2 EMISSIONS FROM STATIONARY SOURCES

2.1 Approach

Stationary sources are buildings, facilities, and residences. Energy is used to heat and produce electricity that is used by these stationary sources. Energy production by fossil fuels – coal, natural gas, propane and fuel oils – generates GHG emissions either directly, via combustion within the county (Scope 1), or indirectly, via the power grid (Scope 2).

Scope 1: GHGs from Combustion within the County

Natural gas is the predominant source of stationary Scope 1 emissions in Fairfax County. Only *de minimis* amounts of GHGs are produced by stationary combustion of other fossil fuels, such as fuel oil and propane. Natural gas is distributed within the county by two providers: Washington Gas (99.93%) and Columbia Gas (0.07%).[3]

The following two parameters were used to incorporate natural gas combustion into the community GHG inventory:

- Natural gas use was measured by customer consumption. Emissions related to transmission loss were excluded because they are outside the county's jurisdiction.
- GHG emissions per therm of natural gas use were determined using standard values in the Local Government Operations Protocol.

Scope 2: GHGs from Electricity Generation outside the County

Essentially all of the electricity that Fairfax County consumes is generated outside the county. Electricity is distributed within the county by two providers: Dominion Virginia Power (96%) and Northern Virginia Electric Company (4%).

Determining the GHG emissions related to electricity consumption relies on the use of factors because the interconnected nature of the electric grid makes it difficult to determine the precise blend of fossil, nuclear and renewable fuels used to produce electricity each year. As a result, the following two parameters were used for estimating electricity-related emissions:

[3] Washington Gas delivered annualized data for all years in therms, for which GHG emissions factors are readily available. By contrast, Columbia Gas provided only 2006 data, and in units of Million cubic feet (Mcf). Thus its data were converted using ratio 1 Mcf:10.27 therms. Columbia Gas data for subsequent years were estimated in proportion to its relative contribution to 2006 natural gas consumption in the county.

- Electricity use was measured by customer consumption. Emissions related to transmission loss were excluded because they are outside the county's jurisdiction.
- GHG emissions per kWh of power consumed each year are based on the United States Environmental Protection Agency's (EPA) inventory emission rate for the portion of the national electricity grid located in Virginia and the Carolinas.[4]

Annual electricity-to-GHG conversion factors (kWh to $MTCO_2e$) are presented in Appendix B, Table 7. For example, the table's conversion factor for 2006 indicates that each kWh of electricity consumed in Fairfax County created a byproduct of about 0.0005 $MTCO_2e$., which is about 1.1 pounds (0.5 kg) of CO_2e per kWh consumed.

Additional detail on the methods used to determine stationary GHG emissions is provided in Appendix B.

2.2 Results

Stationary sources produced over 7.4 million $MTCO_2e$ in 2006. As shown in Table 2, residential and commercial energy use generated the vast majority of emissions from stationary sources, with each accounting for 46% of stationary emissions.

Figure 5 provides the allocation by sector and energy type.

Table 2: 2006 Stationary GHG emissions by sector and energy use (% of total)

Sector	Electricity	Natural Gas	All Stationary Emissions
Commercial	42%	4%	46%
Residential	35%	12%	46%
Local Government	4%	1%	5%
Industrial	1%	2%	3%
All Stationary Emissions	**81%**	**19%**	**100%**

[4] The EPA has defined this area as the Southeastern Electric Reliability Council sub-region for Virginia/Carolina (SRVC).

Figure 5: 2006 stationary GHG emissions (in MTCO2e) by sector and energy use

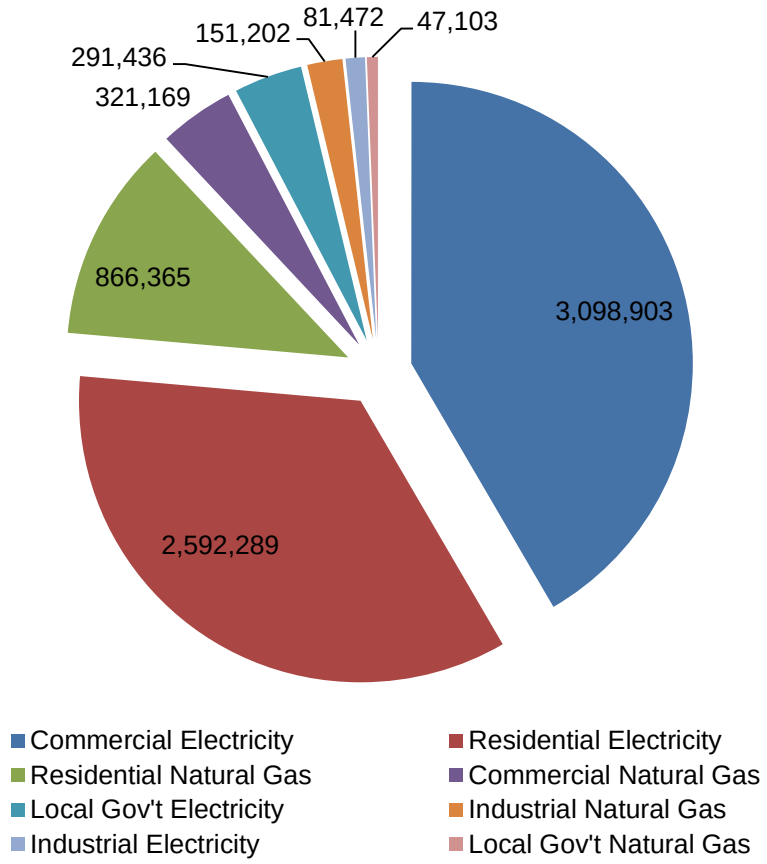

Table 2 also demonstrates that electricity is by far the biggest stationary energy use and GHG source for all sectors but industry. Three-fourths of residential GHGs came from electricity use, whereas 90% of commercial GHGs came from electricity use. Comprising only 5% of stationary emissions, county government GHGs also resulted mostly from electricity.

On a per capita basis, the county produced 7.18 MTCO2e from stationary energy use in 2006. Figure 6 and Table 3 depict how commercial and residential electricity consumption from stationary sources emitted 5.5 MTCO2e per person – nearly half of both stationary and mobile (total) GHGs – for the county that year.

Figure 6: 2006 stationary emissions per capita (in $MTCO_2e$)

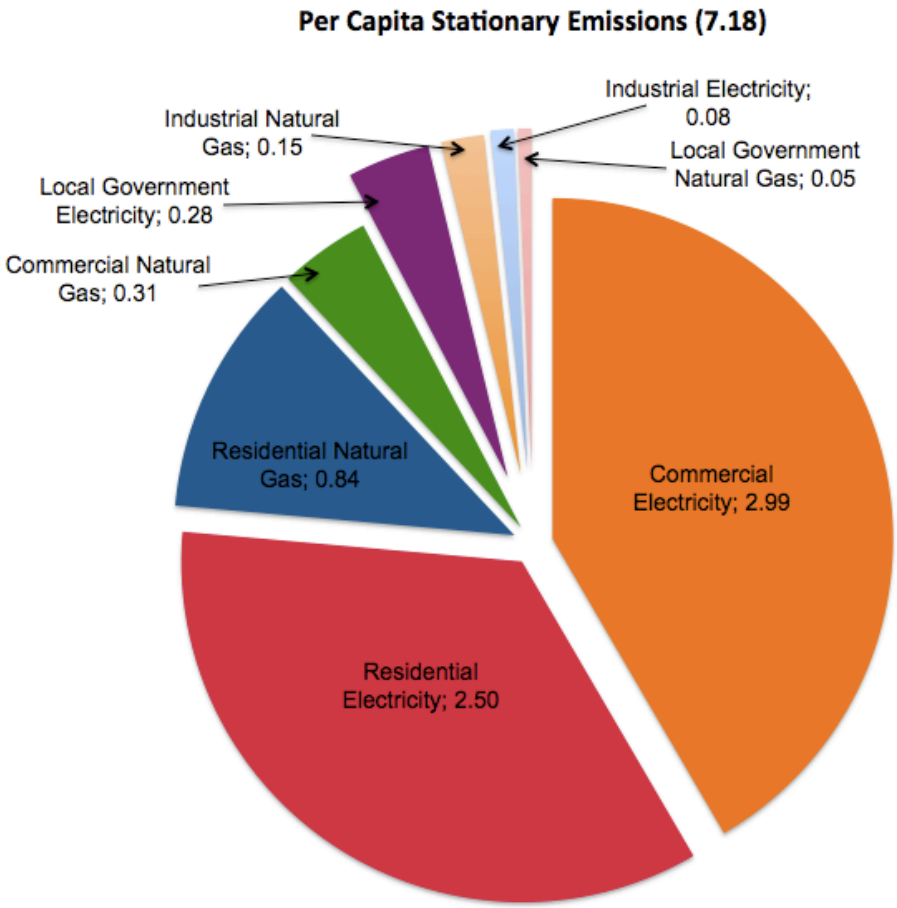

Table 3: 2006 stationary GHG emissions per resident, by sector and energy use

	$MTCO_2e$ per person		
Sector	**Electricity**	**Natural Gas**	**Total Emissions**
Commercial	2.99	0.31	3.30
Residential	2.50	0.84	3.33
Local Government	0.28	0.05	0.33
Industrial	0.08	0.15	0.22
Total	**5.85**	**1.34**	**7.18**

As presented in Appendix C.3, residential GHGs increased more than 7% over five years, from 3.46 million $MTCO_2e$ in 2006 to 3.72 in 2010. GHGs from county operations also increased by 5%, while commercial emissions declined by 1% and industrial emissions by 15%. By 2010, industrial emissions had dropped to only 0.19 million $MTCO_2e$.