
ANNUAL REPORT ON THE ENVIRONMENT

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. According to the report *Global Climate Change Impacts in the US*, some key findings within the US include¹:

- 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 Research², 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

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. This chapter was prepared prior to completion of the task force's work, and we will report on the task force's recommendations in next year's Annual Report. EQAC anticipates that the task force will have created a transformational vision, and its goals will be met through the identification and implementation of scalable, community-wide energy efficiency projects focused on producing measurable results for businesses. By achieving a reduction of energy use for Fairfax County businesses of all sizes, these projects will give companies a clear return on their investments, not only through lowered costs but also through enhanced reliability and security and increased competitiveness in the region and in the country.

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 available at <http://www.fairfaxcounty.gov/chairman/energytaskforce.htm>.

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:

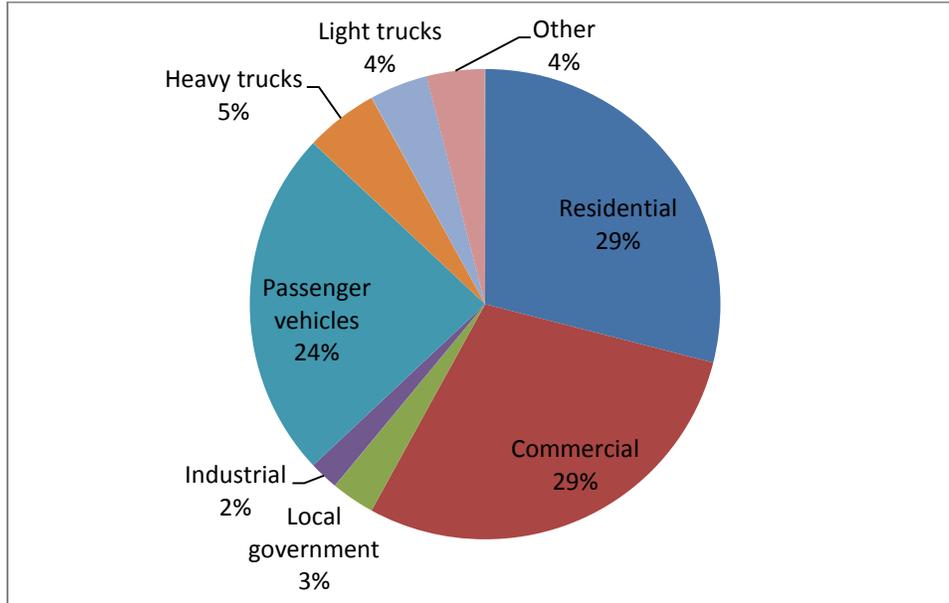
- Only property that was under the jurisdiction of Fairfax County was included. Thus, the federal government properties located within the county, including but not limited to Fort Belvoir, Dulles Airport, the Central Intelligence Agency and the National Reconnaissance Organization, were not included. 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 CO₂ equivalent (MTCO₂e) 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 MTCO₂e. 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 MTCO₂e, 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.

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).

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 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% of this material will remain as ash after incineration.

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 2006. Figure I-2 shows Total Fairfax County GHG emissions for 2006.

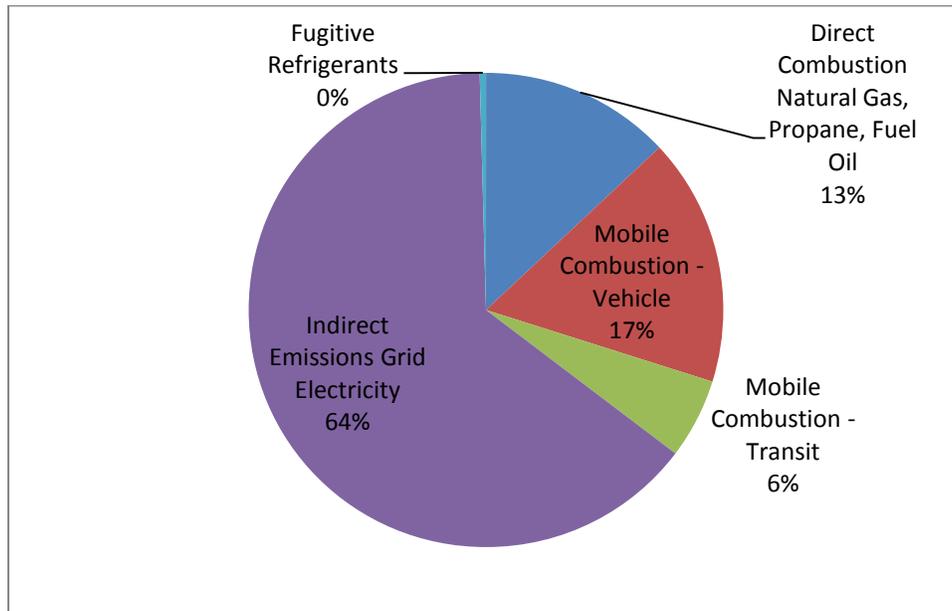
D. FAIRFAX COUNTY OPERATIONS GHG EMISSIONS AND ACTIONS TO REDUCE THESE EMISSIONS

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.

Figure I-2. 2010 Fairfax County Government Emissions by Source Type (460,695 MTCO_{2e})⁴



Source: Fairfax County, Virginia.

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 an Energy Efficiency and Conservation Block Grant of \$9,642,800. The goals of the EECBG program, which was funded by the American Recovery and Reinvestment Act, include improving building and transportation energy efficiency and reducing both total energy use and fossil fuel emissions. To achieve the EECBG program goals, the county developed a pragmatic and results-oriented strategy that builds on its long history of energy improvements. This strategy allocates the county's EECBG funds to projects in areas including information technology, facility improvements and transportation, as well as an education and outreach program targeted to county residents and a community-wide greenhouse gas emissions inventory. The county's largest EECBG project, which was completed in early 2011, involved the consolidation and virtualization of county computer server equipment. By using enterprise server hardware, virtualization and new data center infrastructure management technology, the project is delivering increases in computing performance while significantly reducing both power consumption and greenhouse gas emissions. These benefits are supplemented by avoided hardware and software costs, which are expected to save millions of dollars. The project is saving an estimated 5,671 megawatts and \$380,000 per year and avoiding the emission of an estimated 3,726 metric tons of carbon dioxide equivalents each year. 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 (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.ⁱ 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.

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

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 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_gr eenvehicles.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 October 2012, the county had a total of 29 green building projects, 14 of which attained certification (12 under the LEED program and two under the Green Globes program). The other 15 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/FCPAPolicyManual.pdf>.

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/>.

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.

On May 17, 2011, Fairfax County issued a request for proposals for obtaining services related to residential energy education and outreach. In October 2009, Fairfax County was awarded an Energy Efficiency and Conservation Block Grant of nearly \$10 million by the U.S. Department of Energy as part of the American Recovery and Reinvestment Act. The purpose of the EECBG program is to assist eligible entities in reducing fossil fuel emissions, reducing energy use and improving energy efficiency in the transportation, building and other appropriate sectors. The county's EECBG grant funded 19 activities, one of which is the REE&O program.

The purpose of the RFP was to establish a “Residential Energy Education and Outreach” effort that would explain and publicize the benefits of home energy efficiency improvements and that would encourage county residents to pursue such measures. Work on this program, known as “Energy Action Fairfax,” was scheduled for completion by fall 2012. The county identified the following objectives for its REE&O program:

- Provide a user-friendly experience for residents to learn about their energy consumption and ways to reduce it through improved energy efficiency.
- Use multiple avenues, including local partnerships, social media and marketing, multicultural outreach, and interactive online tools, to engage residents in saving energy.
- In collaboration with the county's Project Management Team, develop a branded REE&O program (“Energy Action Fairfax”) that achieves measurable energy savings and corresponding emissions reductions during and beyond the grant period.

EQAC supported this outreach effort through participation on the Project Management Team.

The Energy Action Fairfax program was aimed at homeowners in Fairfax County, particularly those occupying single-family homes and townhouses. This program filled an important need for residents to be provided with valuable information as to how they can reduce their energy consumption, reduce their carbon footprint and sometimes save money in the process. EQAC commends this effort and recommends the continuation of education and outreach through a follow-on program (see the Recommendations section of this chapter).

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. The 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 21 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.

In January 2010, CEEPC adopted the 2010-2012 Regional Climate and Energy Action Workplan (<http://www.mwcog.org/uploads/public/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*.

In 2011, COG's Climate, Energy and Environment Policy Committee promoted community energy/district energy planning, green business certification programs and building performance labeling. These activities are in the Climate Energy Action Plan for 2012 and were taken to achieve the goal of reducing GHG emissions 10% below 2005 levels by 2012. CEEPC concluded a six-month residential energy efficiency pilot program in three communities: Greenbelt, MD; Cascades in Loudoun County, VA; and the Brookland community in the District of Columbia. The more than 150 homes participating in the energy efficiency pilot program benefitted from energy efficiency kits and workshops, as well as energy efficiency tips in newsletters.

CEEPC sponsored an Electric Vehicle Forum in March 2011 which led to creation of an Electric Vehicle Stakeholder group and discussions about planning for electric vehicle deployment in the metropolitan Washington region. Kambiz Agazi, Fairfax County Environmental Coordinator, served as Chair of the EV Policy and Processes Group. The stakeholders met monthly.

CEEPC advocated on federal issues in favor of Property Assessed Clean Energy financing and incentives for solar roofs. CEEPC held a meeting about commercial PACE programs in the region. Additionally, CEEPC formed a Tree Canopy work group and supported a solar collaborative purchase with EPA.

COG held an electric vehicle 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. Participants, including local governments as well as industry experts, agreed on the need for an electric vehicle readiness strategy to facilitate deployment of electric vehicles in the metropolitan Washington region. To understand the current landscape of the metropolitan Washington region, COG conducted a survey of its 22 member jurisdictions in early 2012 about their electric vehicle permitting and infrastructure planning. Results indicated that two jurisdictions, Fairfax County and Arlington County, were planning for electric vehicles, but most COG jurisdictions were not considering the special needs of electric vehicle charging infrastructure.

In 2011, to respond to the interest in electric vehicle planning in the metropolitan Washington Region, COG and the Greater Washington Regional Clean Cities Coalition initiated a new regional electric vehicle Planning Initiative. The electric vehicle Planning Initiative was heavily stakeholder-driven. The scope of the strategy development is to identify the issues for regional electric vehicle deployment and to make recommendations for the region and local jurisdictions to consider in designing and implementing programs to facilitate adoption of electric vehicles. The primary electric vehicle planning workgroups (Task Force) were focused on infrastructure development and policy and processes. Subgroups were formed to address comprehensive planning, zoning, building codes and permitting/inspection, infrastructure siting, energy utility policy and outreach and education. The list of Task Force stakeholders contributing to the process included vehicle owners, state and local government staff (transportation and energy planners), electric vehicles Original Equipment Manufacturers, electric vehicle supply equipment suppliers, non-profit agencies (e.g., Georgetown Climate Center, Electric Drive Transportation Association, Electric Vehicle Association of Greater Washington DC) and electric utility representatives from the three states. Stakeholders provided direction, feedback and data-sharing on EV deployment issues.

COG staff assessed the status of electric vehicles in the region and recommended steps to improve and enhance regional readiness for electric vehicles. The main areas of concern were electric vehicles and EVSE infrastructure (existing and planned) as well as the range of policies that may have an impact on electric vehicles or EVSE deployment and/or public acceptance of electric vehicles.

The CEEPC also selected Workplan items as 2010 priorities. Those priorities include greenhouse gas inventories, tracking progress toward greenhouse gas reduction goals, developing a pilot regional energy outreach campaign, residential energy savings, street light efficiency programs and local governments purchasing or consuming ten percent renewable energy.

Figure I-3 summarizes 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 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. On March 3, 2011, COG hosted the National Oceanic and Atmospheric Administration's Roadmap to Adapting to Climate Risks Workshop to educate stakeholders and assist in the development of the guidebook. The roadmap process is designed to help communities identify priority vulnerabilities and develop strategies for integrating hazard and climate change issues into local operations. In September 2011, stakeholder meetings were held for each sector where presentations were made on potential vulnerability by sector and local government climate adaptation best practices from around the nation. Stakeholders shared their strategies, priorities and barriers to assist in the development of the EPA's guidebook. Stakeholders provided feedback on the draft guidebook. The final guidebook, which was to have been available prior to publication of the EQAC Annual Report, was to have been an introductory report on general approaches to adapting to the impacts of climate change.

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. The following information highlights efforts of the NVRPA:

- Bull Run Shooting Center is using solar panels to charge the batteries that operate the trap machines on the sporting clays field.
- NVRPA updated the inefficient lighting in the shooting center pro shop to new, more energy efficient light fixtures.
- NVRPA also continues to add alternative fuel vehicles to its fleet, and a 2012 Toyota plug-in hybrid Prius was arranged for display and test-drive at

Figure I-3. Select Local Measure Highlights⁹ (At least 50 percent of local governments are implementing or in progress on each measure listed in the following chart.)

Local Government	2010 Census Population ¹	Govt GHG Inventory	Community GHG Inventory	Govt GHG Reduction Plan	Comprehensive Energy Strategy	Green Building Policy	Efficient Street Light Program	Govt Energy Benchmark	Green Purchasing Policies	Green Fleet Policy	Commuter Options Program	Tree Canopy Plan
District of Columbia	601,723	■	■	□	□	■	□	■	□	□	■	□
Suburban Maryland												
Fredrick County	233,385	■	■	■	■	□			○	□	■	□
City of Frederick ²	65,239	○	○	○	○	○	NR	NR	■	○	○	□
Montgomery County	971,777	■	■	■	□	■	□	■	■	N/A	■	N/A
City of Gaithersburg ²	59,333	□	○	○	■	■	□	○	○	○	○	□
City of Rockville ²	61,209	□	□	■		■	■	■	□	□	■	■
City of Takoma Park ²	16,715	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Prince George's County	863,420	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
City of Bowie ²	54,727	■	○	○	■	■	□	□	○	□	○	□
City of College Park ²	30,413	■	□	○	○	N/A	■	○	□	N/A	■	□
City of Greenbelt ²	23,068	□	□	□	□		N/A	□	○	■	○	□
Town of Bladensburg ²	9,148	○	○	○	○	○	○	□	□	□	□	□
Northern Virginia												
Arlington County	207,627	■	■	□	□	■	□	■	■	■	■	■
Fairfax County	1,081,726	■	□	■	□	■	□	□	■	■	■	■
Loudon County	312,311	■	■	■	■	■	○	■	■	■	■	□
Prince William County	402,002	□	○	□	□	□	○	■	□	□	■	□
City of Alexandria	139,966	■	■	■	■	■	□	□	□	□	■	■
City of Fairfax	22,565	○	○	□	□	■	□	□	○	□	○	□
City of Falls Church	12,332	■	■	□	□	○	□	□	■	■	□	□
City of Manassas	37,821	○	○	○	□	○	□	□	N/A	■	N/A	■
City of Manassas Park	14,273	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

■-Implemented

□-In progress

○-Not Started

N/A-Not Applicable

NR-No response

¹ Source: COG tabulation of Census 2010 PL 94-171 Redistricting Data

² Population in Maryland cities is included in appropriate county totals.

Source: Metropolitan Washington Council of Governments, 2011, *Climate, Energy and Environment Policy Committee Regional Climate And Energy Action Workplan 2010 Progress Report*

Potomac Overlook Regional Park. It served as a great education and outreach tool and provided a sense of how the park's electric charging station will be used.

- Pohick Bay's camping cabins now have ceiling fans and energy efficient lighting.
- New efficient lighting has been installed in the restrooms at Pirate's Cove Waterpark and at the Pohick maintenance shop.
- Meadowlark Gardens prepared plans to install a walking holiday light show that will use all LED lights, which use only a 10th of the electricity that normal incandescent bulbs use.

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. 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 created 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 is conducting research for the county that will help inform negotiations with zoning applicants in Tysons Corner. That research will provide guidance 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. Other areas in which it will provide guidance include renewable energy supplies and distribution for new buildings and building retrofits and electric vehicle charging infrastructure. This guidance is expected to help county staff identify energy efficiency concepts that could be pursued through proffer negotiations.

4. Lorton Green Energy Corridor

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 a major commercial activities and landfills could house a variety of renewable energy technologies (e.g., wind, solar). The planning for the Lorton Green Energy Corridor 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 CO₂, 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/dispomsf.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.

J. COMMENTS

1. The Facilities Management Department cost avoidance from fiscal year 2001 to fiscal year 2010 is in excess of \$7 million, or an average annual energy reduction of one percent. 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. EQAC commends the county for assembling 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 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 county-wide education and outreach program that would cut GHG emissions. EQAC believes 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. EQAC is very encouraged to hear that a process has been established through which the funding of education programs (including social media) and programs to promote energy efficiency through the county's Environmental Improvement Program can be considered. EQAC recognizes that a broader range of EIP projects may be proposed in any given year and that any education and energy efficiency proposals will compete against these other proposals for limited funds; however, EQAC stresses the need for the prioritization process to ensure that strong education and energy efficiency proposals will be successful. Further, while EQAC appreciates all the efforts that have been made, EQAC recognizes that both the County Executive must recommend funding projects recommended by county staff and that the Board of Supervisors must approve the funding. EQAC recommends that the County Executive and the Board of Supervisors support and fund those projects that are recommended by staff.
2. EQAC recommends that the Board of Supervisors direct county staff to evaluate alternatives for the county to further reduce greenhouse gas emissions from either incineration of waste or placement of waste in landfills. The long-term goal should provide for expanding the recycling of all waste streams, including composting of compostable waste. The expansion of waste streams recycled should be considered as the county develops a strategic plan for the management of county waste. In order to support the expansion of recycling, the following steps are recommended:
 - a. Education and outreach on options for increasing recycling, including the composting of compostable material.
 - b. Cooperating with other governments in the region to build capacity and enhance affordability for recycling and composting of waste. This work should include quantifying the various waste streams.
 - c. Gaining experience in expanding recycling streams. For example, modest composting efforts similar to what is being pursued in the District of Columbia and Arlington County that are helping to provide experience in expanding recycling programs and waste composting should be undertaken.
3. 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 should 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.
4. EQAC recommends that Fairfax County fund a program to serve as follow-on to the Energy Action Fairfax (previously referred to as the Residential Energy Education

and Outreach) program that was funded by a grant through the American Recovery and Reinvestment Act of 2009. 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.

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