CHAPTER I

FAIRFAX COUNTY AND GLOBAL CLIMATE CHANGE

I. FAIRFAX COUNTY AND GLOBAL CLIMATE CHANGE

A. OVERVIEW

The impact of environmental contamination on climate change/global warming is the result of world-wide emissions of greenhouse gases (GHG), including carbon dioxide (CO_2). While it is world-wide emissions that contribute to climate change, reductions in GHG emissions will be addressed at the local/community level. Fairfax County is fortunate that we are actively pursuing opportunities to reduce GHG emissions.

1. Introduction and Background

In the summer of 2006, Fairfax County was approached by the Sierra Club and was asked to join its Cool Cities Program. This program was designed to help cities meet the conditions of the U.S. Mayors Climate Protection Agreement, which was to reduce their greenhouse gas outputs seven percent below their 1990 levels by 2012. Chairman Gerald E. Connolly and other members of the Fairfax County Board of Supervisors decided to develop a program that would be more robust and contain similar goals and be better suited to county protocols. This program, Cool Counties, which was first mentioned by Chairman Gerald E. Connolly in his 2007 State of the County address, was developed in collaboration with the Sierra Club and other local government partners, and was officially unveiled in July 2007 at the National Association of Counties annual conference that was held in Richmond, Virginia.

Much of what Fairfax County lists within the framework of this Cool Counties program was initiated previously to address clean water and clean air issues. However, on October 1, 2007, county staff presented its climate change initiatives as part of its fiscal year 2009 Environmental Improvement Program http://www.fairfaxcounty.gov/living/environment/eip/).

Solving climate change is admittedly a daunting task by any measure, but we as county governments have a unique role to play in this effort. Through our regional cooperation and influence on major environmental policy and operations like air quality, land use planning and zoning, transportation, forest preservation, solid waste management and recycling and water conservation, we can lead by example by looking at our own operations to assess what policy or program changes we have the authority and resources to enact in order to lower the emissions produced by our operations.

Fairfax County has already taken a number of these actions, such as purchasing hybrid vehicles, promoting green buildings, purchasing wind power and teleworking to name just a few. Fairfax County now has hybrids as part of its vehicle fleet.

In addition, Fairfax County is purchasing energy from renewable energy sources, which both reduces GHG emissions and encourages the further development of renewable energy sources. In April 2007, the county signed a new three-year wind energy purchase contract with 3-Phases Climate Solutions, Inc. Fairfax County will continue the commitment of purchasing five percent of the general county's electricity from wind energy in 2007 and 2008 and has expanded to 10 percent of the general county usage in 2009.

Telework is another effective tool for reducing our GHG emissions by taking cars off our roadways and commuters out of already-crowded trains and buses. Removing just five percent of cars from the road reduces traffic congestion by up to 20 percent. In 2000, the Metropolitan Washington Council of Governments set the goal of having at least 20 percent of all eligible workers in our region telecommuting one day a week by 2005. All 17 jurisdictions in the region endorsed that goal, and Fairfax County was the first to achieve it.

A few additional examples of current county efforts that support greenhouse gas reductions follow.

2. Land Use and Transportation Solutions

a. Board of Supervisors' Environmental Agenda and the Fairfax County Comprehensive Plan

Both the Board of Supervisors' Environmental Agenda and the county's Comprehensive Plan support development in transit-oriented, pedestrian friendly, mixed use centers. The concentration of new development in relatively high intensity, transit-oriented centers characterized by a mix of residential, employment and retail uses, and the provision of opportunities for non-motorized transportation to, from and within these centers should serve to reduce, in aggregate, the number of motor vehicle trips and vehicle miles traveled, and the associated GHG emissions, that would otherwise occur through more traditional suburban development patterns in the region.

Numerous Area Plan Amendment and zoning actions have been taken to encourage and implement this approach to development, and the Board of Supervisors has adopted a definition and guidance for transit-oriented development in the Comprehensive Plan.

b. Ride Sharing, Telework and Other Transportation Policies

Transportation policies that serve to reduce vehicle trips and vehicle miles traveled (e.g., provision of transit support facilities, transportation demand management efforts such as ride sharing programs and incentives, telework opportunities, bicycle parking and shower facilities in offices, shuttle bus service, transit incentives, etc.) are implemented routinely through the zoning process.

c. Transportation Programs

Numerous transportation programs are also in place that serve to reduce vehicle trips and vehicle miles traveled, therefore reducing overall GHG emissions. These include:

- **Employer Services Program** – This program promotes transportation demand management strategies and associated outreach efforts to employers in Fairfax County, thereby reducing single occupancy vehicle trips.

- **South County Bus Plan** – This program has increased bus ridership significantly on Richmond Highway.

- **Fairfax County Transit Program** – This multi-modal transportation program supports Metro and Virginia Railway Express services. Metrorail trains will soon expand to eight car trains, VRE is replacing existing cars with double deck passenger cars, and CUE bus service will continue to be subsidized. Ridership on all transit systems (Fairfax Connector, Metro, VRE) serving the county has increased. To further encourage the use of mass transit, on Code Red and Code Purple Days, transit systems throughout the entire region offer free rides to all passengers. GHG emissions reductions attributed to the Fairfax Connector totals 5,766 tons of GHG for fiscal year 2009. If the Fairfax Connector Bus services were not available, county staff estimates that there would be an additional 7,543 tons of GHG emissions.

- **Metrocheck** – This is a fare card voucher program that benefits employees using public transportation. Fairfax County's Employees Transportation Benefits Program provides up to $105.00 per employee per month for transportation by bus, rail or vanpool.

- **Ridesources** – This program provides ridematching services to county employees and residents along with a marketing program to encourage its use.

- **County telework program – Approximately 1,500** county employees telework. Fairfax County is the first jurisdiction to reach —and then exceed — the regional goal set by the Metropolitan Washington Council of Governments to have 20 percent of the eligible workforce teleworking by the end of 2005. The county's outreach efforts on telework and other transportation demand management efforts have broader benefits countywide.

Facilities that support non-motorized transportation also serve to reduce motor vehicle trips and motor vehicle miles traveled. The county has provided substantial funding for the construction of trails in support of nonmotorized transportation.

d. Tree Preservation and Planting

Planting efforts reduce GHG concentrations, as trees sequester carbon by absorbing GHG during photosynthesis and by storing carbon as biomass. For every acre of forest that the county is able to preserve and keep healthy, approximately 20 to 30 tons of carbon is stored. Fairfax County's tree canopy is currently estimated to cover 40 percent (104,000 acres) of the county; therefore, this equates to between roughly two and three million tons of carbon storage. It should be noted that the acreage of tree canopy has dropped slightly since last year because of development. An earlier study estimated that the biomass of the county's tree canopy stored over 3.5 million tons of carbon. It has also been estimated that the county's current tree canopy absorbs and stores an additional 11,700 tons of carbon annually. A single tree is capable of absorbing and storing an additional 600 to 700 pounds of carbon per year. It has therefore been calculated that between 110 and 130 trees can offset the carbon "footprint" (77,400 pounds of CO_2) that is estimated to be produced by each household in Virginia annually. These data underscore the value of the county's urban forestry programs and other efforts that serve to protect and restore tree cover.

The Fairfax County Board of Supervisors has adopted a tree canopy cover goal for the county of 45 percent coverage by the year 2037 and has approved a tree conservation ordinance to strengthen tree preservation policies and procedures. In addition, actions to improve urban forestry and preserve tree canopy are part of the FY 2010 Environmental Improvement Program.

Chapter 122 of the Fairfax County Code requires the preservation of existing trees during land development (including by-right development) and strengthens expectations to conserve trees during the zoning process. Tree preservation efforts, landscaping efforts and the preservation and restoration of Environmental Quality Corridors and Resource Protection Areas all serve to enhance overall carbon sequestration, thereby supporting

reduced atmospheric GHG concentrations. The establishment and enforcement of limits of clearing and grading on site plans, subdivision plans and grading plans also support reductions in GHG concentrations, as do tree planting initiatives and public outreach focusing on land stewardship issues such as tree preservation and planting.

3. Energy Efficiency Solutions

a. Green Buildings

GHG emissions will be reduced as energy demands are reduced (or as renewable energy sources that to not emit greenhouse gases, such as wind, solar, and geothermal energy are employed). In support of reduced energy use, Fairfax County has adopted green building policies addressing its own capital projects as well as private sector development. Under the Sustainable Development Policy for Capital Projects (adopted by the Board of Supervisors on February 11, 2008), county projects greater than 10,000 square feet in size have a goal of achieving Silver certification through the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) program; smaller facilities are recommended for LEED certification.

The Department of Public Works and Environmental Services has also accomplished innovative energy saving measures in many of its industrial plant processes. For example, the Noman M. Cole, Jr. Pollution Control Plant uses methane gas from landfills in its sludge burning process. This is important because methane is approximately 20 times more potent as a greenhouse gas as is CO_2. As noted below, methane gas is also used to generate electricity at the I-95 Landfill site. The Division of Solid Waste collects and transports trash in Fairfax County to produce electricity in the Waste to Energy Facility. The Fairfax Center and Crosspointe Fire Stations, both of which are green building projects, opened recently. DPWES is incorporating the green building approach on nearly twenty active building development projects. The Park Authority will also be using green building technology on an expansion to one of its recreation centers.

On December 3, 2007, the Board of Supervisors adopted an amendment to the Policy Plan volume of the Comprehensive Plan that incorporated within the Plan support for green building practices and that served to promote the application of these practices. Included in the amendment were new policies establishing linkages between the incorporation of green building/energy conservation practices and the attainment of certain Comprehensive Plan Options, planned uses or densities/intensities of development. In the county's growth centers, commitments for green building practices sufficient to attain certification through the LEED program or its equivalent are expected for certain nonresidential and

multistory multifamily residential proposals (e.g., proposals seeking development at the high end of the planned density/intensity range; development seeking a Comprehensive Plan Option; development involving a change in use from what would be allowed as a permitted use under existing zoning; development at a planned Overlay Level). ENERGY STAR® Qualified Homes designations are expected for any other residential development proposed at the high end of the Plan density range.

b. Energy Efficiency

The county's Facilities Management Department has started an energy efficiency program for the buildings in its inventory. Total energy measured in 1,000 British Thermal Units (kbtu) in 2008 was 513,779,217 and in 2009 it was 622,511,335. This is clearly an increase in total use. There is also an increase in use per square foot. The addition of the county's McConnell Public Safety and Transportation Operations Center (MPSTOC) and the Courthouse expansion with high energy intensity are the main reason for these increases. However, despite these recent increases, total avoided energy use measured in kbtu and the associated cost avoidance between fiscal year 2001 and fiscal year 2009 exceeds 417,000,000 kbtu and $6.7 million.

Natural gas consumption was also reduced by 14,802,596 therms between FY 2001 and FY 2008. However, natural gas consumption increased by 59,658,438 therms in FY 2009, primarily due to the addition of MPSTOC and Courthouse Expansion.

The Facilities Management Department has set an internal goal of a one percent annual reduction in kBTU/SF; between FY 2001 and FY 2008, the annual reduction averaged 1.8 percent per square foot, and the total consumption reduction during this time was 12.6% per square foot. During FY 2009, there was a 9% increase in total energy consumption, thereby reducing the net savings per square foot since FY 2001 to 4.5%.

The Fairfax County Park Authority initiated the lighting retrofit, energy efficient motor upgrades, and automated controls portion of the Park Authority's energy management effort at eight recreation facilities and the Frying Pan Activity Center. The Park Authority is committed to programmatically addressing energy management and has established an internal position to coordinate energy management initiatives and conservation throughout the agency. Now that the budgeted lighting projects are complete, the Park Authority will monitor the energy usage at these sites and will be able to report those savings in future years. These energy saving retrofits will reap long term, system-wide environmental and cost benefits.

Lighting Retrofits ($107,120) consist of installation of T8 Lamps and electronic ballasts, light-emitting diode exit signs, LED light fixtures, replacement of 400-watt high intensity discharge lamps with 300-watt high-intensity discharge lamps, compact florescent lamps vs. incandescent lamps and occupancy sensors at targeted locations. Annual savings are estimated at $60,358 per year.

The initial funding for this project is now expended and the agency is looking for additional funding for continuation of light system retrofits. Staff is requesting bond funds and stimulus monies as additional sources of funding.

Control Installations ($234,840) consist of Web based wireless control of key mechanical systems to allow automatic run time scheduling, phased start up to avoid peak demand utility penalty charges, remote access and run time history reporting. Annual savings are estimated at $70,493 per year. The team assigned this project is continuing research for these controls and hopes to select a system soon as a test in one of the FCPA locations.

Motor Replacements ($43,260) consist of replacing 20 horsepower or larger motors, with 95% (or even higher efficiency) efficiency optimizing units for pool pumps and air handling units. Annual savings are estimated at $16,068 per year. This project was completed with the allotted funding and with the software tracking site usage staff should be able to report on the savings in future updates.

4. Renewable Energy Solutions

a. Wind Energy Purchase

The county purchased 5.8 million kWh of wind energy in 2005 from Washington Gas Energy Services/Community Energy/Mountaineer Wind Farm in West Virginia, bringing a reduction of 6.2 million pounds of CO_2 in the two-year contract. Fairfax County has continued its commitment of purchasing wind energy and expanded this commitment in 2009 from five to 10 percent of the general county government usage.

b. Waste-to-Energy and Landfill Gas Recovery and Utilization

County recycling, landfill gas to energy, waste to energy and transfer station operations are the most effective means by which to reduce GHG emissions. These efforts have resulted in an annual reduction of CO_2 equivalents of 913,583 tons.

The county has adopted a waste-to-energy approach, recovering methane, controlling nitrous oxide and generating electricity from solid waste. Methane traps 21 times more heat per molecule than CO_2, and nitrous oxide absorbs 310 times more heat. The waste-to-energy plant at the I-95 Landfill generates over 80MW of electricity, offsetting an estimated 1,000,000 tons (approximately) of GHG emissions that would have been generated by a conventional power plant of this size.

The county uses landfill gas generated by the closed I-66 Sanitary Landfill as a fuel source to heat county buildings on the West Ox Campus. In particular, the new Department of Vehicle Services Maintenance Garage has radiant heaters that can be easily converted to burn landfill gas, as was done for the truck wash at the I-66 Transfer Station and for the maintenance shop at the I-95 Landfill. In 2005, the county began the Phase 1 planning and design for the project. Construction of the necessary infrastructure to use landfill gas from the I-66 complex (closed landfill) as a source of renewable energy to heat the buildings mentioned above is being accomplished in Phase 2, was completed in fall 2008. The total project cost is approximately $300,000, and the project will provide estimated annual savings of $70,000 per year in reduced natural gas consumption. The LFG pipeline is approximately 2,500 feet from the existing flare station to the garage, requiring 4" high density polyethylene pipe to transmit the gas. Approximately 150-200 standard cubic feet per minute of LFG are required to heat the garage. In addition, LFG is used at I-95 to generate six MW of electricity which is solid to Dominion Energy, and also as the fuel for sludge processing at Noman M. Cole, Jr. Wastewater Treatment Plant.

5. Green Vehicle Solutions

a. Hybrid Vehicle Replacement Program

As of July 2009, the county's vehicle fleet had the following hybrid vehicles: 55 Toyota Priuses and 55 Ford Escape hybrids. The county plans to continue its hybrid vehicle replacement program in 2010 at a reduced pace due to budget constraints. In 2009, the county purchased a Freights hybrid box delivery truck. The use of these vehicles has resulted in a decrease in GHG emissions equivalent to at least 120 tons per year of CO_2. In 2006, the county converted one of its Priuses to a "plug-in-hybrid-electric" vehicle. This car travels up to 30 miles on electric power from the grid before engine-generated electrical power is used. It achieves fuel efficiency on some trips of over 100 miles per gallon of gas, plus grid electricity. Using Recovery Act funding from the Federal government, the county expects to receive a hybrid school bus and a hydraulic trash truck. The county has also obtained grant funds to acquire a plug in hybrid electric school bus. We expect that the school bus would achieve a 40 percent

decrease in diesel fuel consumption and the truck a 25 percent decrease with corresponding decreases in greenhouse gas emissions.

b. Diesel Exhaust Retrofits

The county has retrofitted 1,012 school buses, 167 Connector buses, and 113 heavy duty trucks with exhaust after-treatments that reduce particulate emissions. The bus retrofits include 436 school buses and 57 Connector buses with treatments that also reduce nitrogen oxides (a precursor to the formation of smog). These retrofits also indirectly benefit greenhouse gas reduction. In addition, Fairfax County Public Schools purchased 147 school buses with the reduced emissions engine control.

c. Idle shutoff and horsepower reduction

All county solid waste trucks and all Fairfax Connector buses have automatic idle shutdown programmed into their engine controls. In addition, the engines on 25 Connector buses have been de-rated by 25 horsepower to reduce fuel consumption and corresponding emissions of regulated pollutants and greenhouse gases by five percent for affected buses.

B. FAIRFAX COUNTY'S PARTICIPATION IN REGIONAL EFFORTS

While progress to reduce GHG emissions takes place at the local level, the greatest benefits of GHG emissions reductions will be realized as Fairfax County, neighboring counties, the Commonwealth of Virginia, other states and foreign countries undertake efforts to reduce GHG emissions. At a regional level, Fairfax County is a leader. Moreover, the county's elected leadership plays an active leadership role in the formulation of county and regional strategies to effectively reduce GHG emissions.

Regional efforts to address climate change over the past year are expected to be key in the development of state, regional and county plans for reducing GHG emissions. The following actions should be noted:

- On December 21, 2007, Governor Tim Kaine issued Executive Order 59, creating the Governor's Commission on Climate Change and setting a target of reducing statewide greenhouse gas emissions to 30% below business as usual by 2025.

- The Governor's Commission on Climate Change (December 2008) recommended the following:

- Virginia will reduce GHG emissions by increasing energy efficiency and Conservation.

- Virginia will advocate for federal actions that will reduce net GHG emissions.

- Virginia will reduce GHG emissions related to vehicle miles traveled through expanded commuter choice, improved transportation system efficiency, and improved community designs.

- Virginia will reduce GHG emissions from automobiles and trucks by increasing efficiency of the transportation fleet and use of alternative fuels.

- Virginia will reduce GHG emissions through accelerated research and development.

- Virginia will reduce GHG emissions by increasing the proportion of energy demands that are met by renewable sources.

- Virginia will reduce GHG emissions by increasing the proportion of electricity generation provided by emissions-free sources of energy.

- Virginia will reduce net GHG emissions by protecting/enhancing natural carbon sequestration capacity and researching/promoting carbon capture and storage technology.

- The Commonwealth and local governments will lead by example by implementing practices that will reduce GHG emissions.

Most planning for regional issues in the metropolitan Washington DC area takes place with the Metropolitan Washington Council of Governments. In November 2008, the Climate Change Report was issued, which provided a number of recommendations that call for reducing GHG emissions. The Climate, Energy and Environment Policy Committee is currently working to develop implementation plans. Fairfax County is an active participant in these efforts and residents should watch these efforts to see both what steps are being taken and how they might contribute to further reducing GHG emissions.

C. NATIONAL RECOGNITION FOR COUNTY EFFORTS

Fairfax County has received national recognition for many of its efforts, including the following:

- In 2009, the Tree Conservation Ordinance received a “Best in Category” Achievement Award from the National Association of Counties.

- Member U.S. Environmental Protection Agency Green Power Partnership.

- Certified as a Green Government through Virginia Municipal League/Virginia Association of Counties Go Green Virginia Initiative.

- Recognition by 3Degrees Energy for Extraordinary Environmental Leadership through the Support of Renewable Energy.

- Initiated the State Wide Local Government Energy Efficiency and Conservation Committee through the Virginia Energy Purchasing Governmental Association.

- In 2008, the county received the 2007-2008 PTI Technology Solutions Award for Sustainability from the Public Technology Institute for its Plug-In Hybrid Vehicle Fleet Trial.

- In 2007, the county was recognized as a Green Power Partner by the U.S. Environmental Protection Agency for efforts to reduce the risk of climate change through green power purchasing.

- In 2007, the county joined the U.S. Environmental Protection Agency's ENERGY STAR® Challenge program.

- In 2006, the county received a National Association of Counties Achievement Award for Environmental Excellence for the Board of Supervisors' Environmental Agenda ("A 20-Year Vision") and for the Environmental Improvement Program.

- In 2006, Fairfax County was first among large counties in the National Association of Counties Change a Light Campaign, a two-month nationwide campaign challenging county employees to change incandescent bulbs with compact florescent bulbs.

- In 2005, the county received recognition as the U.S. Environmental Protection Agency Landfill Methane Outreach Program Community Partner of the Year Award for use of landfill gas as a renewable energy source, saving the county $5,000 a year in fuel.

- In 2005, the county received a National Association of Counties Achievement Award for "Improving Air Quality in the Washington Metropolitan Region, a Commitment to Air Quality Excellence - Air Quality Protection Strategy".

D. STEWARDSHIP

The regional greenhouse gas emissions reduction implementation plans that Fairfax County will be contributing to for the region will serve as a guide for both things that must be done and steps that can be taken on a voluntary basis. Some efforts, such as saving energy, reducing vehicle miles, carpooling or maybe riding a bike to work will involve changes in lifestyle that can be better for the planet and good exercise. Opportunities for reducing one's personal GHG footprint can be organized in many ways but the following suggestions may be helpful.

- Reduce home energy demands. Insulation, energy efficient windows, solar panels, geothermal energy and wind power can all help to reduce GHG emissions. As the use of renewable energy sources increases, the availability and cost of these sources will hopefully decrease.
- Reduce the use of single occupancy vehicles by carpooling, using mass transit, bicycle, walk or other alternatives (including work at home opportunities).
- Participate in local efforts to plan for efforts to improve land use planning and encouraging energy efficient construction practices. Participating in these local efforts will also help to ensure that energy efficient construction practices will have a better chance of acceptance and success.

E. COMMENTS

1. The Facilities Management Department cost avoidance from FY 2001-FY 2009 for electricity and natural gas is $6.7 million without dedicated staffing. For example, one energy project performed by part-time efforts of one staff member resulted in a cost avoidance of approximately $83,000 annually at the Government Center Complex (variable frequency drives, lighting retrofits and lighting software upgrades). More could be accomplished with dedicated staffing. EQAC commends the county for its past efforts and looks forward to working with the county in the future on its climate change program.

2. When the opportunity for reporting of GHG emissions is available, the county should pursue reporting of GHG emissions so that the reporting can be readily combined with reporting of other jurisdictions. Reporting requirements are currently under consideration by the Environmental Protection Agency and we expect those requirements to be similar to those recommended by the Climate Registry. The reporting format of the Climate Registry would standardize electronic reporting, minimizing the need for data handling. If common definitions and electronic reporting are not part of the planning for reporting, the quality of reporting is likely to be impacted and the cost of preparing the GHG emissions inventories will increase.

F. RECOMMENDATION

1. For new building construction, Fairfax County should explore whether commitments should be sought from developers to: (1) encourage reporting of greenhouse gas emissions estimates, which could be based on energy consumption of fuels that release greenhouse gases; and (2) reduce their greenhouse gas emissions by reducing their energy consumption or by obtaining energy from sources that do not emit greenhouse gases (e.g., energy from wind, solar, hydroelectric and/or geothermal sources). The use of electronic reporting standards employed by the Climate Registry or other sources should reduce the need for human intervention in the handling of data. The pursuit of commitments to LEED certification at the Silver level or higher should be considered as well.