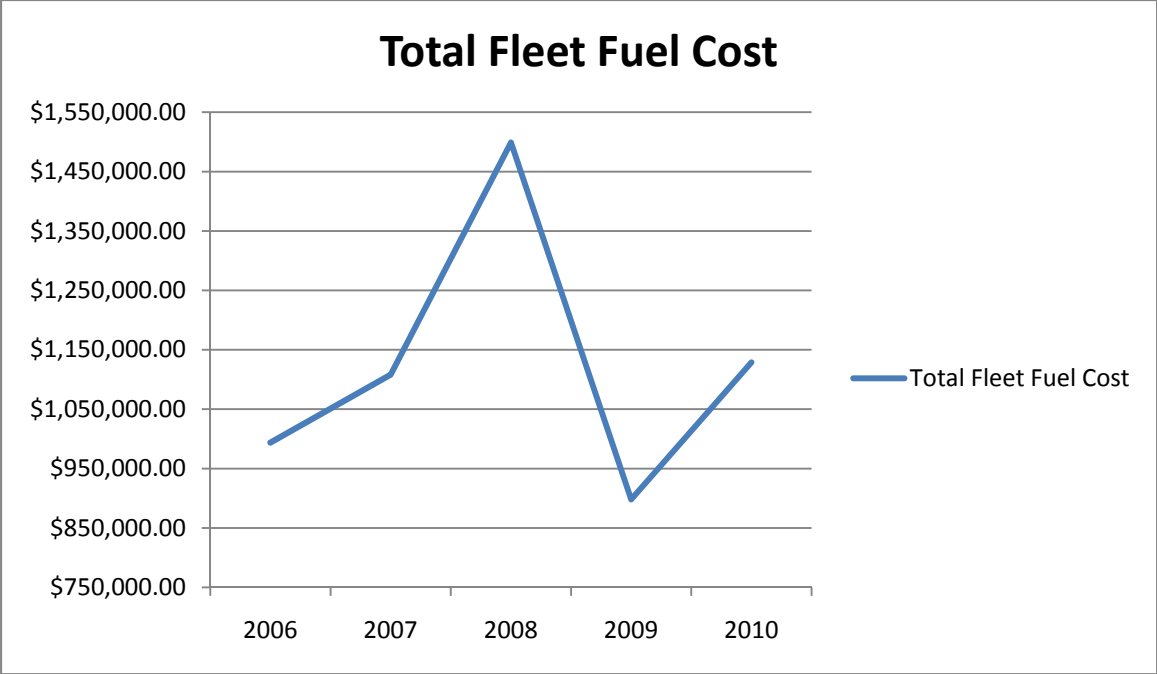
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Calendar Year	Miles per Gallon
2006	14.20
2007	13.97
2008	13.22
2009	13.72
2010	13.11

<sup>3</sup>“North Carolina State Energy Report for 2010” North Carolina Energy Office March 2010





Calendar Year	Fleet Fuel Cost
2006	\$993,816
2007	\$1,108,068
2008	\$1,499,003
2009	\$897,946
2010	\$1,128,934

### Total Fleet Miles Driven

Calendar Year	Fleet Miles Driven
2006	6,732,051
2007	6,817,124
2008	6,862,013
2009	6,771,816
2010	6,544,613

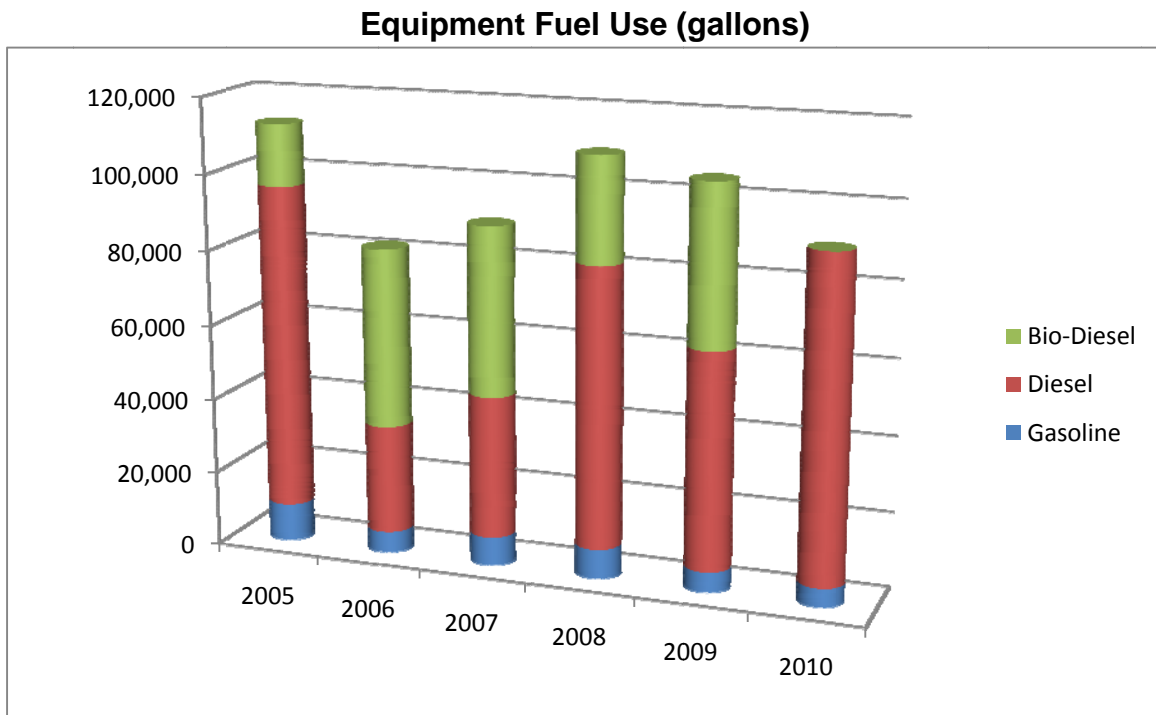
## Analysis

The County's fleet has grown by only four vehicles since 2005 and mileage has remained relatively constant; hovering just below 7 million miles per year. The large increase in fleet operation cost in 2008 was due to a dramatic and sudden increase in fuel prices. The total operating cost in this sector is totally in response to the price of fuel. Further limiting unnecessary travel will have some influence on the budget impact of vehicle fuel.

The overall trend over the past 5 years is a slight reduction in miles per gallon. Fleet presents an area that warrants further exploration in how to improve vehicle mileage without impacting service. Exploring alternative fueling opportunities are currently underway.

## Mechanized Equipment <sup>4</sup>

Buncombe County operates several pieces of machinery at the landfill as well as emergency back-up electrical generators and grounds maintenance equipment. This category covers all energy used by non-vehicle motorized equipment.



<sup>4</sup> Revised from 2009 report

Calendar Year	Total Fuel Used
2005	112,342
2006	81,619
2007	89,711
2008	109,361
2009	104,760
2010	89,848

### Mechanized Equipment Fuel Use

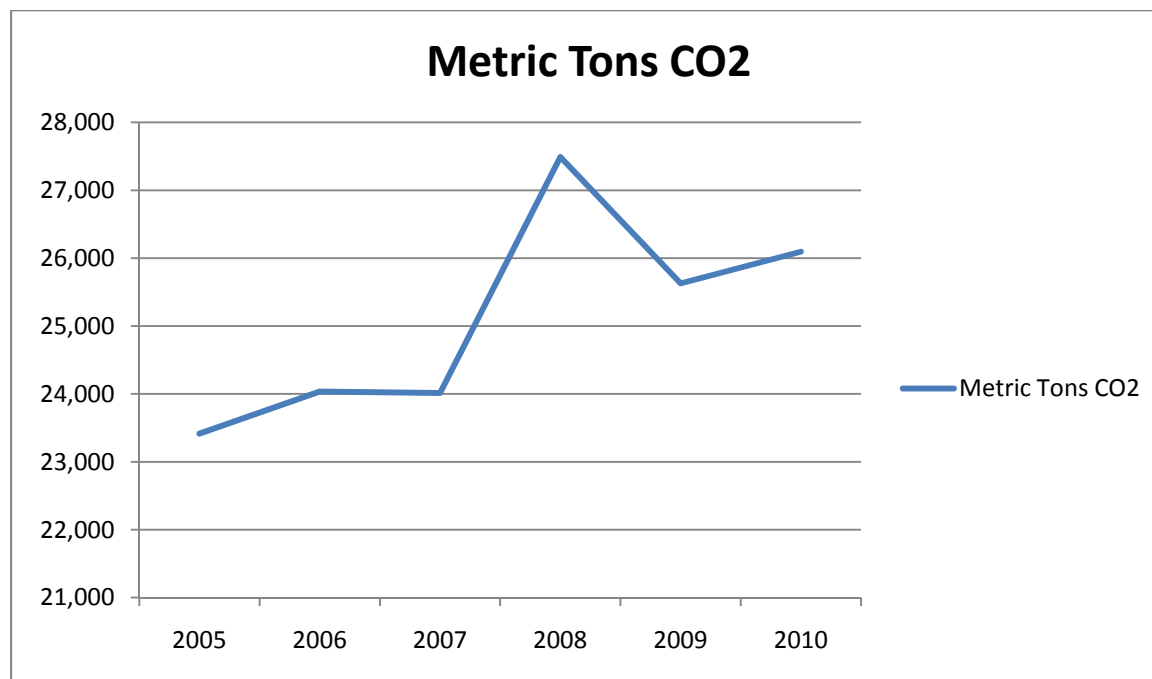
#### Analysis

Fuel consumed by off-road equipment has fluctuated between 2005 and 2010. The primary driving factor is amount of waste processed at the county landfill.

## Part II: Carbon Footprint

Calendar Year	Metric Tons CO <sub>2</sub> <sup>5</sup>
2005	23,416
2006	24,034
2007	24,013
2008	27,491
2009	25,628
2010	26,096

### Total Carbon Emissions



<sup>5</sup> 1 Metric Ton equal to 2,204 lbs

## Buildings:

- For 2010, buildings contributed 15,853 MT CO<sub>2</sub>
- Largest single sector CO<sub>2</sub> emitter; 60.7% of total
- 2010, 5<sup>th</sup> consecutive year of reduction in per square foot carbon emissions

## Employee Commute

- For 2010, employee commute contributed 4,815 MT CO<sub>2</sub>
- Accounts for 18.5% of total CO<sub>2</sub> emissions
- Employees drove an estimated 10.9 million miles getting to work in 2010

## Vehicle Fleet

- For 2010, Buncombe County's vehicle fleet contributed 4,529 MT CO<sub>2</sub>
- Accounts for 17.4% of total CO<sub>2</sub> emissions

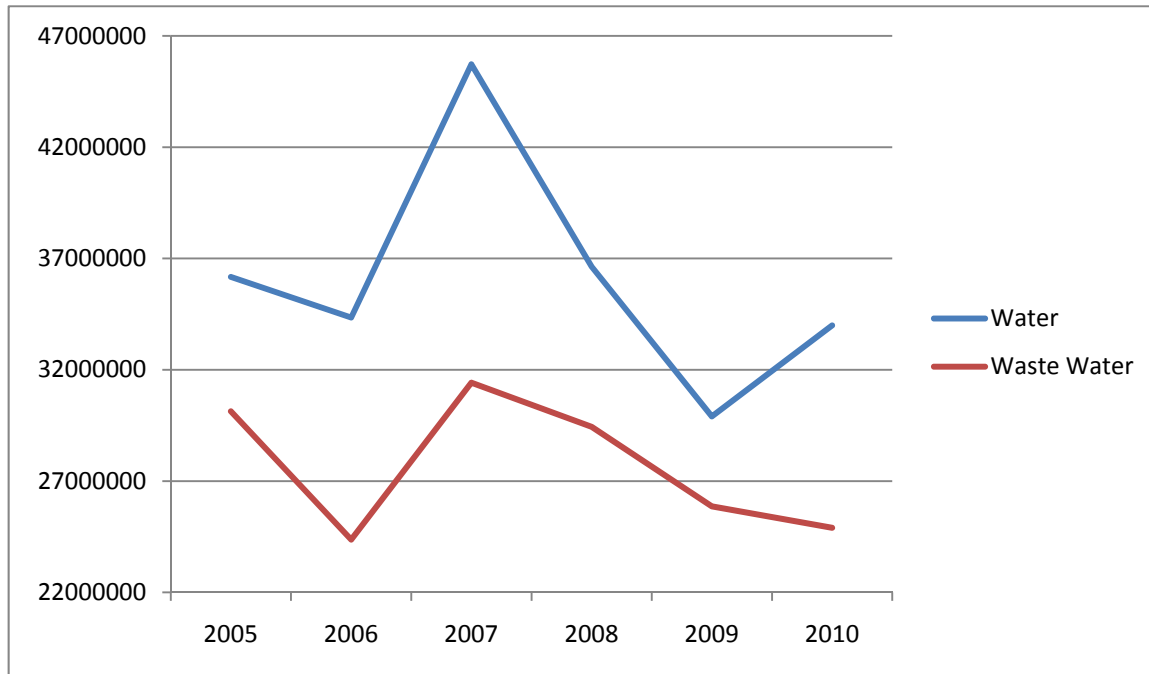
## Mechanized Equipment

- For 2010, Off-road motorized equipment contributed 899 MT CO<sub>2</sub>
- Accounts for 3.4% of total CO<sub>2</sub> emissions

# Part III: Water Consumption

## Water Consumption

This section includes all water purchased from municipal water systems, as well as waste water processed. Water from other sources is not currently able to be tracked and is therefore not included.



Calendar Year	Water (gallons)	Waste Water (gallons)
2005	36,169,400	30,132,432
2006	34,342,668	24,371,336
2007	45,720,992	31,421,984
2008	36,629,452	29,434,548
2009	29,906,148	25,864,344
2010	33,993,644	24,904,795

### Analysis

The County has been continuously working to reduce its water consumption. The peak that occurred in 2007 was due to an unnoticed leak at one of the county’s recreation facilities. Another factor behind the increases in 2007 and 2008 was a record breaking drought experience throughout the region. Anytime that water use drastically increases without accompanying sewer volume that spike can be attributed to additional irrigation at county parks and increased evaporation from county swimming pools.

## Part IV: Reduction Projects

### **Buildings**

Buildings account for the largest single energy consumer and emission source and have presented many opportunities to reduce energy consumption, operating expense and

carbon emissions. Past projects that have assisted in operating a more efficiently include:

- Window replacement at 35 Woodfin Street and the County Court House
- Roof Replacements at several facilities
- Total Facility renovations
  - 40 Coxe Ave
  - 35 Woodfin Street
- Heating and Air Conditioning System improvements
  - 35 Woodfin Street
  - Pack Library
  - Detention Center
  - Agricultural Services
  - 356 Biltmore Ave.
  - Allport Building
- Lighting system improvements
  - Court House
  - 35 Woodfin Street
  - Detention Center

## **Fleet**

Fleet accounts for the second largest energy consumer and emission source for which Buncombe County has direct control. Within the past few years the county has worked at reducing fleet energy consumption through the purchase and use of hybrid vehicles, smaller more efficient vehicles and use of alternative fuels. The county is also currently exploring electric vehicle infrastructure and additional alternative fuel sources.

## **Part V: The Way Forward**

Buncombe County currently has several projects underway and is always working to provide the most efficient operations possible. As time progresses with the “low hanging fruit” having been plucked, energy reduction efforts will become increasingly more challenging. For this reason the county is always searching for and developing alternative funding opportunities and working to stay informed of all the latest developments in building systems, fleet options and all aspects of energy consumption.

One of the most noticeable and far reaching developments in the past year has been the development of an “Energy Savings Reinvestment Fund”. This new fund is capturing 75% of the monetary savings realized through efficiency efforts for the next 10 years. The county expects to redirect this money to other efficiency projects, essentially generating “self funded” energy efficiency programs. In addition to the “Energy Savings

Reinvestment Fund”, Buncombe County was the recipient of \$624,800 in the form of an Energy Efficiency Community Block Grant from the U.S. Department of Energy. These grant funds are being put to work updating the climate control systems at three county facilities. The construction phase of all three projects was completed in the third quarter of 2011.

Energy savings doesn’t just come in the form of upgrades to existing buildings. New construction provides many opportunities to start “saving from day one”. With previous buildings, plan and specification review was conducted to confirm that the building adequately performed the purpose for which it was being constructed. We have added an additional stage in project review which now reviews a design with the added criteria of performing the designed function as efficiently as possible.

## **Conclusion**

Buncombe County has long realized the numerous benefits of reducing energy consumption. Its early efforts to reduce consumption materialized with projects to more efficiently light all facilities and have branched into many other aspects of building function. The county’s ongoing efforts have been able to realize reductions in per square foot energy consumption and help mitigate some of the effects of rising energy prices.

The annual energy report strives to gather all the information from past projects and to determine the effect they had on energy consumption and carbon emissions. Buncombe County has made great strides in managing its energy use and reducing the fiscal burden on county residents. The Buncombe County General Services department has been working to reduce energy consumption for over a decade and pledges to continue working toward improving all facilities and vehicles to the best of its ability.