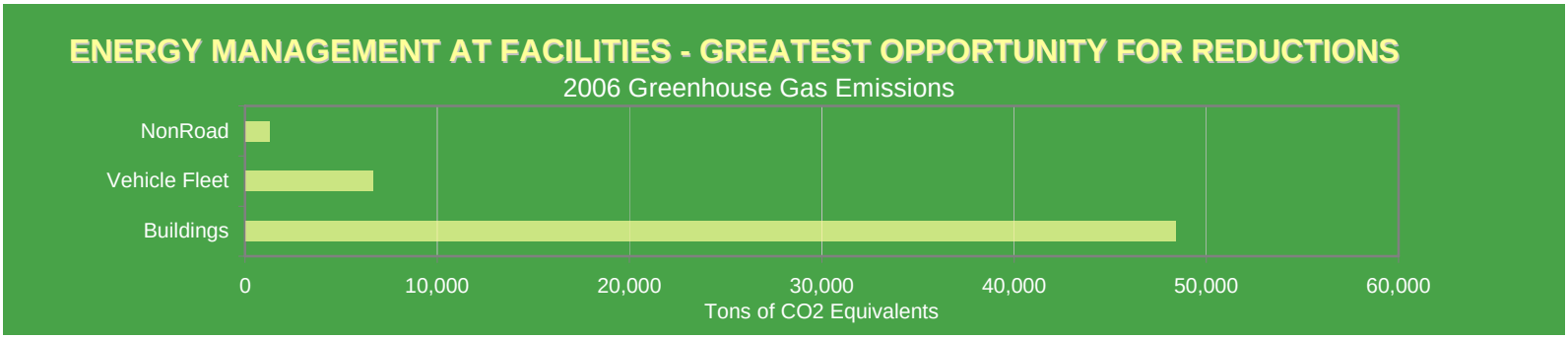

Mecklenburg County, NC Government's 2006 Greenhouse Gas Inventory

Mecklenburg County Government estimates that in 2006, just over 55,000 tons of greenhouse gases (GHGs) were generated as a result of County operations. The major sources included in this inventory are energy usage in buildings, County vehicles, and offroad equipment owned and operated by the County. The largest contribution of greenhouse gases (85%) resulted from energy consumption in County facilities.

The inventory includes energy consumption data (gas and electric) from buildings managed by the Real Estate Services Department, the Library and the Parks and Recreation Department. The contributions from each building set can be seen in the table below.

Department	Tons of CO2e from Buildings	Number of Buildings Included
Real Estate Services	31,972	38
Library	8,554	19
Parks and Recreation	7,869	61
Total	48,395	118

These calculations are based on emission factors obtained from The Emissions & Generation Resource Integrated Database (eGRID), a comprehensive inventory based on available plant-specific data for all U.S. electricity generating plants that report data to the U.S. government and is considered the preeminent source of air emissions data for the electric power sector,. Emission factors for Mecklenburg County's inventory come specifically from our region which includes NC, SC and VA.

Data for individual buildings, vehicle model years and offroad equipment categories can be seen in Attachment 1 of this report.

Why is Mecklenburg County government calculating its operational greenhouse gas emissions?
According to the *Draft North Carolina Greenhouse Gas Inventory and Reference Case Projections 1990-2020* published by the North Carolina Department of Environment and Natural Resources in February 2006, electricity use and transportation are the principal sources of GHG emissions in the state. Mecklenburg County government has an opportunity to reduce emissions from both of these sources and save money through changes in internal operations. In fact, many existing projects aimed at reducing local ozone pollution will also address GHGs produced by Mecklenburg County Government. To begin assessing the potential value of these actions, Mecklenburg County Air Quality prepared an inventory of 2006 GHG emissions from County operations.

How are we doing?
Comparisons of Mecklenburg County's operational GHG emissions to other local governments are difficult for several reasons. The main reason is that there are very few local governments that have tackled the task of completing an inventory. And of the ones that have, different methodologies have been used to calculate emissions. Of the inventories that were identified through Air Quality staff's research, Durham County, NC provides the greatest opportunity for comparisons to Mecklenburg County. As seen in Figure 2, Mecklenburg County facilities managed by the Real Estate Services Department, generate about the same amount of greenhouse gases per square foot as the buildings included in Durham County's 2005 inventory.

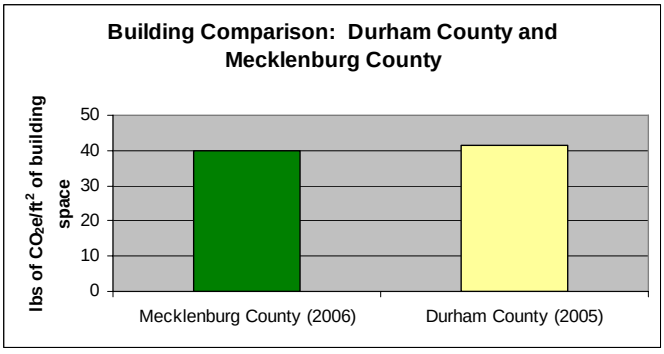

Figure 2. Comparison of GHGs from building sector (lbs of CO_2e/ ft^2 of building space)

Fleet emissions can also be compared to Durham County. Figure 3 shows that Mecklenburg County's fleet of over 1,200 cars produced fewer GHGs per car in 2006 than did Durham's 350-vehicle fleet in 2005.

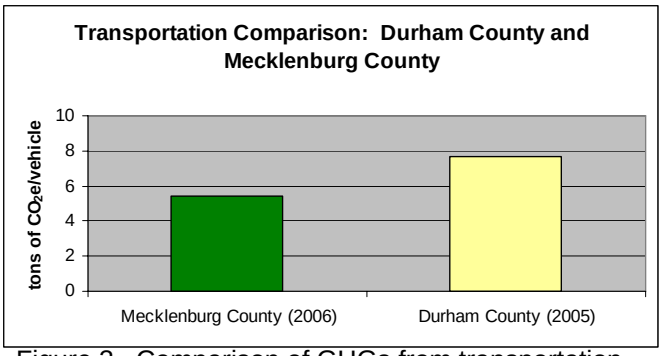

Figure 3. Comparison of GHGs from transportation sector (tons of CO_2e/vehicle)

What are greenhouse gases?
The Earth absorbs energy from the Sun, and radiates energy back into space. Much of the energy going back to space is absorbed by "greenhouse" gases (GHG) in the atmosphere and radiated back to the Earth's surface warming it. Without the natural "greenhouse effect" surface temperatures would be about 60ºF lower. Conversely, an increase in greenhouse gases can cause temperatures to rise.

The GHGs of concern that are produced as a result of human activity include carbon dioxide (CO2), methane (CH3), and nitrous oxide (N2O). The accepted convention of combining these three pollutants into one unit called a carbon dioxide equivalent (CO2e) has been used. CO2e takes into account the fact that both methane and nitrous oxide are stronger greenhouse gases than carbon dioxide. Therefore, in the CO2e unit they are weighted more heavily than carbon dioxide. This common unit allows for a more easy comparison between sources.

What does the final inventory include?
In keeping with examples from states, businesses and other local governments, Mecklenburg County Air Quality has included the following sources in its GHG inventory.

1. Buildings
   - Real Estate Services (RES) Managed
   - Parks and Recreation Facilities
   - Library Facilities
2. Transportation/Fleet
3. NonRoad Equipment

A summary of data sources and emission factors used in the inventory is provided in Attachment 2 of this report.

Why were solid waste emissions not included?
Data was also collected regarding solid waste generated by County operations. However, at this time there is not an agreed upon method of calculating the GHGs from the solid waste sector. The amount of waste generated and sent to the landfill by the County is listed in the table to the right. These amounts can be tracked in future inventories to measure progress in waste reduction efforts.

Waste Type	Amount (tons)
Paper	4,455.6
Wood/Textiles	2,376.3
Food	1,185.2
Other	6,534.9

What were the challenges to completing the inventory?
The biggest challenge to completing the GHG inventory was compiling the energy data and identifying the use associated with the energy accounts paid by Mecklenburg County.

Our work revealed that there are multiple Duke Energy account numbers for many County buildings and park facilities. Many of the accounts for one facility are registered to different physical addresses. Therefore it is difficult to match up account numbers and facilities. There over 550 individual account numbers with Duke Energy. Our final inventory contains data from 182 of these accounts which are registered to the physical addresses provided to us by Real Estate Services, Parks and Recreation and the Library.

What does this inventory tell us?
Clearly, Mecklenburg County Government's biggest opportunity for GHG reduction is in the area of energy management within our facilities. The County's Energy Management Plan, developed by the Environmental Leadership team in 2007 should begin to address this sector and improvements are expected within the next five years. The County must continue to look for ways to reduce energy consumption while providing quality services to its citizens.

ATTACHMENT 1

Mecklenburg County

Government Greenhouse Gas Emissions in 2006

Report by Subsector

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MWh)	Cost ()
Buildings				
Library				
Mecklenburg County, North Carolina				
Beatties Ford Road	188	0.3	257	0
Carmel	74	0.1	101	0
Davidson	57	0.1	78	0
Hickory Grove	46	0.1	62	0
Imaginon	2,034	3.6	2,773	0
Independence Regional	286	0.5	390	0
Main Library	2,419	4.3	3,297	0
Matthews	382	0.7	520	0
Mint Hill	152	0.3	207	0
Morrison Regional	467	0.8	637	0
Mountain Island	177	0.3	241	0
Myers Park	53	0.1	72	0
Plaza Midwood	139	0.2	189	0
Scaleybark	61	0.1	83	0
South County Regional	746	1.3	1,017	0
Steele Creek	286	0.5	391	0
Sugar Creek	313	0.6	427	0
University City Regional	493	0.9	672	0
West Boulevard	181	0.3	247	0
Subtotal	8,554	15.2	11,660	0
Parks and Recreation				
Mecklenburg County, North Carolina				
521 District Park	82	0.1	112	13,575
Administrative Office Building	449	0.8	612	37,134
Albemarle Road Center	129	0.2	176	13,433

Mecklenburg County

Government Greenhouse Gas Emissions in 2006

Report by Subsector

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MWh)	Cost ()
Amay James Center	163	0.3	223	16,056
Amy James Park	111	0.2	151	0
Anita Stroud Park	9	0.0	12	0
Arbor Glen Outreach Center	126	0.2	172	14,369
Armory Training Building	132	0.2	179	11,921
Baxter Street Park	18	0.0	24	3,225
Blythe Landing	42	0.1	58	4,837
C.T. Myers Golf Course	31	0.1	42	5,203
Camp Greene Park	12	0.0	16	2,774
Colonel Francis J. Beatty Comm	156	0.3	212	30,769
Cordelia Pool	44	0.1	59	4,135
Coulwood Park	89	0.2	121	14,399
Derita Creek Park	7	0.0	9	882
Double Oaks Pool	53	0.1	73	5,774
Dowd House	6	0.0	9	0
East Park Maintenance Center	34	0.1	47	3,816
Enderly Center	254	0.5	346	23,733
Freedom District Park	155	0.3	211	29,560
Grady Cole Center	504	0.9	687	55,083
Greenville Center	257	0.5	350	21,692
Hawthorne Center	61	0.1	83	6,045
Hornets Nest District Park	211	0.4	288	33,070
Horticultural Facility	12	0.0	17	1,627
Idlewild Road District Park	30	0.1	41	5,889
Irwin Center & Ray's Splash Pl	1,181	2.1	1,610	91,010
James Boyce Park	4	0.0	5	0
Jetton Park on Lake Norman	105	0.2	144	14,771
Kilborne District Park	18	0.0	25	2,267
Latta Center/Park	84	0.1	115	8,367

Mecklenburg County

Government Greenhouse Gas Emissions in 2006

Report by Subsector

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MWh)	Cost ()
Mahlon Adams Indoor Shelter	34	0.1	46	3,828
Mallard Creek Communtiy Park	93	0.2	126	28,787
Marion Diehl Center/Park/Pool	497	0.9	678	34,609
McDowell Nature Preserve	209	0.4	285	26,616
Memorial Stadium	27	0.0	36	3,342
Methodist Home Park	56	0.1	77	5,496
Methodist Home Recreaction Cen	178	0.3	242	16,396
Midwood Park	14	0.0	19	2,022
Naomi Drenan Center/Grayson Pa	201	0.4	274	19,745
Nevin Community Park	106	0.2	145	21,469
Newell Park	15	0.0	20	2,623
Ninth Street Park	1	0.0	2	0
North Mecklenburg District Par	7	0.0	10	1,791
Olde Providence Park	32	0.1	43	5,453
Park Road Distrcit Park	278	0.5	379	36,152
Ramblewood District Park	33	0.1	46	6,172
Ramsey Creek Park	40	0.1	55	5,615
Randolph Road Park	10	0.0	14	2,851
Reedy Creek Nature Preserve/Di	112	0.2	152	13,288
Renaissance Park	262	0.5	357	42,101
Revolution Park	27	0.0	36	10,863
South Charlotte Athletic Field	155	0.3	212	19,442
Southview Recreation Center	229	0.4	312	19,374
Sugaw Creek Pool	279	0.5	380	33,359
Thomas Mcallister Winget Park	37	0.1	51	4,895
Tuckaseegee Center/Park	184	0.3	251	21,788
Veterans Park	55	0.1	75	7,526
West Charlotte Center	128	0.2	174	12,585
Subtotal	7,869	14.0	10,726	883,602

Mecklenburg County

Government Greenhouse Gas Emissions in 2006

Report by Subsector

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MWh)	Cost ()
Real Estate Services				
Mecklenburg County, North Carolina				
ACCESS	49	0.1	67	0
Board of Elections Warehouse	28	0.0	54	0
Bob Walton Plaza	1,937	3.4	2,640	0
Brevard Street Building	48	0.1	66	0
Carlton G Watkins Center	495	0.9	727	0
Civil Courts	6,128	10.9	8,354	491,062
Community Service Center A	321	0.6	579	0
Comunity Service Center B	575	1.0	1,078	0
County Courts Office Building	1,712	3.0	2,334	143,670
Criminal Courts	1,653	2.9	2,253	145,695
Election Board	25	0.0	34	0
Fighting Back	29	0.1	39	0
Fleet General Services Garage	316	0.6	719	0
Foxhole Landfill	45	0.1	61	6,367
Hal Marshall Annex	693	1.2	1,089	0
Hal Marshall Building	2,085	3.7	3,163	0
Historic Landmark	12	0.0	16	0
Huntersville Health Annex	262	0.5	357	0
Lakeview Center	355	0.6	602	0
McDowell Street Parking Deck	708	1.3	966	0
Medic #3	13	0.0	18	0
Medic #4	19	0.0	43	0
Mental Health Cottage A	146	0.3	235	0
Mental Health Cottage B	125	0.2	170	0
Mental Health Cottage C	173	0.3	245	0
Mental Health Cottage D	91	0.2	171	0
Mental Health Cottage E	97	0.2	142	0

Mecklenburg County

Government Greenhouse Gas Emissions in 2006
Report by Subsector

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MWh)	Cost ()
Nations Ford Storage	7	0.0	18	0
New Courthouse	8,150	14.5	11,110	998,742
Old Intake Center	1,249	2.2	1,703	103,813
Sam Billings Center	838	1.5	1,600	0
Sattelite Gas Pumps	66	0.1	311	0
SE Health Department	83	0.1	393	0
Tire & Metal Recycling	45	0.1	73	0
Tom Ray Center	204	0.4	414	0
Trade Shop	22	0.0	30	0
Vector-Health/Environment	16	0.0	22	0
Wallace Kuralt Center	3,152	5.6	4,296	0
Subtotal	31,972	56.8	46,193	1,889,349
Subtotal Buildings	48,395	86.0	68,579	2,772,950
Vehicle Fleet				
Mecklenburg County, North Carolina				
1985	5	0.0	18	0
1987	3	0.0	10	0
1989	1	0.0	2	0
1990	15	0.0	56	0
1991	36	0.1	129	0
1992	67	0.1	243	0
1993	86	0.2	314	0
1994	68	0.1	248	0
1995	102	0.2	373	0
1996	128	0.2	465	0
1997	292	0.5	1,069	0
1998	428	0.8	1,571	0
1999	420	0.7	1,550	0
2000	354	0.6	1,311	0

Mecklenburg County

Government Greenhouse Gas Emissions in 2006
Report by Subsector

	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (MWh)	Cost ()
2001	771	1.4	2,897	0
2002	708	1.3	2,652	0
2003	276	0.5	1,038	0
2004	432	0.8	1,624	0
2005	962	1.7	3,625	0
2006	877	1.6	3,305	0
2007	615	1.1	2,319	0
Subtotal Vehicle Fleet	6,647	11.8	24,819	0
Streetlights				
Mecklenburg County, North Carolina				
Test	0	0.0	0	0
Subtotal Streetlights	0	0.0	0	0
Other				
Mecklenburg County, North Carolina				
0 to 24 HP Diesel Nonroad Equi	20	0.0		
0 to 24 HP Gasoline Nonroad Eq	104	0.2		
100 to 174 HP Diesel Nonroad E	316	0.6		
175 HP and greater Diesel Nonr	670	1.2		
25 HP or greater Gasoline Nonr	15	0.0		
25 to 49 HP Diesel Nonroad Equ	52	0.1		
50 to 74 HP Diesel Nonroad Equ	16	0.0		
75 to 99 HP Diesel Nonroad Equ	59	0.1		
Gasoline ATVs	6	0.0		
Subtotal Other	1,258	2.2		
Total	56,299	100.0	93,398	2,772,950

ATTACHMENT 2
Review of Methods for Greenhouse Inventory Development
June 11, 2008

Below is a comparison of methods selected by Mecklenburg County for its initial Greenhouse Gas Inventory. Details are provided regarding ICLEI's (International Council for Local Environmental Initiatives) Clean Air and Climate Protection software, the Climate Registry's Draft Reporting Protocol and the method or combination of methods selected by Mecklenburg County.

Mecklenburg County has decided to use ICLEI's CACCP software to organize the inventory due to its reporting functions. However, in most cases, the default emission factors will be replaced with emission factors recommended by the Climate Registry because they are more current.

On-Road Mobile Sources

Data Used for CO_2 Emissions

The Climate Registry	Actual fuel usage is required for Tier A and Tier B. For Tier A qualification, fuel carbon and heat content data for specific fuel is also required. Tier B allows for use of an emission factor in lieu of fuel carbon and heat content data
ICLEI	Actual fuel usage or vehicle miles traveled
Mecklenburg County Inventory	Actual fuel usage only. No fuel carbon or heat content data available.

Emission Factor Used for CO_2

The Climate Registry	8.81 kg CO_2/gallon gasoline
ICLEI	9.39 kg CO_2/gallon gasoline
Mecklenburg County Inventory	8.81 kg CO2/gallon gasoline (same as The Climate Registry)

Data Used for CH_4 & N_2O Emissions

The Climate Registry	Tier A requires vehicle control technology type and vehicle miles traveled.
ICLEI	Vehicle class and either fuel usage or vehicle miles traveled.
Mecklenburg County Inventory	Actual fuel usage Vehicle class Default fuel economy in ICLEI's software

Emission Factor Used for CH_4 & N_2O

The Climate Registry	0.0079 -0.0647 g/mi N_2O and 0 .0147- 0.0704 g/mi CH_4 depending on technology type for passenger cars
ICLEI	0.046 - 0.072 g/mi N_2O and 0.048 - 0.077 g/mi CH_4 depending on model year for passenger cars
Mecklenburg County Inventory	0.0079 -0.0647 g/mi N_2O and 0 .0147- 0.0704 g/mi CH_4 depending on technology type for passenger cars (same as The Climate Registry)

* Emission factors are also available for other vehicle classes besides passenger cars
**ICLEI's emission factors are based on data from 1996-2001
The Climate Registry's emission factors are based on data from 2006-2007

Buildings

Data Used for CO_2, CH_4 & N_2O Emissions

The Climate Registry	Annual electricity and natural gas consumption
ICLEI	Annual electricity and natural gas consumption
Mecklenburg County Inventory	Annual electricity and natural gas consumption

Buildings (continued)

Emission Factor Used for CO_2

The Climate Registry	1.46 lbs/CO_2/kWh (based on SC, NC, and part of VA)
ICLEI	1.47 lbs/CO_2/kWh (based on NC, SC, TN, GA, AL, MS and parts of VA, MO, AR, and LA)
Mecklenburg County Inventory	1.46 lbs/CO_2/kWh (same as The Climate Registry)

Emission Factor Used for CH_4 & N_2O

The Climate Registry	0.029 lbs/CH_4/mWh & 0.019 lbs/N_2O/mWh (based on SC, NC, and part of VA)
ICLEI	0.018 lbs/CH_4/mWh & 0.022 lbs/N_2O/mWh (based on NC, SC, TN, GA, AL, MS and parts of VA, MO, AR, and LA)
Mecklenburg County Inventory	0.029 lbs/CH_4/mWh & 0.019 lbs/N_2O/mWh (based on SC, NC, and part of VA) (same as The Climate Registry)

NonRoad Equipment

Data Used for CO_2, CH_4 & N_2O Emissions

The Climate Registry	Actual fuel usage
ICLEI	None
Mecklenburg County Inventory	Actual fuel usage

Emission Factor Used for CO_2

The Climate Registry	10150 grams of CO_2 per gallon of diesel 8810 grams of CO_2 per gallon of gasoline
ICLEI	None
Mecklenburg County Inventory	Same as The Climate Registry

Emission Factor Used for CH_4 & N_2O

The Climate Registry	0.26 grams N_2O, 0.58 grams of CH_4 per gallon of diesel 0.22 grams N_2O, 0.5 grams CH_4 per gallon of gasoline
ICLEI	None
Mecklenburg County Inventory	Same as The Climate Registry