OFFICE OF THE COUNTY MANAGER

2100 Clarendon Boulevard, Suite 302, Arlington, VA 22201
TEL 703.228.3120  FAX 703.228.3218  TTY 703.228.4611  www.arlingtonva.us
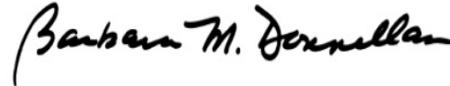
# Memorandum

**To:**  Arlington County Board          **Date:**  May 21, 2013

**From:**  Barbara M. Donnellan, County Manager

**Subject:**  Achieving the AIRE 2012 goal

Arlington County exceeded its goal to reduce 10% of greenhouse gas emissions from County government operations. In 2007, we set the goal and launched the Arlington Initiative to Reduce Emissions (AIRE) to help us get there. As a result, the County has seen a decrease in net emissions from government activities of 11.7% between 2000 and 2012.  A detailed technical report on greenhouse gas emissions by Arlington County government activities is available here on our web site.  The highlights below focus on the AIRE goal and its achievement, particularly considering the increases in services to the community over the past 12 years.

Arlington faced a significant challenge in achieving our goal. Since 2000, the County added many large facilities, expanded our transit service, and upgraded our wastewater treatment facility to meet ever-stricter standards. Thanks to a successful, multifaceted strategy of improved energy efficiency and use of cleaner fuels, we overcame these hurdles to achieve our 10% goal.  If we had not implemented these measures, the County's carbon footprint would have grown by 25% to over 73,000 metric tons by 2012, instead of declining nearly 12%.  In addition, in County buildings alone, annual energy and water costs would have been about $850,000 higher in 2012 if efficiency measures taken since 2007 were not in place.

The County's multifaceted approach to reducing greenhouse gas emissions offers valuable lessons for achieving future reductions as County services and operations continue to grow. This effort also serves as a learning experience for achieving reductions across the community.

## BACKGROUND

On January 1, 2007, Paul Ferguson introduced the Arlington Initiative to Reduce Emissions[1] (AIRE) as his County Board Chair's initiative. The core goal of this program was to reduce greenhouse gas emissions (GHG) from County government operations through improved energy efficiency and the use of cleaner, alternative fuels.[2]  The target was a 10% reduction in GHG emissions by 2012 compared to 2000.  Arlington monitors and reports GHG emissions on a calendar year basis.

---

[1] AIRE was named Arlington Initiative to Reduce Emissions when launched in 2007. The program was renamed Arlington Initiative to Rethink Energy in 2013 due to the importance of energy as an essential component of the economy in addition to the environmental burden of energy supply and use.

[2] http://www.arlingtonva.us/departments/Communications/PressReleases/page8817.aspx

The predominant greenhouse gas is carbon dioxide ($CO_2$), a by-product of burning fossil fuels (such as coal, oil, and natural gas). Other, less common gases are potent at trapping heat in the atmosphere. These other gases are usually quantified and expressed in terms of carbon dioxide equivalents ($CO_2e$) for ease in using one measure for GHG emissions.  In 2000, GHG emissions from County government operations were 58,335 metric tons $CO_2e$.  In 2012, total net emissions were 51,545 metric tons $CO_2e$.

Nearly all greenhouse gas emissions from County government activities are the result of energy consumption, either as the product of combustion of fuels directly in buildings and vehicles, or indirectly from electricity use that is created by fuel combustion at distant electric power generation plants. Figure 1 shows GHG emissions from government activities in 2012 by source, where it is clear the use of electricity dominates the County's carbon footprint. Stationary combustion is the use of natural gas and diesel fuel at buildings for space heat/hot water and on-site generators, respectively.  Mobile combustion is vehicle fuels. A very small portion is due to other gases (methane, nitrous oxide) produced in the wastewater treatment process ('process emissions'), and 'fugitive' gases are refrigerants that can leak from HVAC equipment.

**Figure 1**



2012 Arlington Government Activity , GHG Emissions by Source

- Purchased Electricity — 73%
- Stationary Combustion — 7%
- Mobile Combustion — 18%
- Process Emissions — 2%
- Fugitive Emissions — 0%

**Figure 2**



2012 Arlington Government Activity, GHG Emissions by Sector

- Government Buildings — 41%
- Water & Wastewater Utilities — 29%
- County Fleet — 12%
- Streetlights and Traffic Signals — 10%
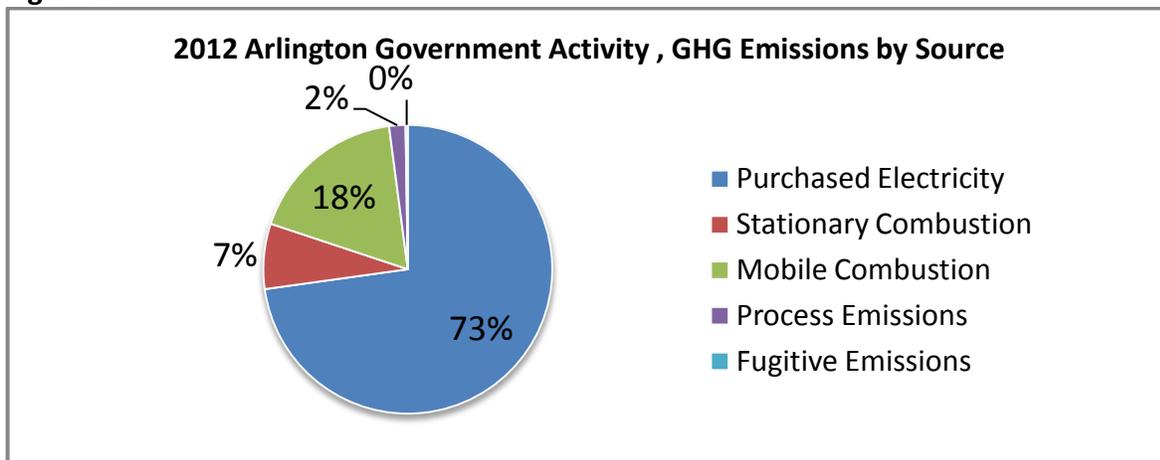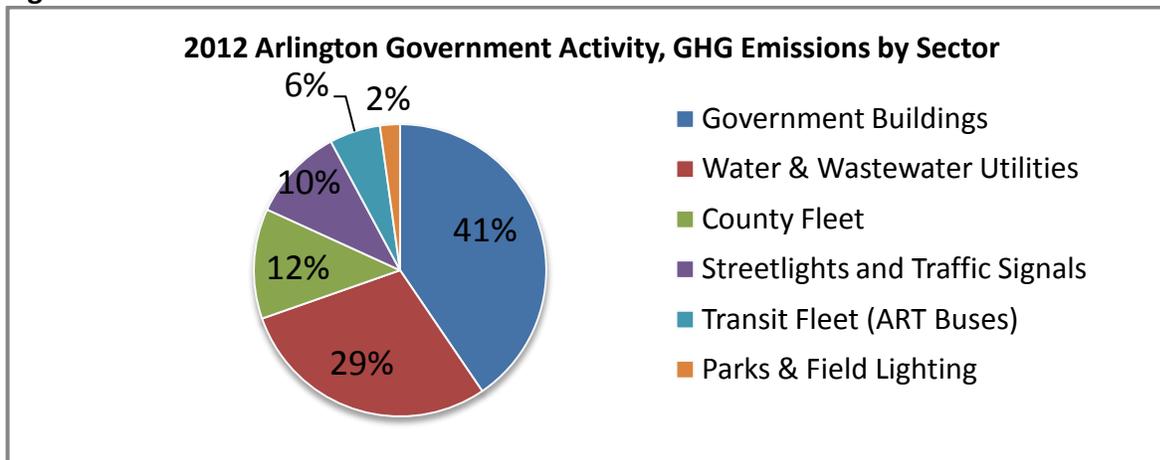- Transit Fleet (ART Buses) — 6%
- Parks & Field Lighting — 2%

Figure 2 shows GHG emissions from government activities by functional sector. This view highlights the significance of government buildings and the water/wastewater utility operations to our carbon footprint. The relative shares of emissions by source and sector are generally the same in 2012 as in 2000 with one exception: in 2000 the GHG emissions from the Arlington Transit bus fleet was 0.1% of the total, whereas now the ART fleet is 6% of the total.

Using the established protocols for GHG emissions inventories, Arlington Public Schools (APS) was also included in the technical report, even though the AIRE goal did not expressly include schools. APS also achieved a similar reduction, and the overall public (County + APS) net carbon footprint improved 12% between 2000 and 2012.

### RESULTS

The 10% reduction goal was met through steady improvements in operations and increasing use of cleaner fuels. A summary chart from the technical report (Figure 3) shows GHG emissions for 2000, 2007, and 2012 from the various functions and sectors of government activity. The negative numbers shown in 2007 and 2012 are the sum of (a) purchases of certified green power, (b) carbon offsets included in the County's purchases of natural gas, and (c) credit given for reducing personal vehicle emissions as a result of ART bus use. The bold black line is the net result, the 11.7% reduction in 2012 relative to 2000. Emissions were slightly higher in 2007 than in 2000; the net reduction from 2007 to 2012 is 12.3%.

**Figure 3**
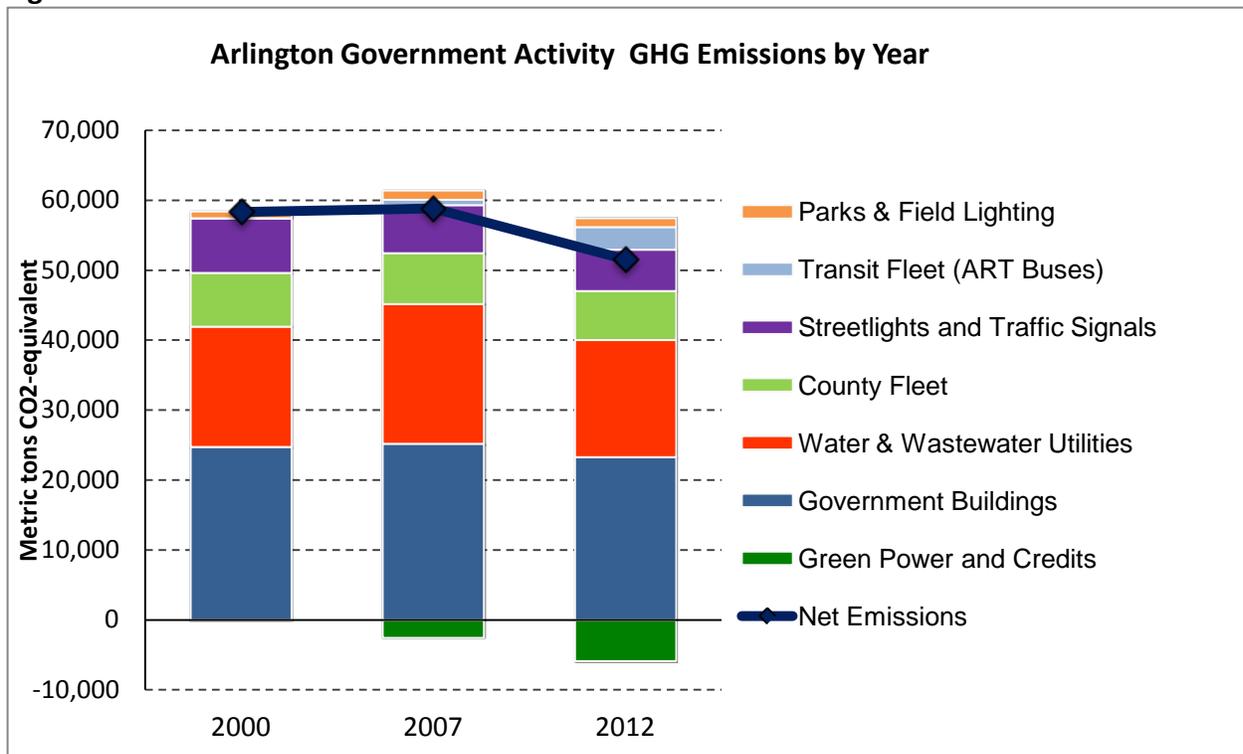


Not apparent in Figure 3 is the growth in County services over the past twelve years, indicating an increase in efficiency of operations during that time. In addition, the improvement

(decrease) in GHG emissions from electricity purchased from Dominion Virginia Power is embedded in the results shown for several sectors, notably buildings, wastewater utility, and streetlights, traffic signals, and park/field lighting. The following discussion provides context for the changes over time and what may have occurred under a 'business as usual' scenario.

<u>Government buildings</u>  Over the past 12 years the County has added 15 new or expanded buildings, including two new fire stations, two new libraries, a community center, two new arts facilities, and five new buildings at the Trades Center – an increase of over 340,000 square feet (17% growth). This expansion in services was offset by improved energy efficiency in our buildings.  Overall, the portfolio of County government buildings achieved an improvement (decrease) in energy intensity (energy per square foot) of 15% since 2007.  The building energy report cards on the County website provide detail and case studies of these efficiency gains, including several buildings with reductions in energy intensity exceeding 25%.

<u>Streetlights and traffic signals</u>   About 3,000 new streetlights have been installed along County roads since 2000 (a 23% increase), as a result of Neighborhood Conservation projects and improvements in the streetscape of our metro corridors.  Also, 40 additional traffic intersections are now controlled by signals (16% growth since 2000). Meanwhile, the County has retrofit over 2,000 streetlights with highly-efficient LEDs (light emitting diodes) in place of less efficient metal halide and high-pressure sodium lamps.  LEDs use about half as much electricity as conventional lamps, and LEDs last much longer, reducing maintenance costs.

<u>Water and wastewater utility</u>   The capacity of the Arlington Water Pollution Control Plant (WPCP) has increased by 33% over the past decade, and the water treatment process has been upgraded to meet much more stringent effluent requirements for the health of the Chesapeake Bay.  Water treatment is an energy-intensive activity, and achieving today's strict effluent requirements consumes more energy per gallon of water treated than in the past.  However, now that the plant reconstruction is complete, the WPCP facility is consuming slightly less energy than during its construction in the mid- and late-2000s.

<u>County fleet</u>   The County now has over 140 fuel-efficient hybrid-electric vehicles in its fleet, and it uses biodiesel[3] in all diesel engine vehicles.  GHG emissions from the County operations fleet have fallen 9% between 2000 and 2012 thanks to improved fuel efficiency and the lower carbon content of biodiesel.

<u>ART fleet</u>  The ART fleet and ridership grew dramatically, from four small vehicles and fewer than 170,000 passenger-trips in 2000, to 55 buses and over 2.5 million passenger-trips in 2012. Moving more people requires more energy.  Despite use of compressed natural gas (CNG), a relatively clean fossil fuel, GHG emissions from the ART fleet have grown from 0.1% of County government emissions to 6% of the total. On the other hand, ART ridership lowers personal vehicle use, removing GHG emissions from the community. A modest credit to account for this shift is discussed below.

---

[3]  A biodiesel blend of 20% soybean oil and 80% petroleum diesel ('B20') is used from April to October of each year, while a blend of 5% soybean oil and 95% petroleum diesel ('B5') is used from November to March.

<u>Purchase of 'green power' and other offsets and credits</u>  One strategy for achieving the AIRE goal stated in the 2007 launch was an increase in purchases of certified green power, specifically renewable energy credits (RECs) from wind power. Voluntary purchases of green power through RECs are an important component of market development of cleaner electricity supply.  As a member of the U.S. EPA's Green Power Partnership, County government began purchasing RECs from local wind farms in 2005 equivalent to 3% of the government's electricity use. In 2007 with the launch of AIRE, the County increased its purchases to 6% of electricity use, and the County has gradually increased purchases since then.  In 2012, certified green power purchases were 13% of the County government's electricity use.  Thanks to the increasing market penetration of wind power, the total cost of these purchases in 2012 was below what was paid in 2005.  These green power RECs represent over 5,200 metric tons $CO_2e$ avoided.

Washington Gas Light (WGL) is the County's natural gas distributor, but Washington Gas Energy Services (WGES) is the County's provider of natural gas commodity by contract. In 2011 WGES began offering Clean Steps™ carbon offsets to their customers, bundled with natural gas commodity purchases. The WGES carbon offsets are created through innovative partnerships with J.B. Hunt trucking and the Chesapeake Bay Foundation and are verified for permanence and additionality by a third party. The County's purchase of offsets with a small amount of natural gas purchases totaled 11 metric tons in 2012 (less than 0.1% of our total footprint).

The strong growth of the ART fleet and ridership over the past decade has increased mobility and improved transit options for many Arlingtonians. This ridership has reduced other vehicle trips, including personal vehicles that contribute to emissions quantified in the community GHG inventory.  The American Public Transit Association (APTA) has developed a methodology[4] for estimating the reduced GHG emissions from increased transit services.  This guidance was applied to the ART fleet, finding that 643 metric tons $CO_2e$ were avoided due to ART ridership (about 1/5th the total emissions attributable to the ART fleet in 2012). This credit would have been higher if not for the various transit choices already available in Arlington.

<u>Emissions factor for electricity</u>   Electricity is the dominant energy source affecting the County's GHG emissions.  Between 2000 and 2009 (the latest year for which an emissions factor is available), the amount of $CO_2e$ produced per unit of electricity generated in our region decreased by 11%.  This decline is mostly due to utilities in this region shifting power production from coal-fired power plants to natural gas-fired power plants, but an increased use of renewable energy sources in the mid-Atlantic also helped.  The reduced emissions factor is embedded in the results shown above; this effect will be unpacked in the discussion below.

<u>Business as usual</u>   To illustrate the contributions of these factors relative to what may have happened without improvements in efficiencies or fuels, Figure 4 shows a 'Business as Usual' total based on the aforementioned growth in services and activities.  The colored wedges quantify the improvements that reduced emissions. The dashed wedge at the bottom of the emissions chart shows the growing portion of County emissions due to the increased ART transit service.

---

4   http://www.aptastandards.com/Portals/0/SUDS/SUDSPublished/APTA_Climate_Change_Final_new.pdf

**Figure 4**



Contributions to achieving the AIRE GHG emissions reduction goal
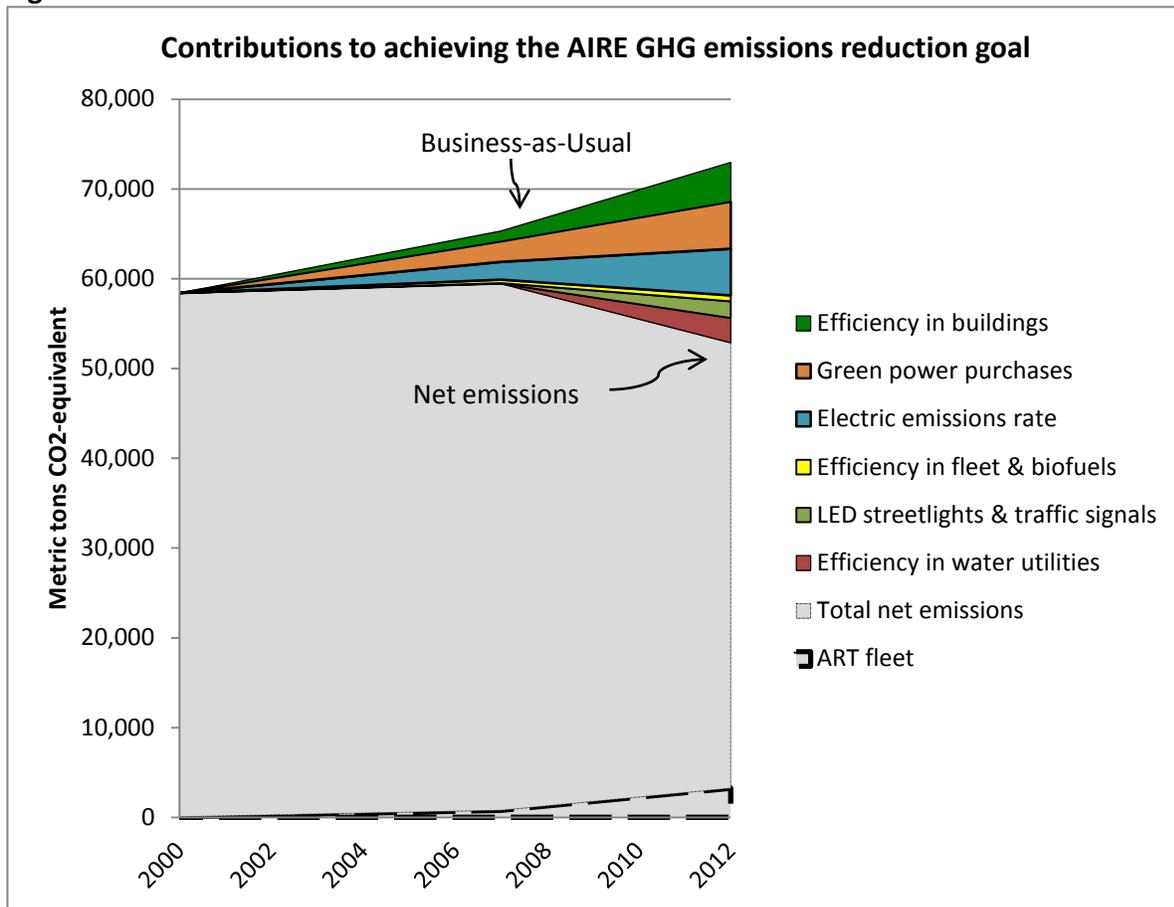
Without a combination of interventions – improved energy efficiency in buildings and other infrastructure, the use of cleaner fuels in transportation and in electric power generation, and the County's green power purchases – the growth in County government services and activities would have increased the County's carbon footprint by 25% to over 73,000 metric tons in 2012.

**CONCLUSION and NEXT STEPS**
The County accomplished its goal in the face of a substantial headwind of growth. The multifaceted approach to reducing GHG emissions shown here provides valuable lessons for achieving further reductions as County services and operations continue to grow, and this experience informs our strategies for achieving carbon reductions community-wide.

The proposed Community Energy Plan sets a goal of a 76% reduction in GHG emissions from County operations in 2050, with a near-term goal of a 25% reduction (from a 2007 baseline) in 2020. As shown here, the County has already reduced GHG emissions 12% from a 2007 base, but additional headwinds of new large County facilities and continued expansion of the transit system will present new challenges to future carbon reductions. Staff will pursue cost-effective energy efficiency and clean energy strategies to meet these challenges, and seek collaboration with Arlington Public Schools for broader beneficial impact in these areas. The County will establish plans to achieve these further goals, identifying opportunities and constraints.