CHAPTER I

CLIMATE CHANGE AND ENERGY

I. CLIMATE CHANGE AND ENERGY

A. BACKGROUND

The impact of environmental contamination on climate change/global warming is the result of world-wide emissions of greenhouse gases, including carbon dioxide. Because the rise in greenhouse gas concentrations is attributed to the combustion of fossil fuels, many local governments across the United States are working to improve energy efficiency and reduce GHG emissions (http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf). This chapter outlines work that is under way in Fairfax County to reduce GHG emissions and improve energy efficiency.

Why is climate change important? Climate change is already impacting the United States. The governments of many countries and scientists worldwide acknowledge a real concern for the impacts of climate change. Levels of carbon dioxide have risen from around 350 ppm near 1950 to over 400 ppm in 2013. Carbon dioxide levels have been examined by groups such as CO2now. According to the report *Global Climate Change Impacts in the US,* some key findings within the US include[1]:

- U.S. average temperature has risen over the past 50 years and is projected to rise more in the future; how much more depends primarily on the amount of heat-trapping gases emitted globally and how sensitive the climate is to those emissions.

- Precipitation has increased an average of about five percent over the past 50 years. Projections of future precipitation generally indicate that northern areas will become wetter, and southern areas, particularly in the West, will become drier.

- The amount of rain falling in the heaviest downpours has increased approximately 20 percent on average in the past century, and this trend is very likely to continue, with the largest increases in the wettest places.

- Many types of extreme weather events, such as heat waves and regional droughts, have become more frequent and intense during the past 40 to 50 years.

- The destructive energy of Atlantic hurricanes has increased in recent decades. The intensity of these storms is likely to increase in this century.

- In the eastern Pacific, the strongest hurricanes have become stronger since the 1980s, even while the total number of storms has decreased.

- Sea level has risen along most of the U.S. coast over the last 50 years, and will rise more in the future.

- Cold-season storm tracks are shifting northward and the strongest storms are likely to become stronger and more frequent.

- Arctic sea ice is declining rapidly and this decline is very likely to continue.

Is there evidence of climate change for Fairfax County? In recent years we have seen warmer temperatures and more poison ivy, which has been attributed to slightly warmer temperatures. As a result of the rise in sea level in Fairfax County, the county has redrawn the floodplain boundaries on maps to meet Federal Emergency Management Agency floodplain designations, resulting in more home structures now being located in floodplains. The Governor's Commission on Climate Change estimated that there will be a sea level rise between 1 and 1.6 feet by 2050 and between 2.3 and 5.2 feet by the year 2100. Similar impacts are being predicted around the world. National and international responses to climate change are expected, and while there are few national mandates to address climate change, Fairfax County is fortunate that it is actively pursuing opportunities to inventory and reduce GHG emissions.

The 2008 National Capital Region Climate Change Report provides some excellent background information on climate change in the metropolitan Washington, D.C. area. The report (http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf) highlights many important considerations, including:

- Temperatures are rising along with both sea level and atmospheric carbon dioxide levels.

- As population continues to increase in the Washington, D.C. area, emissions of GHG are also projected to increase.

- A variety of actions have been proposed in the report to reduce GHG emissions; these recommendations have formed the basis for bringing together local governments from the Washington, D.C. area to take action to reduce GHG emissions.

According to the Pew Center for Climate Research[2], the United States has five percent of the world's population and 17 percent of the world's GHG emissions. Moreover, U.S. emissions account for 30 percent of the world's GHG emissions since 1850. Given the observed increases in GHG concentrations in the atmosphere, the increases in temperature, melting of the glaciers and rises in sea level, the world is moving towards controlling GHG emissions.[1]

While the impact of greenhouse gases is widely accepted by the scientific community, there are few required steps to address greenhouse gases. Some steps that have been taken include:

- The light duty vehicle GHG National Program extends to model years 2017-2025.

- GHG regulations have been adopted for heavy-duty engines and vehicles.

- The Renewable Fuel Standard lays the groundwork for significant reductions in GHG emissions, which will also lower our dependence on petroleum.

- On March 21, 2011, the U.S. Environmental Protection Agency published a deferral for sources that emit CO_2 from biomass processes such as wood combustion. The deferral is in effect until July 21, 2014. The EPA deferral was adopted into the Virginia regulations by the State Air Pollution Control Board and went into effect on November 9, 2011. Sources that would have been major only because of their CO_2 emissions from biomass will not have to go through the major New Source Review permitting process until the deferral expiration. The deferral applies only to CO_2 emissions and does not apply to other GHGs.

In summer 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 a daunting task by any measure, but Fairfax County continues to play a leadership role in this effort. The county plays an active and significant role in regional cooperation and influence on major environmental policy and operations like air quality, land use planning and zoning, transportation, forest conservation, solid waste management and recycling and water conservation. Fairfax County leads by example by: adjusting Fairfax County operations to

understand both GHG emissions and energy use; adopting programs to improve energy efficiency and reduce GHG emissions; and looking at county operations to assess what policy or program changes we have the authority and resources to enact in order to lower the emissions produced by county operations.

To guide efforts to address energy, Chairman Sharon Bulova created the Chairman's Private Sector Energy Task Force to bring together prominent members of the Fairfax County development and business communities as well as academia to create a new energy strategy for the county. The task force brought together the private sector, utilities, schools, government officials, organizations including the Environmental Quality Advisory Council and county staff.

Recommendations from the Private Sector Energy Task Force (see link shown below) were presented to the Fairfax County Board of Supervisors on October 16, 2012. One of the primary recommendations was the creation of an Energy Alliance to guide and implement improvements in energy efficiency and to create economic opportunity for the private sector in Fairfax County.

Fairfax County government was directed to assist the leadership of the Private Sector Energy Task Force and the Fairfax County Chamber of Commerce to set up the Energy Alliance, which would ultimately review the recommendations that were contained in the final report (http://www.fairfaxcounty.gov/chairman/pdf/energy_task_force_recommendations.pdf). The chartering process to set up the Energy Alliance is currently ongoing.

The new energy strategy will also attract green collar jobs to Fairfax County. This will be achieved by fostering a business community that these industries find attractive--one that is committed, across all sectors, to achieving ambitious energy efficiency goals. More information is available at http://www.fairfaxcounty.gov/chairman/energytaskforce.htm.

In order to assess the impact of climate change on rises in sea level, the Board of Supervisors asked staff to update a presentation on the impact of climate change on Fairfax County. The Northern Virginia Regional Commission is also preparing a number of products that will address regional impacts on climate change by the end of 2013.

Climate change is a very active area for the region and it is impressive the way that most local governments are undertaking efforts to address it. This chapter reviews efforts that Fairfax County is taking and provides some information on regional efforts as well as the efforts of nearby counties.

Arlington County:

In March 2011, a Community Energy and Sustainability Task Force provided the Arlington County Board with a report containing 18 recommendations and

strategies to guide and manage energy use between 2011 and 2050. The task force report envisions and recommends the installation of both types of district energy systems as well as the creation of new, local district energy companies to operate and manage the district energy systems.[3, 5]

The task force report did not analyze either the public or private sector's ability to implement district energy systems. Arlington County is now in the process of developing a work plan to implement the task force's recommendations. According to the draft work plan, research regarding legal options for district energy is a high-priority task that is ongoing as of the preparation of this report.[3]

Loudoun County

In December 2009, Loudoun County adopted an energy strategy, the development of which was funded by its federal Energy Efficiency and Conservation Block Grant. That energy strategy appears to contemplate both thermal district energy systems and thermal/electric district energy systems.

The Loudoun County Energy Strategy concludes that there is no regulatory impediment to the establishment of district energy systems. According to Loudoun County, "*[f]rom a regulatory standpoint, there are no known barriers to implementing district energy (heating or cooling) networks, other than the provision of public rights of way for infrastructure. It is assumed this is a local County or Town jurisdiction.*"[6] The reasoning underlying this conclusion is not provided. The assumption regarding public rights of way suggests that the conclusion itself may rest on an assumption; significantly, the strategy does not acknowledge Title 56 of the Virginia Code, which addresses public utility regulation.

Loudoun County anticipates the use of scale projects to implement its district energy systems. These scale projects are expected to help the county develop a detailed set of local guidelines applicable to "the formation of neighborhood district energy entities and their relationship to the incumbent utilities." No scale projects involving district energy are currently under way.

Virginia laws complicate the question of district energy and whether and how energy can be sold back into the grid. This point can adversely affect the economics of such projects so that they would not be profitable in Virginia when they would be viable in the District of Columbia or Maryland. Fairfax County has been active in working with other Virginia jurisdictions to evaluate district energy. Moreover, the use of district energy is easier to implement when a single owner is responsible for multiple buildings, as is the case in Crystal City (part of Arlington County). Moreover, there are issues with obtaining credit for the return of excess energy back into the grid resulting from the way that Virginia law is written. Fairfax County is an active participant with this and other issues at a regional level and is undertaking efforts to

provide answers that will allow Fairfax County and other Northern Virginia jurisdictions to move forward on this and other issues in the future.

Another example involves efforts to obtain a "carbon footprint" (i.e., the GHG emissions associated with the consumption of fossil fuels and other activities that release GHG emissions). Briefings to EQAC from county and Fairfax County Public Schools staffs have reported significant energy savings in a variety of county facilities, including schools that are renovated. While Fairfax County government has undertaken work to characterize the carbon footprint for government buildings, similar building-specific efforts evaluating the performance of individual non-government buildings have not been expanded to the residential and commercial sectors. There are a number of issues associated with such work, some of which might be solved by reporting from utilities. Again, Fairfax County is working with other jurisdictions to explore options for obtaining and managing this information.

This chapter focuses on three areas: (1) activities that Fairfax County government is undertaking to reduce GHG emissions associated with county operations; (2) efforts that Fairfax County is taking to network with the greater Washington metropolitan region in these efforts; and (3) Fairfax County's GHG emissions and activities that the county is taking to reduce such emissions from residences and business operations.

B. FAIRFAX COUNTY GHG EMISSIONS INVENTORY

The Fairfax County GHG emissions inventory followed accepted practices for the conduct of such inventories. The compilation of GHG emissions employed the following practices:

Only property that was under the jurisdiction of Fairfax County was included. Thus, the federal government properties located within the county, including but not limited to Fort Belvoir, Dulles Airport, the Central Intelligence Agency and the National Reconnaissance Organization, were not included. In addition, independent political subdivisions such as the City of Falls Church and the City of Fairfax were excluded from the analysis.

The analysis includes scope 1 (all direct GHG emissions) and scope 2 (indirect GHG emissions) emissions. Scope 3 emissions associated with the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity related activities not covered in Scope 2, outsourced activities, waste disposal and other GHG emissions are mentioned but excluded from the analysis.[4,7]

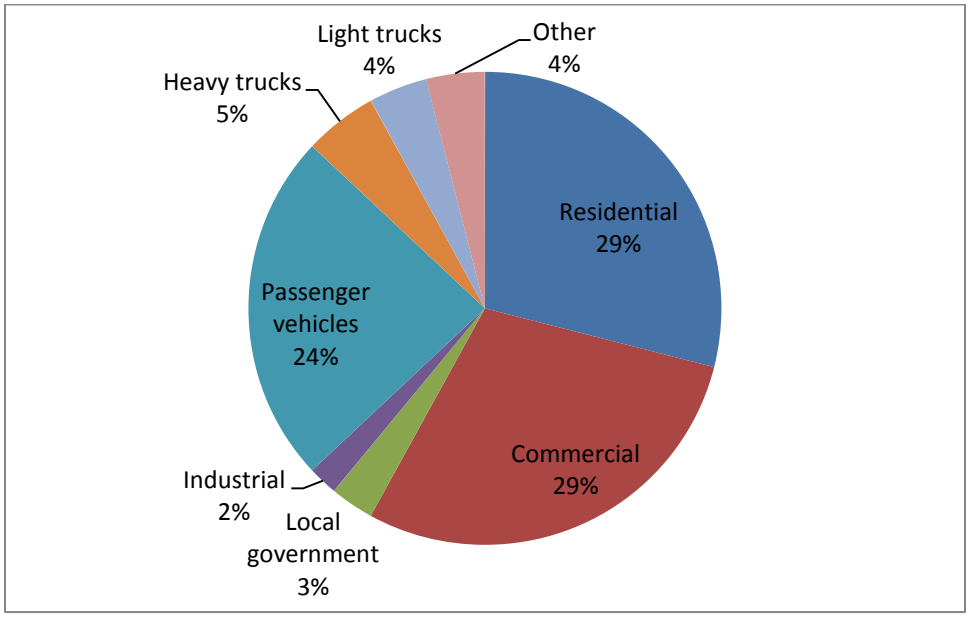
Both of the above assumptions, though reasonable, should be examined when comparing the Fairfax County emissions of 11.4 metric tons CO_2 equivalent per

capita across local jurisdictions. For example, Arlington County's estimate of over 13 metric tons per capita includes emissions from National Airport, although Arlington County exerts no control over the airport.

Figure I-1 shows that the main sources of GHG emissions are electricity generation (both residential and commercial) and mobile sources. The annual GHG emission per average Fairfax County resident is about 11.4 $MTCO_2e$. Information from the county's GHG emissions inventory, which includes a base year of 2006 with four additional years of data, shows that this number has decreased slightly in 2010, which could be attributable to a combination of factors, including education and outreach efforts to reduce energy consumption. According to the Pew Center for Climate Research, the average U.S. citizen has an annual average GHG emission of over 20 $MTCO_2e$, over twice the world average. However, the lower estimate of GHG emissions per person reported in this inventory has a much sounder basis than this gross estimate from the Pew Center. There are valid reasons that the Fairfax County per capita GHG emissions could be higher or lower. For example, the mix of vehicles in the Washington, D.C. area is newer than in many other areas, the Washington, D.C. area has mass transit to serve the population, and much of the building stock of Fairfax County is newer and more energy efficient than buildings in other areas. However, the Washington metropolitan region does suffer from some of the nation's worst traffic, which would raise GHG emissions. Moreover, the estimate of GHG emissions for Fairfax County does not include scope 3 emissions, which we expect is consistent with the GHG inventories of many, if not most, local governments.

While Figure I-1 groups GHG emissions into a few groups of emission sources, there are many different sources of GHG emissions and many opportunities for reducing GHG emissions. For example, most waste in the Washington, D.C. area is incinerated, which is preferred to landfill disposal of waste because landfills generate methane (which is 20 times more potent than carbon dioxide as a GHG). Recently, however, some property managers of buildings in Arlington County, the District of Columbia and parts of Maryland adopted a more comprehensive recycling program, which is being offered by a private company. One of the reasons that this program for waste management is being selected is that the cost is similar to the cost of incineration and ash disposal. Materials recycled include the materials that most waste companies offer (i.e., glass, aluminum, newspaper) as well as other materials that include batteries, plastic bags and any material that can be composted (i.e., food waste, soiled paper towels, and other materials). In addition to providing for a more comprehensive recycling program, the composting of food waste and other materials decreases waste. Composting of waste is far more desirable because it reduces the generation of GHG when compared with the

Figure I-1. 2006 Countywide GHG Emissions (11.838 MMTCO2e)[4]



Source: *Community Greenhouse Gas Inventory for Fairfax County, Virginia, Report of Findings: 2006-2010*, Fairfax County, Virginia (advance copy).

past practice of landfilling waste. Moreover, because composting of waste provides a useful product as opposed to ash from an incinerator that must be managed into the future, composting of food and other materials that can be composted has merits that warrant further consideration as about 30 percent of this material will remain as ash after incineration.

The Northern Virginia Regional Commission is undertaking a regional GHG inventory update that will facilitate aggregating GHG emissions and facilitate comparisons among jurisdictions. Fairfax County is participating in an effort to update all GHG inventories in the region to remove the inconsistencies in GHG inventories resulting from different assumptions and approaches.

C. ACTIVITIES THAT FAIRFAX COUNTY RESIDENTS CAN UNDERTAKE TO REDUCE GHG EMISSIONS

The Fairfax County GHG inventory serves as a guide for both actions that EQAC feels are fundamental to any GHG emissions reduction effort (e.g., monitoring energy use in government buildings and undertaking renovations to be energy efficient) and other actions. 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. Key opportunities for GHG emissions reductions include:

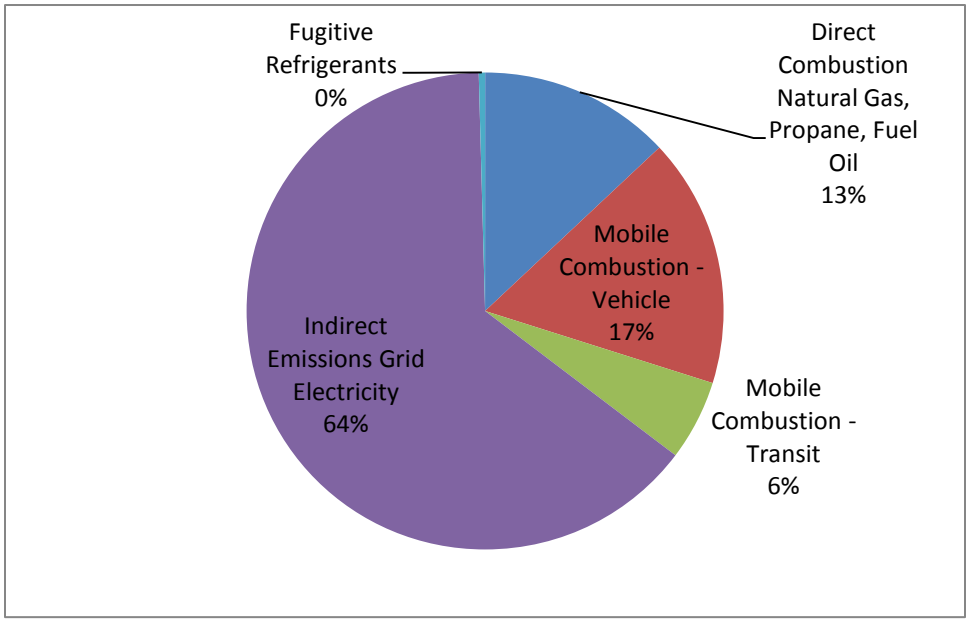
- Reduce home energy demands. Much of the electrical use shown in Figure I-1 serves to power, heat and cool buildings. Insulation, energy efficient windows, solar panels, geothermal energy and wind power can all help to reduce GHG emissions from building operations. As the use of renewable energy sources increases, the availability and cost of these sources will hopefully decrease.

- Reduce the use of single occupancy vehicles by carpooling, using mass transit, bicycling, walking or pursuing other alternatives (including work at home opportunities). Vehicle emissions constitute another significant source of GHG emissions, so this is another area that seems to be an appropriate target for reduction.

- Participate in local efforts to plan for improved land use patterns and to encourage 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.

The Fairfax County GHG inventory also provides historic emission estimates going back to 2010. Figure I-2 shows Total Fairfax County GHG emissions for 2010.

Figure I-2. 2010 Fairfax County Government Emissions by Source Type (460,695 MTCO2e)[4]



Source: Fairfax County, Virginia.

D. FAIRFAX COUNTY OPERATIONS GHG EMISSIONS AND ACTIONS TO REDUCE THESE EMISSIONS

1. Overview

The Fairfax County government has undertaken extensive efforts to both characterize GHG emissions associated with county operations and to target opportunities for increased energy efficiency. While county savings from these efforts are to be commended, the success of Fairfax County government in characterizing emissions and improving the efficiency of operations serves as a model for both businesses and residents in the county.

Fairfax County has already taken a number of significant actions, such as purchasing hybrid vehicles, promoting green energy efficient buildings, promoting renewable sources of energy and teleworking to name just a few.

Fairfax County has had a hybrid vehicle replacement program since 2002 and currently has 112 hybrids in its vehicle fleet. In 2006, the county converted one of its Toyota Priuses to a "plug-in-hybrid-electric" vehicle. This car travels up to 30 miles on electric power from the grid before engine-generated electric power is used; on some trips it has a fuel efficiency over 100 miles per gallon of gas (plus grid electricity). More recently, the county purchased five plug-in hybrid electric Chevrolet Volts.

Fairfax County is using renewable energy technology to harness energy. This includes landfill gas to energy systems at both closed landfills and solar mixers at the Noman M. Cole Jr. Pollution Control Plant. In addition, Fairfax County is purchasing energy from renewable energy sources, which both reduces GHG emissions and encourages the further development of these energy sources.

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.

In October 2009, Fairfax County was awarded a three-year $9.6 million grant under the federal Energy Efficiency and Conservation Block Grant program. The EECBG program, which was funded by the American Recovery and Reinvestment Act of 2009, was intended to fund projects that improve building and transportation energy efficiency and achieve measurable reductions in energy consumption. The county developed a pragmatic, results-oriented strategy to achieve these objectives within the three-year grant term. Its strategy included projects in the areas of information technology, facility improvements,

transportation and professional services. By the time the award expired in October 2012, the county had completed 14 projects and had spent all but $187.73 of the award. As these examples demonstrate, the benefits of these EECBG projects include reductions in energy consumption and greenhouse gas emissions for the lifetime of the equipment purchased or installed:

- Information Technology: The county's single largest EECBG project funded the consolidation and virtualization of its enterprise servers. According to the Department of Information Technology, in 2011 this project reduced electricity demand by about 2.319 megawatts of electricity, saving approximately $188,000 in annual electricity costs. The reduced energy demand avoided GHG emissions of approximately 1,524 metric tons. The project also created additional savings by reducing the need for computer hardware and software and reducing space requirements in the county's data center.

- Schools: The EECBG award funded the purchase and installation of digital energy management control systems and occupancy sensors at Oakton High School, Bryant Alternative High School, Luther Jackson Middle School and Washington Mill Elementary School. According to the Fairfax County Public Schools' Energy Manager, in just over a year the EECBG-funded improvements to Oakton High School avoided the use of 1.465 megawatts and 737 metric tons of GHG emissions, while enhancing occupant comfort. The project also helped Oakton High School earn ENERGYSTAR® certification in January 2012.

- Facilities Management: EECBG funding was used at the Gum Springs and Lillian Carey/Bailey's Community Centers to replace outdated rooftop heating/cooling units with energy-efficient models and to install energy management control systems. According to the county's Facilities Management Department, these improvements have reduced average monthly electricity consumption 22 percent while enhancing occupant comfort. FMD reports that the installation of EECBG-funded lighting controls at the Herrity and Pennino Buildings and the South County Center reduced average monthly electricity consumption 34 percent across the three buildings.

- Parks: EECBG-funded lighting improvements at Fairfax County Park Authority properties included the purchase and installation of (1) LED parking lot lights at four parks; (2) web-based lighting controls at over 20 athletic fields located at 12 sites; (3) user-controlled timers at over 50 tennis and basketball courts in 23 parks; and (4) outdoor lighting upgrades at an additional eight parks. Precise energy savings cannot be determined because these lighting fixtures are not separately metered. However, curbing night-time lighting promotes dark sky stewardship and benefits park neighbors. Additionally, the user-controlled lighting timers installed at

basketball and tennis courts help allow park users to assume responsibility for lighting and energy consumption. More information is available at http://www.fairfaxcounty.gov/living/environment/energy/eecbg-project-status-march2011.pdf.

2. Facilities Management

A decade ago, the county's Facilities Management Department set an internal goal of a one percent annual reduction in energy use per square foot (measured in kBTU/square foot) for the buildings in its inventory. Because annual savings are cumulative, reductions of over 10 percent in energy usage per square foot are expected over a 10-year period. Recent numbers show FMD achieving or exceeding this goal, despite a substantial increase in square footage. During the period Fiscal Year 2001 – FY2010, FMD's energy reduction efforts resulted in a cost avoidance of more than $7 million.[1] The magnitude of the energy savings is illustrated by kilowatt hours avoided: in 2005, FMD's actions saved 4,232,639 kWh and saved an additional 2,398,036 kWh in 2006. Additionally, during these same years natural gas consumption was reduced by 111,440 therms per year. FMD took a wide range of actions to achieve these savings, including: the installation of energy management control systems; right-sizing heating, ventilating and air conditioning equipment; and installing efficient lighting and lighting controls.

3. Vehicle Services

In response to the county's need for cleaner and more energy-efficient vehicles, the Department of Vehicle Services began to include hybrid-electric vehicles in its vehicle replacement program, where appropriate. As a result, a conventional gasoline-fueled county fleet vehicle at the end of its service life may be replaced with a hybrid vehicle, if requested by the agency and conditions warrant. There are over 100 hybrid vehicles in the county's fleet, including five Chevy Volts. The county saves over 60,000 gallons of gas each year from its use of hybrid vehicles. DVS operates a number of other non-conventional vehicles, including a hybrid-electric school bus and a hybrid hydraulic launch assist refuse truck, which can generate up to 25 percent savings in fuel and energy costs depending on duty cycle and driver behavior. DVS has undertaken a diesel exhaust retrofit project, in which it retrofitted 1,012 school buses, 167 Connector buses, and 113 heavy duty trucks with exhaust after-treatments that reduce particulate emissions. Other innovative energy-saving DVS activities include programming automatic idle shutdown into all county solid waste trucks and all Fairfax Connector buses and de-rating the engines on 25 Connector buses by 25 horsepower to reduce fuel consumption and corresponding emissions by five percent for affected buses. Using federal stimulus funding, DVS is adding five

[1] The county's fiscal year is June 30 through July 1.

electric vehicles to the county fleet and anticipates installing the charging stations necessary to support them.

In 2012, DVS ordered six Ford Fusion Hybrids utilizing EECBG grant funding covering the incremental cost difference to that of a standard sedan. The vehicles were expected to have arrived in July 2012. The Fairfax County Public Schools are evaluating a hybrid conversion system on one of its school buses; this system, which is offered by ElectroMotive Designs, provides 20 to 100kW of electric power to the conventional drivetrain during acceleration and is designed to pay for itself by reducing operation costs.

DVS continues to seek grant funding for further exploration of hybrid and electric drive vehicles. As other prototype or early production vehicles become available, DVS will consider whether to conduct demonstrations with those vehicles as well.

More information is available at http://www.fairfaxcounty.gov/living/environment/coolcounties/countyefforts_greenvehicles.htm.

4. Green Buildings

In early 2008, the Board of Supervisors adopted the Sustainable Development Policy for Capital Projects applicable to the construction of new county buildings and renovations or additions to existing buildings. The policy provides a framework for preserving and promoting a natural environment, conserving energy, meeting or exceeding air and water quality standards, creating healthy work environments and establishing a community standard for sustainable practices. Under this policy, county projects greater than 10,000 square feet in size are expected to achieve a minimum LEED® Silver certification.[8] Smaller facilities are expected to achieve LEED certification. As of May 2013, the county had a total of 31 green building projects, 14 of which attained certification (12 under the LEED program and two under the Green Globes program). The other 17 projects, all of which have a goal of LEED Silver, are in design or are under construction. In addition, the county managed the LEED Gold Virginia Department of Transportation Administration Building. The Richard Byrd Library attained a LEED Gold rating, making it only the second library in the state to achieve a gold certification; it has since been joined by the Martha Washington and Dolley Madison Libraries. The county's Crosspointe and Great Falls Fire Stations rank among only a few LEED Gold-certified fire stations in the nation. One-time increases in construction costs associated with complying with the policy are offset by annual savings in energy and water bills. Annual savings at seven buildings currently registered and certified are ranging between $9,000 and $12,000 per building. More information is available at http://www.fairfaxcounty.gov/living/environment/coolcounties/county_green_buildings.htm.

5. Parks

The Fairfax County Park Authority, which has its own energy management policy, is committed to programmatically addressing energy management and has begun coordinating energy management initiatives and conservation throughout the 417 parks it manages. It has embarked on an energy-saving retrofit replacement program at its RECenters, nature and visitor centers, buildings, tennis courts and athletic fields to reap long-term, system-wide environmental and cost benefits. Key aspects of that program include lighting retrofits (e.g., the installation of T8 Lamps and electronic ballasts, LED exit signs, occupancy sensors, and compact florescent lamps), motor replacements (e.g., replacing 20 horsepower or larger motors with high-efficiency units) and control installations (web-based wireless control of key mechanical systems that allows automatic run-time scheduling, phased start-up to avoid peak demand utility penalty charges, and remote access). The Park Authority's first major energy project was completed at the Providence RECenter in 2008. Energy use declined 60 percent in those areas receiving new lighting, including the pool area, and overall facility electricity costs declined 20 percent, which translates to a three-year payback for the project. As an added bonus, pool customers prefer the new lighting. Park Authority Energy Management Policy (103.4) is available at http://www.fairfaxcounty.gov/parks/parkpolicy/

Below are some completed energy projects for park facilities:

- Completion of a lighting system project for the Mount Vernon RECenter. This project was completed in three phases, installing building controls for the lighting system, upgrading the building light fixtures and upgrading swimming pool lights. This resulted in improved efficiency and quality of light and reduced energy costs and environmental impacts.

- Completion of athletic fields lighting Web-based control systems for 22 athletic fields at nine sites. All 104 Park Authority fields are now equipped with this control system. This system allows for better field light scheduling and control from a remote location, resulting in improved operational efficiency and reduced energy waste.

- Completion of lighting and Heating/Ventilation/Air Conditioning system improvements for the Area 5 Park Management offices and maintenance shop, including HVAC control, lighting fixtures and lighting control upgrades, resulting in increased efficiency and energy conservation.

- Completion of lighting and HVAC system improvements for the Hidden Oaks Nature Center, including HVAC control, lighting fixtures and lighting control upgrades, resulting in improved energy efficiency and at the same time allowing for the special needs of live animal care.

- Direction of surveys and creation of a chart for temperature set points of the park facilities for efficient use of energy in the facilities, balancing energy conservation with the needs of the customer, including live animal and historic collections.

- Completion of lighting and control system improvements for the Oak Marr RECenter, including pool lighting and control system upgrades and replacement of the pool area skylight, resulting in more natural light, improved energy efficiency and reduced energy costs.

- Completion of lighting and control system improvements for the South Run, Spring Hill, Wakefield and Oak Marr RECenters parking lots, resulting in better energy efficiency, reduced energy waste and better compliance with dark sky needs.

6. Waste Management

The Department of Public Works and Environmental Services has also undertaken innovative energy saving measures to achieve energy savings in many of its industrial plant processes. For example, the Noman M. Cole, Jr. Pollution Control Plant uses methane gas from a county landfill in its sludge-burning process, thereby avoiding the purchase of natural gas and recovering a gas that has a global warming potential that is 21 times that of carbon dioxide. DPWES is using solar energy equipment to power nine remote wastewater flow-monitoring sites and to assist in treating wastewater; its use of solar mixers at the treatment plant is saving about $40,000 a year in energy costs. DPWES is also undertaking a water reuse project to use 560 million and 24 million gallons of reclaimed water from the plant for process and irrigation purposes, respectively; this project avoids the energy use and costs associated with treating the water. Also underway is a project to provide the Energy/Resource Recovery Facility with approximately two million gallons of potable water for process purposes. This project will reduce consumption of potable water at the E/RRF through the reuse of wastewater treatment plant effluent as a substitute. This action will provide both facilities with cost savings of up to 25 percent per year over the cost of potable water. More information is available at http://www.fairfaxcounty.gov/dpwes/wastewater/noman_cole.htm and http://www.fairfaxcounty.gov/dpwes/construction/water_reuse/.

7. Transportation

The county contributes funding for the operations of the Washington Metropolitan Area Transit Authority. In addition, the county's Department of Transportation has a number of initiatives supporting transit use in Fairfax County. The Employer Services Program provides outreach to employers on transportation demand management strategies, including rideshare incentives and promotions, computerized ride matching, carpool incentives such as

preferred parking, subsidies and telework programs. Other DOT efforts include the Connector Bus system, the "RideSources" program, which provides ridesharing information and ride matching assistance to commuters (part of the regional Commuter Connections system), the Community Residential Program, which assists residential communities with the assessment and promotion of alternatives to single occupant vehicle trips and the provision of park-and-ride lots. Employees are eligible to receive a subsidy for transit use of up to $120 per county employee. Also, in 2012, DOT initiated efforts for the conversion of the maintenance and service buildings at West Ox Road for their use of landfill gas for heating. More information is available at http://www.fairfaxcounty.gov/fcdot/.

8. MITRE Study for Electric Vehicle Charging

In August 2011, the MITRE Corporation, per a proffered commitment to sustainability-related work for the benefit of Fairfax County, completed a report titled "Electric Vehicle Charging Infrastructure Recommendations to Fairfax County." The report included several recommendations, with a particular focus on electric vehicle charging-related opportunities associated with redevelopment in Tysons Corner. The MITRE report was transmitted to the Board of Supervisors, which, in turn, referred the report to the Planning Commission for its review and recommendation.

The Planning Commission's Environment Committee has been reviewing the MITRE report and its recommendations. During the several meetings that the committee has held on this issue, the committee has received presentations from: the MITRE Corporation; the Fairfax County Environmental Coordinator (regarding related efforts at the regional level); and three private sector providers of electric vehicle supply equipment. As of the date of preparation of this summary, the committee was considering a number of issues and questions that had been identified during and subsequent to these presentations.

9. Green Building Policy and the County's Comprehensive Plan

In December 2007, the Board of Supervisors adopted an amendment to the Policy Plan volume of the county's Comprehensive Plan that established a green building policy. The policy includes broad support for green building practices and establishes linkages between the incorporation of green building/energy conservation practices and the attainment of certain Comprehensive Plan options, planned uses, and 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 recommended for certain nonresidential and multi-story 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 recommended for any other residential development proposed at the high end of the Plan density range.

The aforementioned Policy Plan amendment was adopted with the expectation that it would be reviewed in two years. The Planning Commission's Environment Committee began its review of this policy in November 2009; this review resulted in the completion, in July 2011, of a "strawman" draft Plan amendment that was released for public review and comment. The committee's review of all comments received on this draft was completed in fall 2012, and a Planning Commission recommendation for a Policy Plan amendment was transmitted to the Board of Supervisors in December 2012. The Planning Commission has recommended several changes to the policy, including:

- Clarification of policy language.
- Support for additional green building concepts.
- Updating of green building rating systems recognized by the policy.
- Support for higher levels of green building efforts for higher levels of density or intensity.
- Expansion of the areas of applicability of the policy in growth centers such that it would also apply in industrial areas.
- Other modifications.

The Planning Commission's Environment Committee requested that the Plan amendment be crafted in a manner that would provide flexibility to consider additional public input regarding whether there should continue to be geographic differentiation in regard to green building recommendations and whether additional guidance is needed in regard to green building efforts for public-private partnerships on county property.

The green building Plan amendment was incorporated into the Pilot Comprehensive Plan Amendment Work Program that was adopted on July 9, 2013 by the Board of Supervisors (see the above discussion on Fairfax Forward). Staff is anticipating that a Planning Commission public hearing will be held in spring 2014.

A green building policy should encourage private sector building practices to construct buildings that are more energy efficient. However, it is important to realize that some companies have recognized that energy efficient practices are not only good for the environment but that they also save money, and energy efficient operations are attractive to many consumers. Consequently, it is not hard to find a variety of hotels, commercial offices, grocery stores and other commercial operations that have adopted energy efficient and environmentally sensitive practices in building construction and operations.
As of the preparation of this report, we are aware of one "big box" store in Fairfax County that is applying for LEED certification. This COSTCO store is

located on Richmond Highway and some highlights of things that COSTCO has done include:

- Air doors to keep refrigeration in refrigerated areas.
- Double vestibule for cold climates with air curtains.
- Energy efficient lighting, both indoors and outdoors.
- LED lighting for display cases and refrigeration.
- Anti-sweat controls for refrigeration doors.
- Localized refrigeration sensors to better manage energy requirements.
- Low flow bathroom fixtures.
- Night screens.
- Reflective roof with solar panels.
- Controls to turn lights off inside when skylights provide sufficient indoor lighting.
- Secondary loop refrigeration and reduced use of refrigerants that are greenhouse gases.
- Recycling of cardboard, grease and other materials.
- Construction materials are largely from recycled materials.

For the store that was recently constructed, stormwater management controls have also been established that either filter stormwater runoff through a bioswale or underground filtration system before release to Little Hunting Creek.

E. EDUCATION AND OUTREACH

Climate change is a phenomenon that can have real impacts on our lives, and yet the effects of local actions are more limited than those associated with other environmental problems. Counties across the U.S. are taking steps to reduce GHG emissions and inform people who live and work in these counties. To address this challenge, Fairfax County is exploring the use of social media to facilitate communications and education on climate change. One of the most significant actions that Fairfax County has taken is the establishment of an outreach program to assist Fairfax County residents in understanding the benefits of efforts to improve home energy efficiency, which also reduces GHG emissions.

As discussed in Section D, in October 2009, Fairfax County was awarded a three-year $9.6 million grant under the federal Energy Efficiency and Conservation Block Grant program. Of the 14 funded EECBG projects, one was a residential energy education and outreach program. The terms and conditions of the EECBG award required that federally-funded work on this program be completed prior to the award's October 2012 expiration.

In late 2011, following an open bidding process, the county selected a vendor to assist in the development and branding of the REE&O program and to work closely with the county's Project Management Team overseeing the effort. EQAC supported this outreach effort through participation on the PMT.

Working collaboratively throughout the first three quarters of 2012, the vendor and PMT developed the Energy Action Fairfax pilot program to provide ways for residents to learn about their energy consumption and how to reduce it through improved energy efficiency. Given the limited time horizon, the program was narrowly focused and aimed at homeowners in Fairfax County, particularly those occupying single-family homes and townhouses. The program's direct outreach included presentations at homeowner association meetings, small "audit parties" within selected communities and the distribution of informative brochures at events and fairs. The program also generated stories for local media and created a multi-faceted presence on the county website (www.fairfaxcounty.gov/energyactionfairfax/) that includes tips sheets, checklists and short how-to videos.

In its 2012 Annual Report, EQAC commended this effort and recommended the continuation of energy education and outreach through a follow-on program. Staff is building on the pilot Energy Action Fairfax with a second phase focused on the business community. This second phase is supported by FY2014 funding approved by the Board of Supervisors. Planned elements include direct outreach to small and medium-sized businesses, community events including a spring 2014 conference at the Government Center and business-oriented updates to the Energy Action Fairfax website. Staff anticipates periodic updates to those portions of the website that address residential energy consumption and the resumption of homeowner presentations beginning in fall 2013.

F. REGIONAL COORDINATION

1. Climate, Energy and Environment Policy Committee

The county is well-recognized for its participation in regional environmental and energy initiatives. One such initiative is the Climate, Energy and Environment Policy Committee. CEEPC was created in 2009 by the Metropolitan Washington Council of Government's Board of Directors to provide leadership on climate change, energy, green building, alternative fuels, solid waste and recycling issues and to help support area governments as they work together to meet the goals outlined in the National Capital Region Climate Change Report.

CEEPC includes representatives from COG's 22 member governments, state environmental, energy and transportation agencies, state legislatures, the Air and Climate Public Advisory Committee, federal and regional agencies, electric

and gas utilities, environmental organizations, business organizations and members of the academic community.

a. Climate and Energy Action Plan

In January 2010, CEEPC adopted the 2010-2012 Regional Climate and Energy Action Workplan (http://www.mwcog.org/uploads/pub-documents/pl5eXFs20110630110805.pdf), which identifies short term goals and action items to meet the regional greenhouse gas emissions reduction goals identified in the National Capital Region Climate Change Report.

b. Climate Change Report

Figure I-3 summarizes recent local government efforts to address the local measures that were included as key priorities in the 2010 Workplan. This figure helps to illustrate the extent of cooperative work that is shared by the different local jurisdictions in the Washington, D.C. area. As one of the largest and richest local governments, Fairfax County is not only active but plays a leadership role in many activities related to climate change.
In September 2012, CEEPC formed a workgroup to review the existing action plan and suggest changes for an updated 2013 to 2016 plan. The group suggested that the plan place a greater emphasis on energy efficiency and climate resiliency. The 2013-2016 Climate and Energy Action Plan was adopted in May 2013 (https://www.mwcog.org/environment/climate/Documents/2013-5-22%20Final%202013-2016%20CEEPC%20Action%20Plan.pdf). The new plan includes recommendations for local governments on: greenhouse gas inventories and reduction plans; built environment and infrastructure; renewable energy; transportation and land use; sustainability and resiliency; and public outreach.

c. Workshops and Symposia

In 2012, CEEPC hosted workshops on: energy leadership by local governments across the country; energy efficiency and renewable energy for the defense department and surrounding communities; and innovative energy efficiency finance mechanisms.

Figure 1.3. Climate Action Plan Progress Chart

Local Government	2012 Census Population Estimate[1]	Govt GHG Inventory	Community GHG Inventory	Govt GHG Reduction Plan	Community GHG Reduction Plan	Govt Energy Track/ Benchmark	Energy Efficient Street Light Program	Renewable Energy on Govt Property	Idling Regulations	Commuter Options Program for Govt Workers	Green Fleet Policy
District of Columbia	632,323	●	●	◐	◐	●	◐	●	●	●	◐
Suburban Maryland											
Charles County	150,592	○	○	○	○	●	○	●	○	●	○
Frederick County	173,200	●	●	●	◐	●	●	◐	●	●	◐
City of Frederick[2]	66,382	○	○	○	○	○	◐	NR	●	○	○
Montgomery County	861,466	●	●	●	●	●	◐	●	○	NR	●
City of Gaithersburg[2]	62,794	◐	○	○	○	◐	◐	●	◐	◐	○
City of Rockville[2]	63,244	●	●	●	●	●	●	◐	○	●	◐
City of Takoma Park[2]	17,205	●	●	●	●	◐	◐	●	●	○	●
Prince George's County	760,932	●	●	●	●	◐	◐	●	NR	◐	◐
City of Bowie[2]	56,129	●	●	◐	◐	◐	N/A	●	●	○	●
City of College Park[2]	31,208	●	◐	○	○	◐	●	N/A	N/A	●	N/A
City of Greenbelt[2]	23,541	●	◐	◐	○	●	N/A	●	◐	◐	●
Town of Bladensburg[2]	9,328	○	○	○	○	◐	○	●	◐	◐	◐
Northern Virginia											
Arlington County	221,045	●	●	●	◐	●	●	●	◐	●	●
Fairfax County	1,118,602	●	●	●	◐	◐	◐	●	●	●	●
Loudoun County	336,898	●	●	●	●	●	○	●	◐	●	●
Prince William County	430,289	●	○	◐	○	●	○	●	○	●	◐
City of Alexandria	146,294	●	●	●	●	●	◐	●	●	●	◐
City of Fairfax	23,461	◐	◐	◐	○	◐	◐	○	◐	○	◐
City of Falls Church	13,229	●	●	◐	◐	◐	◐	●	●	NR	●
City of Manassas	40,605	○	○	○	○	◐	◐	●	N/A	NR	●
City of Manassas Park	15,798	○	○	○	○	◐	○	○	○	◐	○
Percent Jurisdictions. Implemented		68%	55%	41%	27%	45%	18%	73%	36%	45%	36%
Percent Jurisdictions In Progress		9%	14%	27%	27%	50%	50%	9%	27%	23%	36%
Implemented + In Progress		**77%**	**68%**	**68%**	**55%**	**95%**	**68%**	**82%**	**64%**	**68%**	**73%**

● - Implemented ◐ - In Progress ○ - Not Started N/A - Not Applicable

[1]Annual Estimates of the Resident Population: 4/1/2010 - 7/ 1/2012 Source: U.S. Census Bureau, Population Division
[2]Population in Maryland cities is included in appropriate county totals.

Source: Metropolitan Washington Council of Governments, Annual Local Government Climate and Energy Survey, 2013

In February, COG hosted a Leadership Symposium titled "21st Century Local Energy Innovation" to highlight best new practices in local government investment in clean energy. The City of Boulder presented on building a municipal utility to secure a higher proportion of renewable energy. The Sonoma County Water Agency presented on sustainability and efficiency initiatives. The DC Sustainable Energy Utility presented its model and how the program promotes the goals of energy efficiency and equitable economic development simultaneously.

In July, COG hosted an Agency and Expert Roundtable on Sustainable Energy and Economic Development, focused on energy efficiency and renewable energy in the defense department, and potential for including surrounding communities in those initiatives. Speakers included representatives of the White House Council on Environmental Quality, Departments of Defense, Navy, Air Force and Army, as well as leaders from national labs and educational institutions.

Also in July, a workshop titled Innovative Financing Tools for Energy Efficient Buildings brought together leaders from banks, law firms and the Department of Energy with consultants and non-governmental organization leaders. Panelist discussed the potential for energy efficiency finance, barriers to deployment and case studies on innovative solutions.

d. Advocacy

CEEPC advocated on federal issues in favor of Property Assessed Clean Energy financing and supporting the use of alternative fuels by the Defense Department in the National Defense Authorization Act. Additionally, CEEPC advocated for a number of state legislative issues, including offshore wind, community net metering for renewables, on-bill finance for energy efficiency upgrades and power purchase agreements for solar energy.

e. Electric Vehicle Planning Initiative

In 2012, CEEPC continued its Electric Vehicle Planning Initiative in partnership with the Greater Washington Regional Clean Cities Coalition, leading to the publication of the report, "Electric Vehicles in Metropolitan Washington" (http://www.mwcog.org/store/item.asp?PUBLICATION_ID=449). The COG Board of Directors endorsed the report in November 2012.
COG's electric vehicle initiatives began with a workshop in early 2011 to examine successful local and regional EV readiness strategies and to begin the conversation on a regional level on how to effectively and collectively deploy electric vehicle transportation technology.
This led to the creation of a stakeholder-driven task force whose mission was to make recommendations for the region and local jurisdictions to

consider in designing and implementing programs to facilitate adoption of electric vehicles. Kambiz Agazi, Fairfax County Environmental Coordinator, served as task force co-chair, and subgroups were formed to address comprehensive planning, zoning, building codes and permitting/inspection, infrastructure siting, energy utility policy and outreach and education.

Task force stakeholders contributing to the process included electric vehicle owners, state and local government staff (transportation and energy planners), electric vehicle original equipment manufacturers, electric vehicle supply equipment suppliers, nonprofit organizations (e.g., Georgetown Climate Center, Electric Drive Transportation Association, Electric Vehicle Association of Greater Washington DC) and electric utility representatives from the three states.

The report provides a comprehensive look at current regional EV readiness and offers recommendations to address barriers to EV use. The report also stresses the benefits of EVs, including reducing greenhouse gases, improving air quality and dramatic fuel costs savings.

Although metropolitan Washington still has a relatively small electric vehicle market, consumer interest in EVs is growing and more models are becoming available. However, the region's charging infrastructure and EV policy frameworks are not yet sufficient to accommodate more widespread adoption of these vehicles. COG's inventory of EV charging stations in the region identified 332 chargers in 133 publicly available charging station locations. In terms of infrastructure, metropolitan Washington lags behind other regions, such as San Francisco and San Diego, in the number of EV charging stations, though this figure is increasing due to stimulus funding and private investment.

Furthermore, the absence of a clear policy framework for EV infrastructure planning – which considers permitting, citing, zoning, utility policy and other issues – exacerbates existing market barriers. The report notes that a streamlined regional strategy would help overcome these obstacles and encourage wider EV adoption.

The top five recommendations from "Electric Vehicles in Metropolitan Washington" to encourage greater EV use in metropolitan Washington are:

1. Regional EV Partnership: A Washington Regional Electric Vehicle Partnership should be formed to develop a business case for EVs and to assess the potential for community return on investment.
2. Incentives: Stakeholders should consider offering incentives such as preferred parking, HOV occupancy exceptions and tax credits to promote EV adoption.

3. Utility Planning and Policy: Electric permitting procedures should identify EV charging station installations and notify electric utilities of their locations.
4. Outreach and Education is needed to promote EV adoption and inform the public of its benefits.
5. Local Government Policy: Comprehensive plans and zoning regulations should guide EV infrastructure development and ensure that the built environment can accommodate future EV charging station installations.

f. Climate Adaptation

In October 2010, EPA awarded the Washington Metropolitan Council of Governments technical assistance through the Smart Growth Implementation Assistance Program. Through the program, EPA is developing a guidebook for adapting to risks from climate change in four sectors: land use; transportation; buildings; and water.

During the process to develop the guidebook, stakeholders identified the need for more specific information about climate trends and anticipated impacts in the National Capital Region and planning implications by sector. To address this need, COG has been coordinating with local university experts to characterize data needs of local decision-makers and hosted a Climate Impacts Symposium on May 21, 2012. There were over 90 attendees plus media at the event. In the morning, climate experts from the University of Maryland and Penn State University discussed what the trends and modeling results are saying about the effects of climate change in our region. Afternoon speakers explored the planning implications of climate impacts for water, land use and transportation planning in the region.

g. Responsible Purchasing Network Regional Membership and Trainings

COG established a Regional Membership to the Responsible Purchasing Network in 2012. The RPN Regional Membership assists COG member jurisdictions in establishing and implementing green purchasing policies and programs. RPN membership in 2012 was provided at no charge to COG member jurisdictions to an unlimited number of local jurisdiction employees.

RPN is an international network of buyers dedicated to socially responsible and environmentally preferable purchasing. RPN's membership base is comprised of over 250 institutional purchasers that represent federal agencies, state and local governments, businesses and nonprofits. RPN provides green purchasing resources and tools that assist members in reaching green purchasing goals and save staff time and money. For instance, RPN's Responsible Purchasing Guides provide detailed guidance

designed to help institutional purchasers identify and buy greener goods and services.

COG has hosted trainings to help orient members with sustainable purchasing principles and inform them how to utilize the RPN membership. On January 18, 2012, COG hosted a "Sustainable Purchasing 101" webinar that included a new member orientation. On September 27, 2012, COG hosted a Sustainable Purchasing Workshop at which RPN trained procurement and environmental stakeholders on environmental products that save money.

h. Built Environment and Energy Advisory Committee

The Built Environment and Energy Advisory Committee was established in 2013 and serves as a technical advisory committee to Climate, Energy and Environment Policy Committee. Membership includes local government energy managers, government staff supporting Green Building initiatives, as well as interested stakeholders. The group serves as a forum for discussion and monitoring of energy and green building issues in the National Capital Region.

The group was formed as a merger of two existing COG committees, the Energy Advisory Committee and the Intergovernmental Green Building Group. Members of both groups recognized that there was an increasing overlap between their core issues, particularly as green building practices are placing a stronger emphasis on alternative energy and energy efficiency.

BEEAC held its first meeting in March 2013. Its monthly meetings have focused on updating regional stakeholders on the status of local green building policies throughout the region. Noel Kaplan, Senior Environmental Planner with the Fairfax County Department of Planning and Zoning, presented the county's green building policy to the group and discussed lessons learned to assist other localities in developing and refining green building programs.

In 2012, EAC and IGBG explored a number of renewable energy, energy efficiency and grid management issues. EAC highlighted a several new technologies, including software programs for energy management, demand response, alternative fuels, geothermal energy, smart meters, fuel stabilizers and sub-metering. The group also received presentations on policies and programs at the local level to increase energy efficiency and renewable energy generation.

IGBG's members focused on green codes, including the International Green Construction Code and the American Society of Heating, Refrigerating and Air-Conditioning Engineers' Standard 189.1. IGBG drafted a letter,

endorsed by CEEPC in November, to the Virginia Board of Housing and Community Development to adopt the 2012 International Energy Conservation Code as the basis for the energy provisions of the Unified Statewide Building Code. Other topics explored by the group included sustainable development for affordable housing and low-income communities, ecodistricts and sustainability/community energy plans in the region.

2. Northern Virginia Regional Park Authority

Three Northern Virginia counties (Fairfax, Loudoun and Arlington) and three cities (Alexandria, Fairfax and Falls Church) participate in the Northern Virginia Regional Park Authority. NVRPA was founded in 1959 and currently operates 25 regional parks on 11,156 acres of land that it owns and leases throughout the region. It also holds conservation easements on 115 parcels covering more than 652 acres.

a. Energy Efficiency Efforts

In 2005, the Northern Virginia Regional Park Authority adopted energy conservation plans for each park and began tracking its carbon footprint. Using the accounting system, instead of just recording utility costs, NVRPA also recorded units of consumption for all fuels, so it could calculate its carbon footprint. While NVRPA's park system has grown dramatically from 19 to 25 parks since 2005, carbon emissions in 2012 were virtually the same as in 2005. In that time period, NVRPA's enterprise revenues grew from $10 million to $16 million, but it has been able to decrease from 350 tons of carbon per $1 million of enterprise revenue to just 235 tons. This reduction was achieved by implementing easily attainable items, such as: efficient lighting and insulation to improve the energy consumption of existing buildings; using a wide range of technologies like geothermal heat pumps, electric and hybrid vehicles, solar panels, programmable thermostats and green building elements that improve efficiency; and having a policy that considers the life cycle costs of the energy-consuming systems. Regional parks in Fairfax County that had the most significant energy reductions were Fountainhead, Sandy Run and Bull Run Marina at 25.58 percent and Meadowlark Botanical Gardens at 12.22 percent.

In November and December 2012, Meadowlark Gardens hosted a walking holiday light show using all LED lights that use only a 10th of the electricity that normal incandescent bulbs use. Upon completion of the season, NVRPA negotiated to purchase renewable energy credits for both its all-LED holiday light shows at Bull Run Regional Park and Meadowlark, to offset their power consumption. This is yet another opportunity to educate the public about carbon footprint and sustainability. Other energy efficiency

efforts of note include the installation of ceiling fans and energy efficient lighting at Pohick Bay's camping cabins and the installation of efficient lighting in the restrooms at Pirate's Cove Waterpark and at the Pohick maintenance shop.

b. Environmental Education and Outreach

NVRPA continues to have a roving park naturalist regularly visit the high-attendance parks such as pools, campgrounds and golf courses, bringing live wildlife and other exhibits and providing programming about nature and the environment. The naturalist also attends events and functions such as the Dominion W&OD Trail Mix, the Walter Mess 5K race and the Friends of the W&OD 10K race.

In 2012, the Northern Virginia Regional Park Foundation gave grants through its Nature Nuts Program to 11 Fairfax County public schools for children to attend environmental education camps at Hemlock Overlook Regional Park. Adventure Links at Hemlock Overlook Regional Park in Clifton offers a variety of outdoor and environmental education, team development programs for public and private schools, religious and community groups, sports teams, corporations, professional organizations and local, state and federal government and military agencies. Also in 2012, Meadowlark partnered with the Volgenau Foundation to provide teacher training and student field trips to Meadowlark Botanical Gardens and Potomac Overlook Regional Park. These trips focus on the natural history of the Potomac River basin, conserving native plants and animals.

The Park Authority partners with REI's adventure school, introducing people to the outdoors at Pohick Bay, Hemlock Overlook and Fountainhead Regional Parks. The Park Authority's naturalists hold regular educational canoe and kayak trips at Pohick Bay, and the roving naturalist conducts environmental programs at Meadowlark Botanical Gardens as well as at Bull Run and Pohick Bay Regional Park campgrounds. Potomac Overlook Regional Park and W&OD Trail staff hosted booths at various county fairs to give environmental information to the public.

The installation of an electric vehicle charging station at Potomac Overlook Regional Park has provided a great education and outreach tool.

c. Stewardship

Occoquan Regional Park hosted two clean up events on the Occoquan River and added five new recycling bins at its picnic shelters and boat ramp. Fountainhead and Bull Run Marina were host sites for the Friend of the Occoquan clean-up days, removing dozens of bags of trash from the reservoir. At Sandy Run Regional Park, rowing crew teams took part in

water clean-up days, removing trash from the Occoquan Reservoir around Sandy Run. New trashcans were installed at Fountainhead and the W&OD Trail to prevent tipping and foraging by wildlife.

Environmental stewardship opportunities for volunteers are available at Meadowlark Botanical Gardens, Potomac Overlook Regional Park, Upton Hill Regional Park, Pohick Bay Regional Park and various other parks on occasion. NVRPA implemented a program that allows youth to access its fee-based park facilities through volunteer service. It has a wide variety of community partnerships in place that encourage groups to take advantage of the regional parks for environmental and historic education and service projects. For current information about the Northern Virginia Regional Park Authority, visit its website, http://www.NVRPA.org/.

G. SMART GROWTH (see also the Land Use and Transportation chapter of this report)

1. Transit-Oriented Mixed-Use Development

Key planning concepts in Fairfax County include the protection of stable, residential neighborhoods from incompatible development and the concentration of new growth in mixed-use growth centers, largely focused around transit opportunities and revitalization areas. Transit-oriented development should serve to reduce, in aggregate, the number of motor vehicle trips and vehicle miles traveled and the associated emissions that would otherwise occur through more traditional suburban development patterns in the region. An increasing focus on TOD over the last 20 years led to the 2007 adoption of a Comprehensive Plan definition for TOD and development guidelines, with a strong emphasis on vehicle trip reduction and pedestrian and non-motorized transportation. Major recent initiatives include: adoption of the Plan for Tysons Corner; adoption of Plan Amendments supporting TOD in the Franconia-Springfield Area and Baileys Crossroads; a high density mixed use concept in Annandale; and the adoption of new zoning districts to facilitate the establishment of mixed use, transit-oriented development in growth centers. As highlighted in the Land Use and Transportation chapter, a number of Plan amendments and special studies are under way; each supports transit-oriented development, housing in activity centers and/or pedestrian-oriented neighborhood commerce. More information is available at http://www.fairfaxcounty.gov/planning/tod.htm.

2. Transforming Tysons

On June 22, 2010, the Board of Supervisors adopted a Comprehensive Plan amendment for Tysons Corner that will turn the area into the county's "downtown." The plan focuses future growth within an easy walking distance of transit. Fairfax County expects that 75 percent of future growth will be within a half mile of the four Metrorail stations. Many offices and homes will be a three to six minute walk from these stations, allowing people to get around on foot, bicycle, bus or subway. The plan, which was creating based on economic, transportation and fiscal analyses, guides growth during the next 20 years while creating a framework for redevelopment beyond 2030. It sets an initial development level of 45 million square feet for office space, which is the highest market forecast for the year 2030. Once this amount of office development is reached, the plan would be updated to allow for additional growth. The plan also encourages mixed use development by allowing residential, hotel and ground floor retail at levels above the 2030 forecast. The plan also provides for the use of district energy--allowing use of energy near the point of generation, which provides opportunities for much greater efficiencies in the use of energy generated.

The Comprehensive Plan amendment establishes the expectation of substantial commitments to energy and water conservation measures for development proposals, especially where rezonings are being sought. As substantial redevelopment is expected in the Tysons area, the plan for Tysons Corner should lead to redevelopment that is more energy and water efficient. More information is available at http://www.fairfaxcounty.gov/dpz/tysonscorner/.

3. MITRE Proffer

Per a proffered commitment received from the MITRE Corporation, MITRE conducted research for the county focusing on flexible building design to accommodate energy efficiency innovations – that is, ways to design buildings now to allow for the future implementation of innovative energy systems that may not be cost effective or otherwise feasible at the present time. The report also provided guidance regarding renewable energy supplies and their potential applicability for new buildings and building retrofits. MITRE's report was transmitted to the Board of Supervisors in May 2013 and has been referred to the Planning Commission for review and recommendation.

4. Lorton Green Energy Triangle

The Lorton area is also undergoing significant growth and development. In 2011, a white paper was developed by an energy industry engineer serving on the board of the Lorton Arts Foundation; the paper describes efforts that could be explored beyond the efforts that are already being pursued (see the next section of this chapter and the Solid Waste chapter) in conjunction with waste management facilities in the Lorton area. For example, landfill gas could be

used in the Lorton Workhouse Art Center, waste heat from the waste to energy facility in Lorton could be used to power major commercial activities and landfills could house a variety of renewable energy technologies (e.g., wind, solar). The planning for the Lorton Green Energy Triangle has involved a number of parties, including the Department of Public Works and Environmental Services. This effort has been recognized by the Chairman's Private Energy Sector Task Force.

These cooperative planning and efforts to make more efficient use of existing energy sources and to create renewable energy within the county is commendable.

H. WASTE MANAGEMENT AND ENERGY EFFICIENCY

1. Waste-to-Energy

The county's Energy/Resource Recovery Facility recovers methane, controls nitrous oxide and generates about 80 megawatts of electricity from solid waste – enough energy to power about 75,000 homes and the facility itself. The sale of this electricity to the local utility generates revenues that partially offset the facility's operational cost. Converting waste to energy at the E/RRF provides a number of benefits in addition to these revenues. Incineration avoids the need to landfill garbage and the resulting production of methane, which traps 21 times more heat per molecule than CO_2, and nitrous oxide, which absorbs 310 times more heat. In addition, waste-to-energy avoids the combustion of coal, oil or gas to produce electricity. The county's Department of Public Works and Environmental Services estimates that the waste-to-energy plant avoids the equivalent of approximately one million tons of greenhouse gas emissions each year. More information is available at http://www.fairfaxcounty.gov/dpwes/trash/dispomsf.htm.

2. Landfill Gas Recovery and Utilization

There are both closed and open portions of the I-95 landfill, with the open portion collecting ash generated by the Energy/Resource Recovery Facility. The county collects landfill gas generated by the closed portion of the I-95 Landfill (which collected solid waste) and the closed I-66 landfill as a substitute for fossil fuel to heat on-site buildings. It has installed a system to use landfill gas from the closed I-66 landfill as a fuel source to heat vehicle maintenance facilities at its West Ox campus, at an initial project cost of approximately $300,000. With annual natural gas savings of between $40,000 and $50,000, the estimated payback for the West Ox LFG project is less than eight years. Installation of a second system at the Bus Operations Garage is under way and was to have been operational by fall 2011. At the I-95 landfill, LFG recovered from a well field is delivered to a series of power stations that produce up to six megawatts of electricity, which is sold to the local utility and is then distributed

to homes. This can power supports about 75,000 homes and saves approximately two million barrels of oil a year. The county's LFG projects reduce its carbon dioxide emissions by more than 300,000 tons each year. More information is available at http://www.fairfaxcounty.gov/dpwes/trash/dispmethrvc.htm .

I. AWARDS AND RECOGNITION

In 2011, the county received the American Planning Association's Daniel Burnham Award for its Comprehensive Plan for the Tysons Corner Urban Center. Its energy-specific awards include designation by the U.S. Environmental Protection Agency as an *Energy Star Partner*, a *Green Power Partner* for its green purchasing and a *Landfill Methane Outreach Program Community Partner of the Year*; it also has received the Public Technology Institute's *Solutions Award* in the Sustainability category for its plug-in hybrid vehicle fleet trial.

Other climate and energy related awards include:

- Tree Preservation Award (Fairfax County Tree Commission): Dolley Madison Library (Jan. 18).

- Community Appearance Awards (Community Appearance Alliance of Northern Virginia): Superior Performance Award to Dolley Madison Library and the Great Falls Volunteer Fire Station.

- American Public Works Association - Mid-Atlantic Chapter "Best Project" Awards:
  - Dolley Madison Library.
  - Projects $5 Million to $25 Million - Structures Category.
  - I-66 Transfer Station Operations Center.
  - Projects Less than $5 Million - Structures Category.

- 2013 Design Award (Northern Virginia Chapter of the American Institute of Architects): Dolley Madison Library - 2013 Jurors' Special Citation in Institutional Architecture.

- National Association of Counties: Government Center Innovative Stream Restoration - "Best in Category" Achievement Award, "Environmental Protection and Energy" category.

- National Association of Clean Water Agencies: 2013 Platinum Peak Performance Award: Noman M. Cole Pollution Control Plant.

J. COMMENTS

1. EQAC is pleased that the county has hired an Energy Manager and that the county is realizing significant savings on energy since his arrival. EQAC looks forward to additional reporting and analyses that show opportunities for further efficiencies in energy conservation.

2. EQAC commends the county for updating an inventory of greenhouse gas emissions for Fairfax County facilities and for designing a GHG reporting program for county that allows for GHG emissions to be more easily combined with reporting of other jurisdictions.

3. EQAC commends the county for recognizing the importance of reducing the community's GHG emissions and for soliciting bids for a countywide education and outreach program that would cut GHG emissions. EQAC feels that this effort has been productive and encourages the county to continue this work.

4. EQAC commends the county for participation in regional efforts to reduce GHG emissions and improve energy efficiency. Certain GHG programs, such as transportation related programs, district energy and reporting of carbon footprints require intergovernmental cooperation.

K. RECOMMENDATIONS

1. While the county has promoted the incorporation of energy efficient certification, such as LEED at the Silver level or higher, EQAC recommends that the Board of Supervisors also promote periodic (e.g., bi-annual) evaluation of the GHG footprints for buildings and facilities. Such a step would be a natural follow up action to education and outreach that has been started in 2012 for residential energy use and that is envisioned for the commercial sector. While EQAC is encouraged that plans are being developed that would address this recommendation, additional work will be needed before this recommendation can be fulfilled. We are hopeful that the work of the Energy Manager will help with the implementation of this recommendation.

2. EQAC recommends that Fairfax County continue to fund a program to serve as follow-on to the Energy Action Fairfax. The EAF program completed a small number of outreach events and audits and developed a website and educational videos. The program educated county residents on energy conservation and greenhouse gas emission reductions. EQAC feels that it would be beneficial if the program was to continue. Given the significant efforts and expenditures made by the county to get this program started, it would be most cost-efficient to continue the program at this time rather than stop it and then try to re-start it at some future date.

3. Given the importance of the work of the private sector, the EQAC strongly supports the continuation of work started by the Chair's Energy Task Force be continued through the Energy Alliance.

REFERENCES

1. Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, Global Climate Change Impacts in the US. Cambridge University Press. http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf
2. Pew Center for Climate Change. 2011. Climate Change 101: Understanding and Responding to Global Climate Change.
3. 2010. Arlington County. Presentation Ensuring a Competitive and Sustainable Community http://www.epa.gov/statelocalclimate/documents/pdf/dooley_presentation_5-16-2012.pdf
4. Fairfax County. 2012. Community Greenhouse Gas Inventory for Fairfax County, Virginia.
5. Arlington County. Tasks and Timeline to Produce Implementation Workplan Working Draft. http://freshaireva.us/wp-content/uploads/2012/01/implementation-workplan-timeline-and-tasks.pdf
6. 2010. Loudon County. Loudoun County Energy Strategy. http://www.loudoun.gov/index.aspx?nid=163
7. 2011. World Resources Institute. Greenhouse Gas Protocol. http://www.ghgprotocol.org/about-ghgp
8. The Leadership in Energy and Environmental Design (LEED®) Green Building Rating System was developed by the U.S. Green Building Council. More information available at http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1988.
9. 2011. Metropolitan Washington Council of Governments. Climate, Energy and Environment Policy Committee Regional Climate And Energy Action Workplan 2010 Progress Report. http://www.mwcog.org/uploads/committee-documents/Z15WV1pf20110712141323.pdf