

**UPDATE TO GREENSBORO  
GREENHOUSE GAS ESTIMATES  
2007 TO 2013**

**GREENSBORO CITY COUNCIL  
MARCH 24, 2015**

# METHODOLOGY FOR GREENSBORO GHG INVENTORY (ICLEI, CACP)

## OVERVIEW OF CACP'S CAPABILITY

- ❖ Create GHG and criteria air pollutant emissions for base year
- ❖ Forecast and back-cast emissions growth
- ❖ Evaluate measures to reduce emissions
- ❖ Prepare emissions reduction action plans



# GREENSBORO GHG INVENTORY DATA SOURCE

## CATEGORIES OF DATA

- ❖ Residential
- ❖ Commercial
- ❖ Industrial
- ❖ Transportation
- ❖ Waste

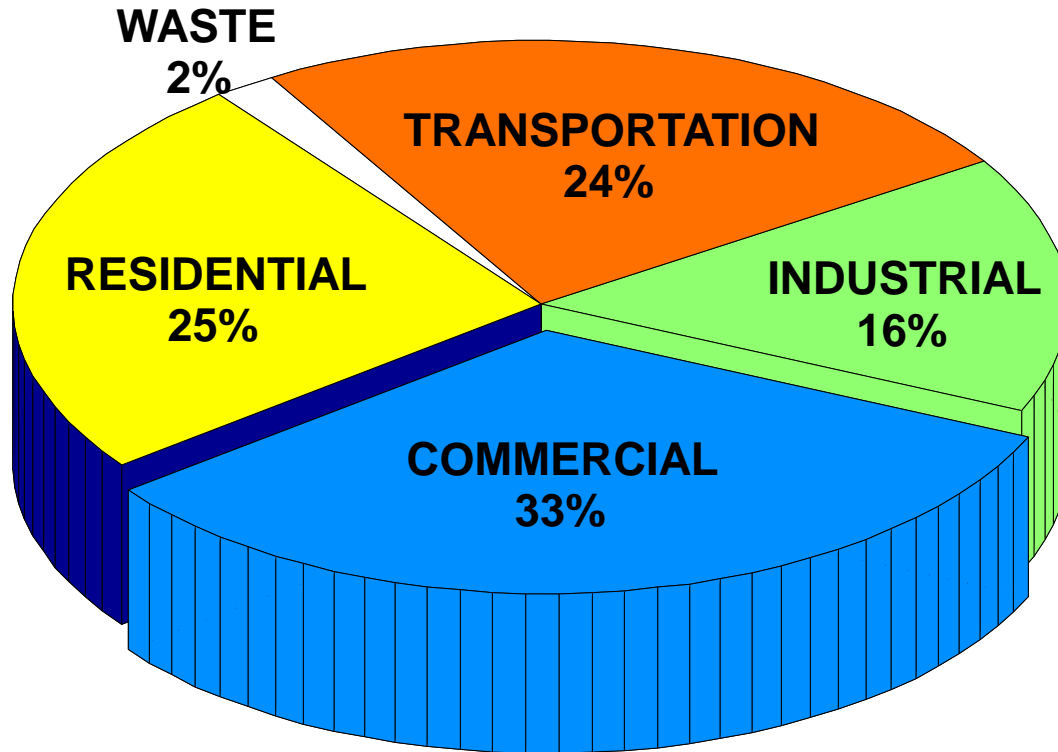


TRANSPORTATION

# ENERGY CONSUMPTION BY SECTOR AND GHG EMISSIONS BASE YEAR 2007

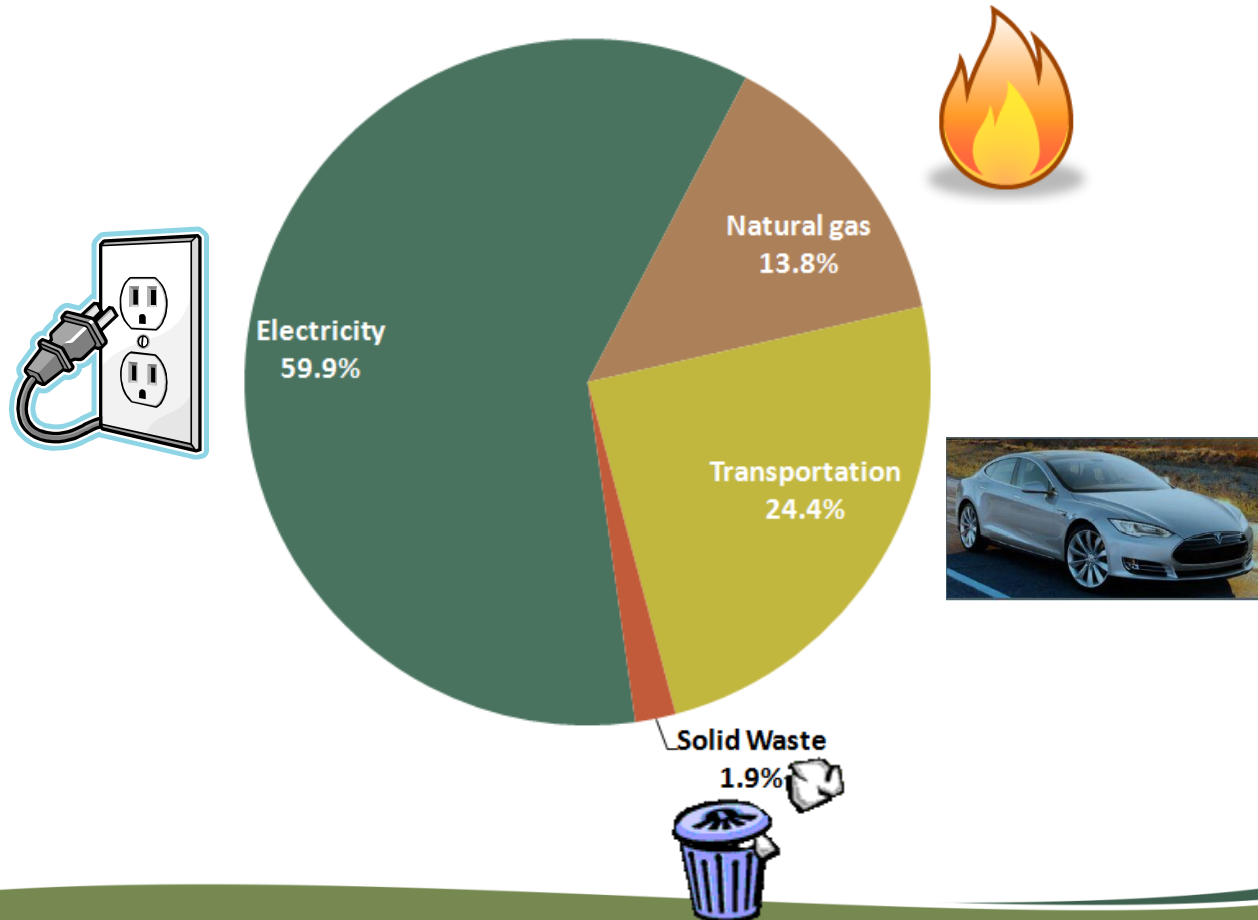
<i><b>SECTOR</b></i>	<i><b>ENERGY (MMBtu)</b></i>	<i><b>EQUIV. CO<sub>2</sub> (tons)</b></i>
<i><b>Residential</b></i>	10,861,686	1,264,199
<i><b>Commercial</b></i>	12,224,646	1,659,310
<i><b>Industrial</b></i>	6,930,813	840,942
<i><b>Transportation</b></i>	17,328,166	1,485,117
<i><b>Waste</b></i>	NA	115,844
<i><b>Total</b></i>	47,345,311	5,365,412

# BASE YEAR PERCENTAGE COMMUNITY GHG EMISSIONS BY SECTOR

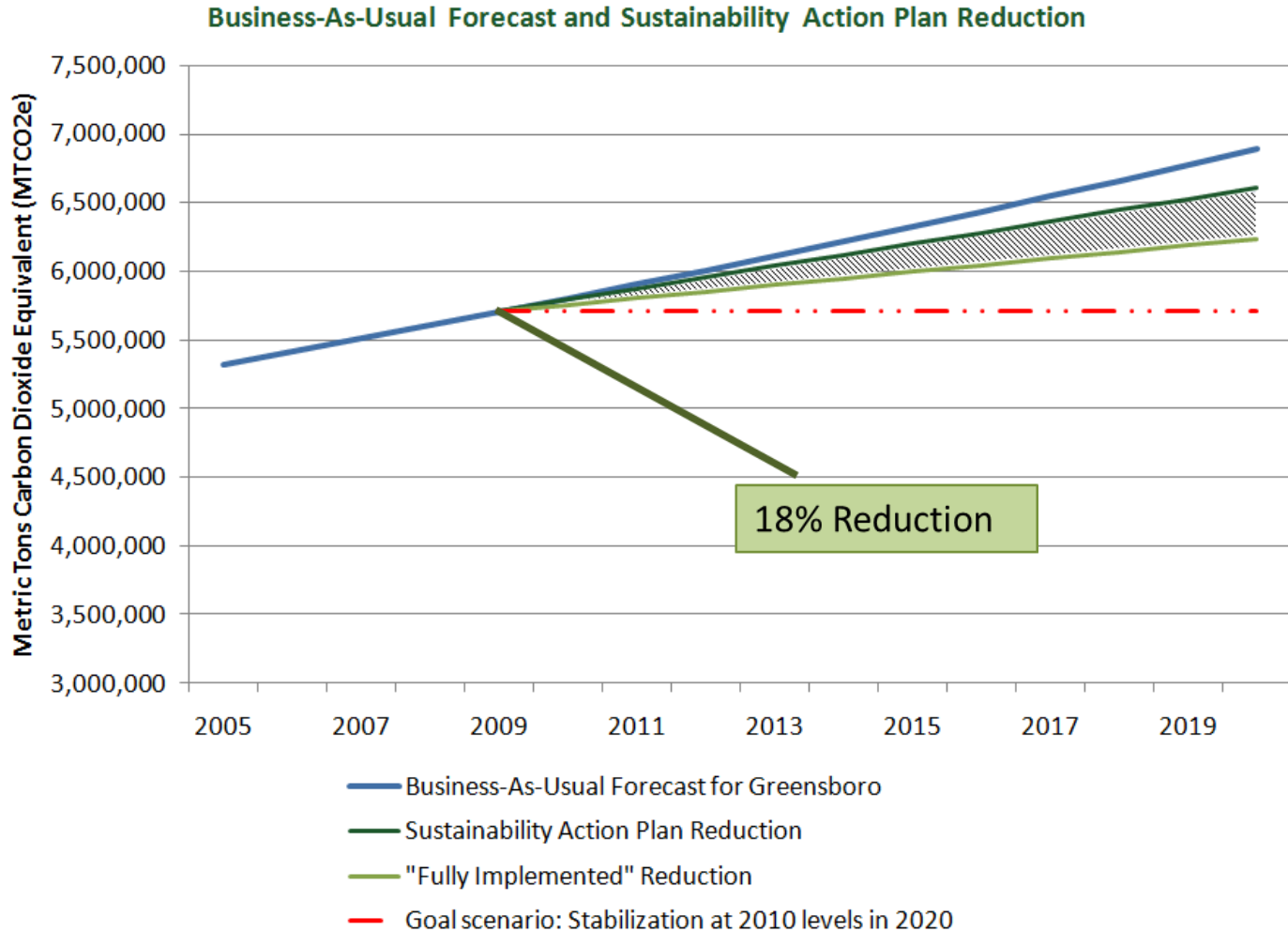




**City of Greensboro 2007 Emission Sources  
(community-wide)  
5,517,161 Metric Tons CO<sub>2</sub>e**



# Forecast and Goal

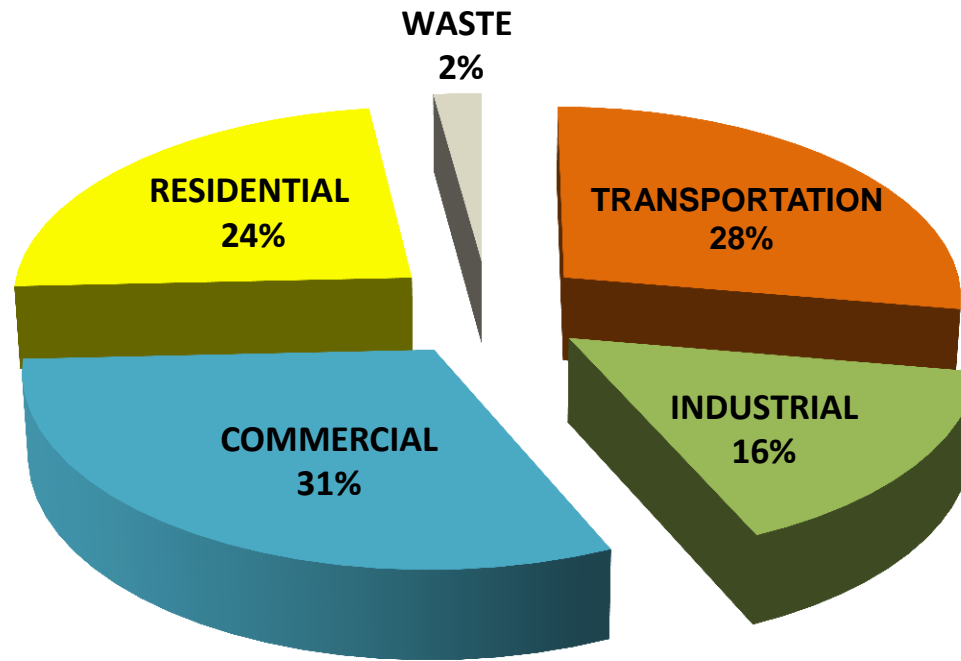


# BASE YEAR ENERGY CONSUMPTION BY SECTOR AND GHG EMISSIONS 2013

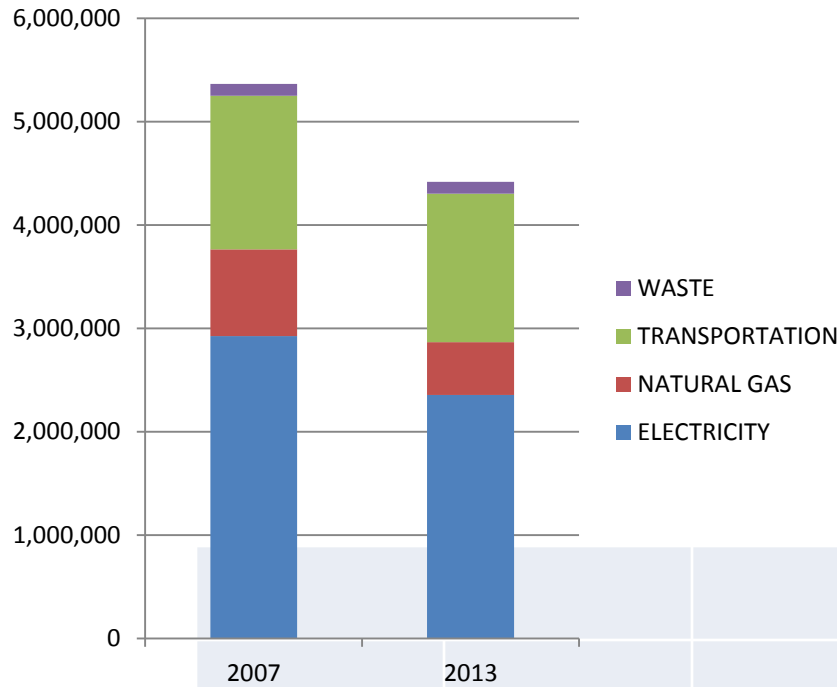
<i><b>SECTOR</b></i>	<i><b>ENERGY (MMBtu)</b></i>	<i><b>EQUIV. CO<sub>2</sub> (tons)</b></i>
<i><b>Residential</b></i>	<b>10,879,527</b>	<b>1,078,827</b>
<i><b>Commercial</b></i>	<b>11,851,436</b>	<b>1,335,268</b>
<i><b>Industrial</b></i>	<b>3,320,553</b>	<b>453,245</b>
<i><b>Transportation</b></i>	<b>16,808,321</b>	<b>1,485,117</b>
<i><b>Waste</b></i>	<b>NA</b>	<b>115,234</b>
<b>Total</b>	<b>42,859,837</b>	<b>4,467,691</b>



# PERCENTAGE COMMUNITY GHG EMISSIONS BY SECTOR 2013



TONS OF CO2 EQUIVALENT

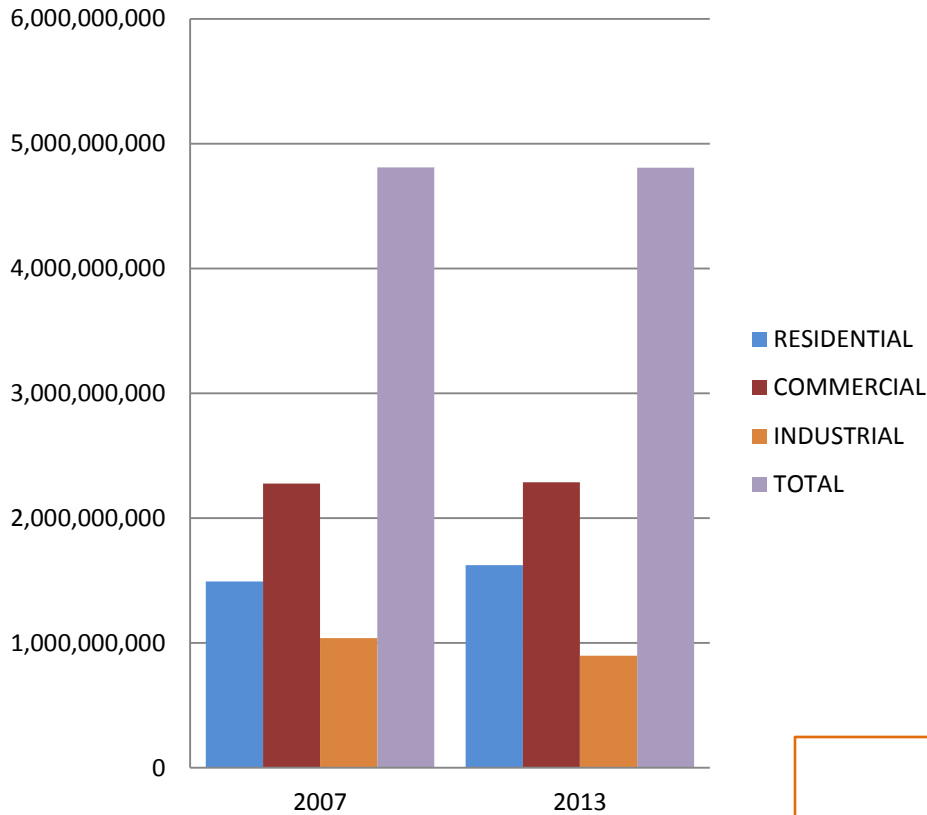


# GREENHOUSE GAS SUMMARY 2007 TO 2013

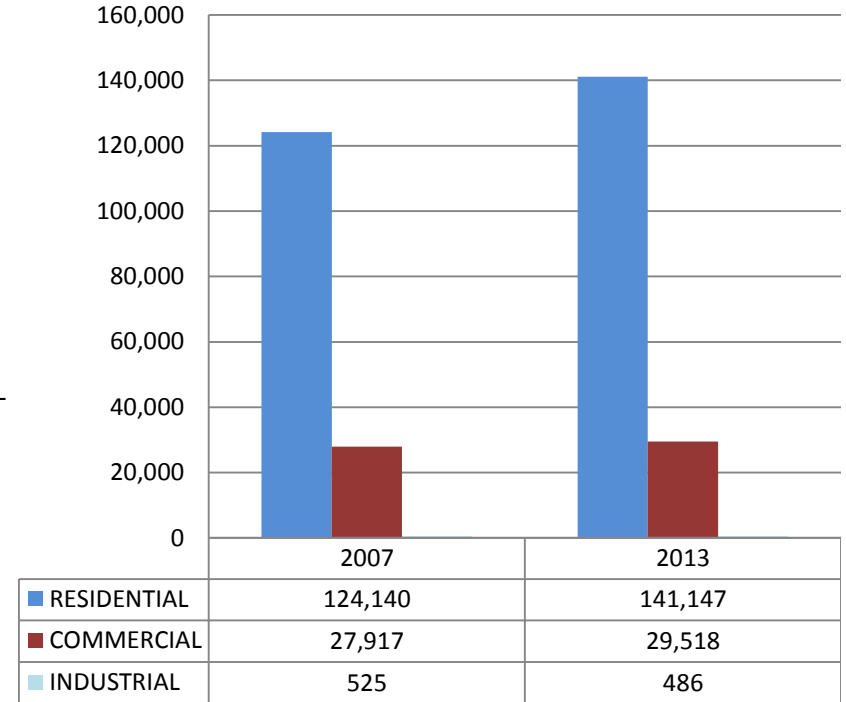
	2007	2013	CHANGE	
			SECTOR	PER CAPITA
<b>ELECTRICITY</b>	<b>2,924,049</b>	<b>2,355,537</b>	<b>-19%</b>	<b>-21%</b>
<b>NATURAL GAS</b>	<b>840,402</b>	<b>511,803</b>	<b>-39%</b>	<b>-44%</b>
<b>TRANSPORTATION</b>	<b>1,485,117</b>	<b>1,435,277</b>	<b>-3%</b>	<b>-3%</b>
<b>WASTE</b>	<b>115,844</b>	<b>115,421</b>	<b>0%</b>	<b>0%</b>
	<b>5,365,412</b>	<b>4,418,038</b>	<b>-18%</b>	<b>-20%</b>

# ELECTRICITY

## ENERGY USE



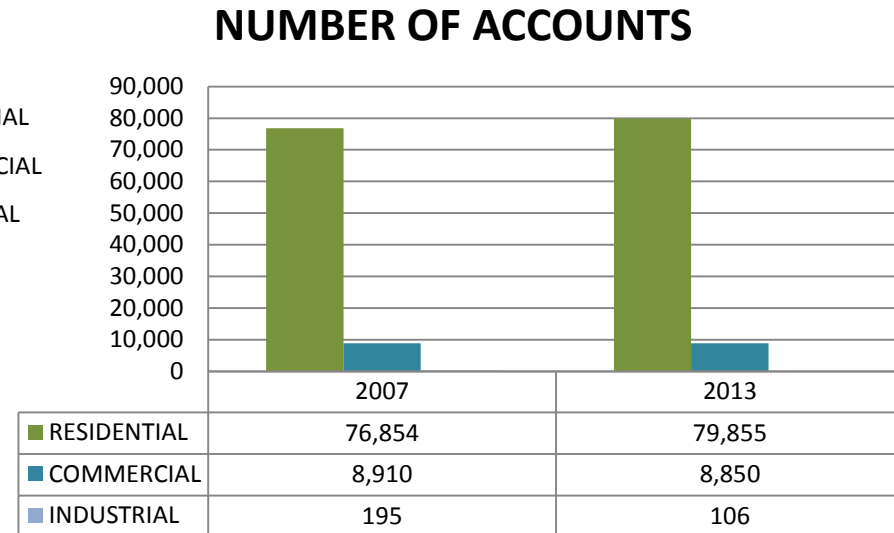
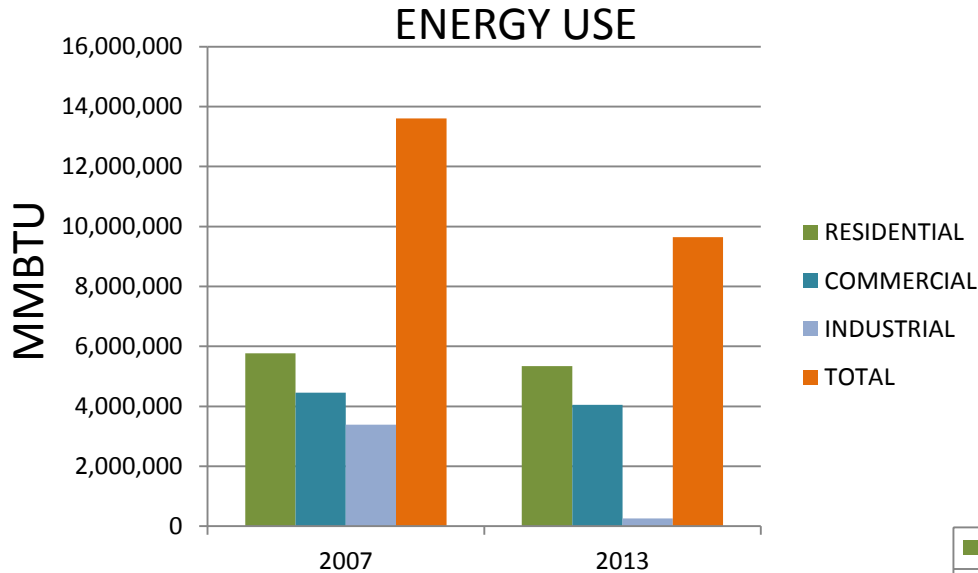
## NUMBER OF ACCOUNTS



<b>Total Energy Use</b>	<b>0%</b>
<b>Total CO<sub>2</sub>e Produced</b>	<b>-19%</b>

	RESID	COMM	INDUST
Number of users	14%	6%	-8%
Per Capita change	-4%	-5%	-7%
Energy use change	9%	0%	-14%

# NATURAL GAS



	<u>RESID</u>	<u>COMM</u>	<u>INDUST</u>	<u>TOTAL</u>
Number of users	4%	-1%	-46%	
Per Capita use	-11%	-9%	-86%	
Energy Use	-7%	-9%	-92%	-29%

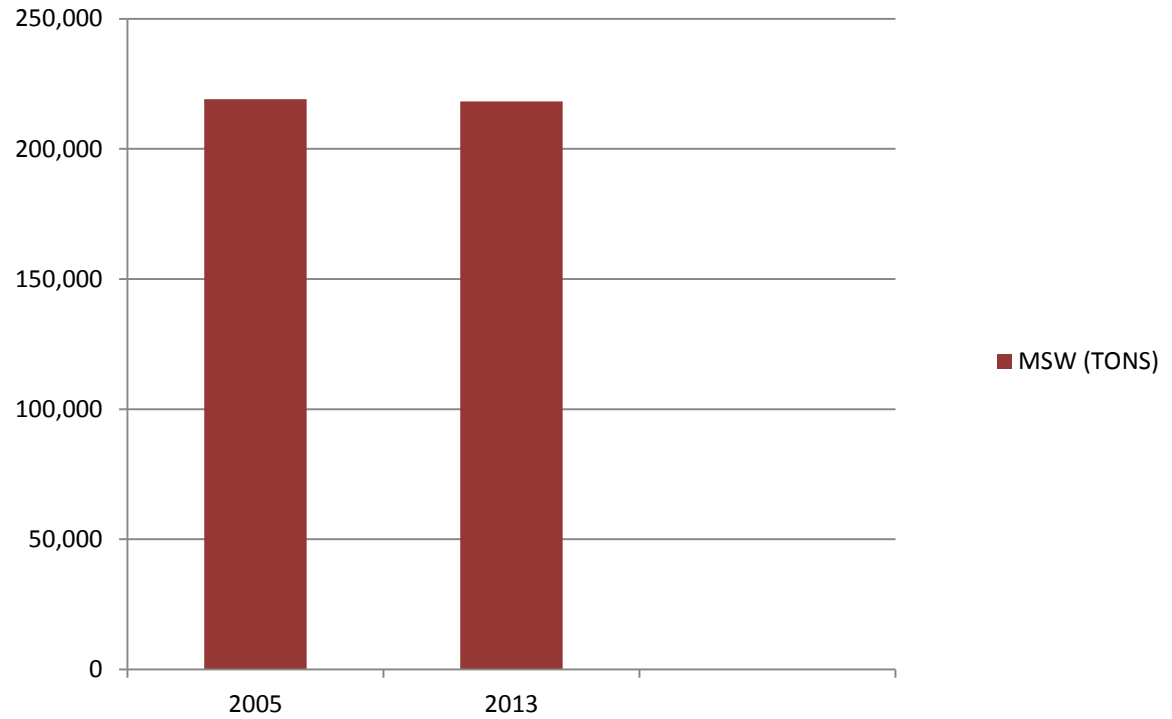
# TRANSPORTATION

	2007	2013	% CHANGE
VEHICLE MILES TRAVELED (VMT)	2,287,689,697	2,216,102,230	-3%
POPULATION	247,183	279,639	13%
PER CAPITA VMT/DAY	25	22	-14%

REPRESENTS A GREEN DIVIDEND OF  
\$150 MILLION FOR THE CITY  
AS DESCRIBED BY THE CEO'S FOR CITIES

# WASTE

## MSW (TONS)





# CITY OPERATIONS

	2007	2013	% CHANGE
ELECTRICITY	72,512,069 KWH	69,266,413 kwh	-3%
NATURAL GAS	257,884 Therms	291,371 Therms	13%
TOTAL	273,199 MBtu	265,474 MBtu	-4%

# **Contributing Factors to Reductions of Energy Use and Greenhouse Gas Production**

- **Energy Conservation in the Residential and Commercial Sector**
- **Reduced number of Industries that are less energy intensive**
- **Conversion of the Duke Energy fleet away from coal fired plants**
- **Reduced vehicle miles traveled in Greensboro**

City of Greensboro Greenhouse Gas Estimates  
Report to City Council  
March 24, 2015

- In 2007 the CSC prepared an estimate of the Greenhouse Gases produced associated with the energy consumption and municipal solid waste produced by the City of Greensboro operations and in the City of Greensboro at large. The purpose of gathering this information was to establish a baseline to measure future trends for these two indicators and to guide the creation of the Greensboro Sustainability Action Plan.
- These estimates were calculated using formulas established by the International Council for Local Environmental Initiatives (ICLEI). It was based on local demographic information including electric energy and natural gas consumption, vehicle miles traveled and municipal solid waste transferred to the landfill.
- We analyzed this information for five sectors; Residential, Commercial, Industrial, Transportation and Waste and estimated the energy use and corresponding greenhouse gas production for each sector. The resulting estimates for 2007 were energy consumption of approximately 47 million MBtus and greenhouse gas production of 5.3 million tons of CO<sub>2</sub> equivalent.
- The estimates gave a snapshot of the role of energy consumption in the life of the city at that time. It gave a breakdown of energy use by sector commercial buildings using 33% of all energy in the city, residential and transportation each using about 25%, industrial consuming 16% and municipal solid waste reflecting 2% of total greenhouse gas production.
- It also showed how greenhouse gas production broke out by source with about 60% due to electricity, 14% due to natural gas, 25% due to transportation fuels of gasoline and diesel fuel and 2% due to solid waste.
- Based on these numbers the Sustainability Action Plan recommended a goal for the city to maintain the same level of gas production. The intent was to reduce the per capita production to balance the population growth over time.
- We have completed the estimate for 2013 using the same formulas. The resulting estimates are approximately 43 million MBtus of energy consumption and greenhouse gas production of 4.5 million tons of CO<sub>2</sub> equivalent.
- This represents a decrease of 8% in energy consumption and 18% in greenhouse gas production.
- The energy use and greenhouse gas production by sector is essentially unchanged
- The energy use by fuel shows some interesting trends:
  - Electricity
    - The consumption of electricity was essentially the same in 2007 and 2013.
    - There was a rise in consumption in the residential sector of 9%. This is based on a 14% increase in the number of residential accounts and a 4% average savings per account.
    - The consumption in the commercial sector did not change. This is based on a 6% increase in the number of commercial accounts and a 5% average savings per account.

- There was a decrease in consumption in the industrial sector of 9%. This is based on a 8% decrease in the number of industrial accounts and a 7% decrease in average energy use per account.
- The associated greenhouse gas production associated with this use dropped by 19% from 2,924,050 Metric tons per year to 2,355,536 Metric tons per year. This is based on the change in the CO2 equivalent production of the Duke Energy fleet of power plants from 1.34 lb/kwh in 2007 to 1.08 lb/kwh in 2013.

#### Natural Gas

- The consumption of natural gas dropped by 29% between 2007 and 2013.
  - There was a drop in consumption in the residential sector of 7%. This is based on a 4% increase in the number of residential accounts and an 11% average savings per account.
  - There was a 9% drop in consumption in the commercial sector. This is based on a 1% decrease in the number of commercial accounts and a 9% average savings per account.
  - There was a decrease in consumption in the industrial sector of 92%. This is based on a 46% decrease in the number of industrial accounts and a 92% decrease in average energy use per account.
  - The estimate for the associated greenhouse gas production associated with this use dropped by 39% from 840,402 Metric tons per year to 511,803 Metric tons per year. This is due to the 29% drop in energy use and in an adjustment in how the associated greenhouse gas has been calculated.
- Transportation; Overall Vehicle Miles Traveled have dropped by 3%, but given population growth the per capita drop of 14% is significant
  - Municipal Solid Waste has been unchanged and per capita amounts have decreased.
  - City of Greensboro comments from Steve
- This is a broad brush look at local activities that affect greenhouse gas production. Factors that have contributed to the reduced energy use and greenhouse gas production in Greensboro include the following:
    - Energy Conservation in the Residential and Commercial Sector
    - Reduced number of Industries that are less energy intensive
    - Conversion of the Duke Energy fleet away from coal fired plants
    - Reduced vehicle miles traveled in Greensboro