

NATIONAL CAPITAL REGION

Climate Change Report And Recommendations

COMMITTEE REVIEW DRAFT MAY 23, 2008

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Metropolitan Washington Council of Governments

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Introduction

On April 11, 2007, the Metropolitan Washington Council of Governments (COG) celebrated its 50th anniversary. As part of its 50th anniversary year, the COG Board of Directors examined the extraordinary changes that took place during the first half century of its existence and how COG grew up along with the region and helped shape its growing and vibrant communities.

The Board then set its sights on the next 50 years. It recognized that one profound force fundamental to defining the decades ahead is global climate change. The Board resolved that the region would become a leader in the growing national and international effort to combat this major challenge to the region's quality of life.

Thus on April 11, 2007, the Board adopted Resolution R31-07 (see Appendix C), creating a regional climate change initiative. In its resolution, the Board stated: "The failure to reduce greenhouse gases can undermine the quality of life in our region and its economic and environmental sustainability." The Board action called for creating a regional climate change program that would include developing a greenhouse gas inventory, setting regional goals and identifying best practices for reducing emissions, and making recommendations on regional climate change policy.

With this resolution, the metropolitan Washington region joined more than 28 states and 200 local governments that are taking actions to mitigate and prepare for climate change. The COG initiative was among a handful of regional climate action programs. With its focus on the National Capital Region, COG placed itself front and center on the national landscape of those taking leadership action on climate change.

Resolution R31-07 established a Climate Change Steering Committee to guide the initiative. The committee's initial work, which began in May 2007, focused on examining climate initiatives in Maryland, Virginia, and the District of Columbia, as well as among its twenty-one member local jurisdictions. Between May, 2007 and May, 2008 this work included:

- Reviewing the work of the Intergovernmental Panel on Climate Change, as well as local assessments of potential impacts in the mid-Atlantic region;
- Preparing a report cataloguing best practices and greenhouse gas reduction activities already underway in the region.
- Developing an inventory of greenhouse gas emissions, and forecasting the future level of emissions out to 2050 under a "business as usual" scenario;
- Evaluating a wide range of potential regional greenhouse gas reduction goals, and reaching consensus on an aggressive sequence of reduction targets starting in 2012;
- Examining state and federal legislation;
- Preparing advocacy positions primarily focused on enhancements to local and regional roles and resources to support local and regional initiatives;
- Endorsing the Cool Capital Challenge, a grassroots effort to jumpstart emission reductions in the region;

- Reviewing a wide range of measures to reduce greenhouse gas emissions; and
- Framing a regional Climate Action Plan.

This report reflects the work of the COG Climate Change Steering Committee during the past year. It presents recommendations for regional action by proposing broad goals, identifying actions that will begin to reduce regional greenhouse gas emissions, and it setting in place a process for a broad stakeholder partnership to implement the regional framework crafted in this document.

An overarching tenet of this report is the Climate Change Steering Committee's acceptance of the overwhelming evidence presented by the Intergovernmental Panel on Climate Change, U.S. National Academies of Science, National Center for Atmospheric Research, and others that the Earth is gradually warming and this warming trend is due in large part to human activities. The Committee also acknowledged the need for taking action now in an effort to avoid the potentially catastrophic consequences of climate change forecast for the middle and latter parts of this century. The committee was motivated not only by the need for action to address global climate change, but also by the growing body of evidence that adverse consequences are already taking place in our region.

While climate change concerns provided the foundation for the action plan recommended in this report, the committee also notes that many, if not virtually all, of the recommended actions will provide very significant benefits and will enhance the future of the region's quality of life, irrespective of whether the anticipated climate changes materialize as predicted, or whether the collective intervention of those in this region, across the United States, and elsewhere in the world ultimately produce the desired greenhouse gas mitigation benefits.

Executive Summary

[to be provided]

Facing the Facts: Our Climate Is Changing Our Climate Is Changing

An overwhelming body of scientific evidence indicates that climate is indeed changing and has changed rapidly starting at the beginning of the twentieth century. The greenhouse effect is a natural warming process. Carbon dioxide (CO₂) and other gases, primarily methane and nitrous oxide, are always present in the atmosphere. They create an effect similar to the warming inside a greenhouse, where energy from the sun passes through the gases, is reflected back by the earth's surface, and much of this radiation is trapped by the various greenhouse gases. Natural factors that affect the balance between the sun's energy warming the Earth and loss of energy into the atmosphere include clouds, water vapor, and greenhouse gases.

Starting in the mid-20th century, the greenhouse effect and associated global warming has been accelerated by the dramatic increase in man-made greenhouse gases, according to the scientific consensus of the Intergovernmental Panel on Climate Change, the National Academy of Sciences and other scientific organizations.

Figure 1 shows the dramatic rise in global CO₂ emissions since the mid-1750s, and the relative contributions from various large industrial countries.

Figure 1: Global Anthropogenic CO₂ Emissions by Region

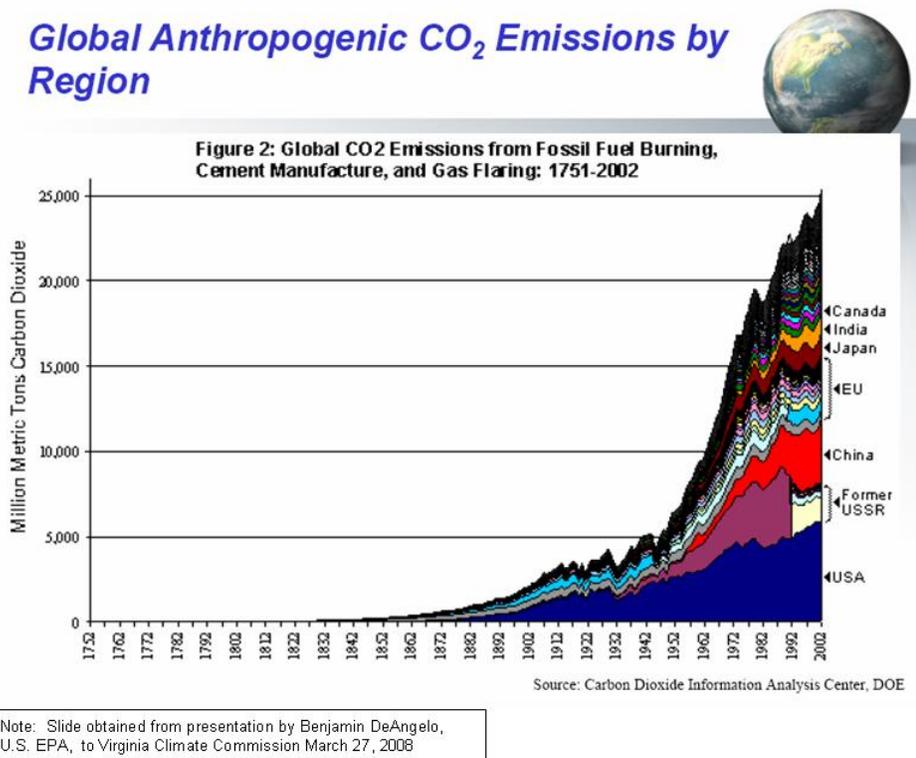
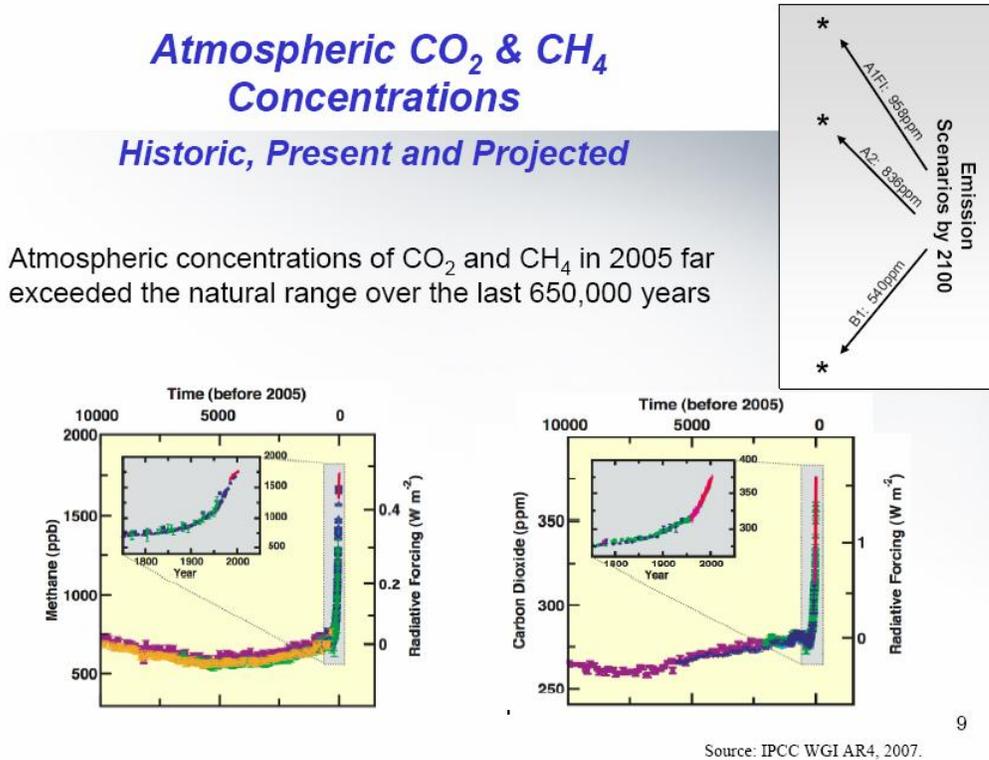


Figure 2 shows the dramatic increase in concentrations of CO₂ and methane (CH₄) in the atmosphere and the projected concentrations absent any mitigation of man-induced emissions.

Concentration levels are projected out to 2100 showing the possibility of unprecedented levels of CO₂ and methane are possible.

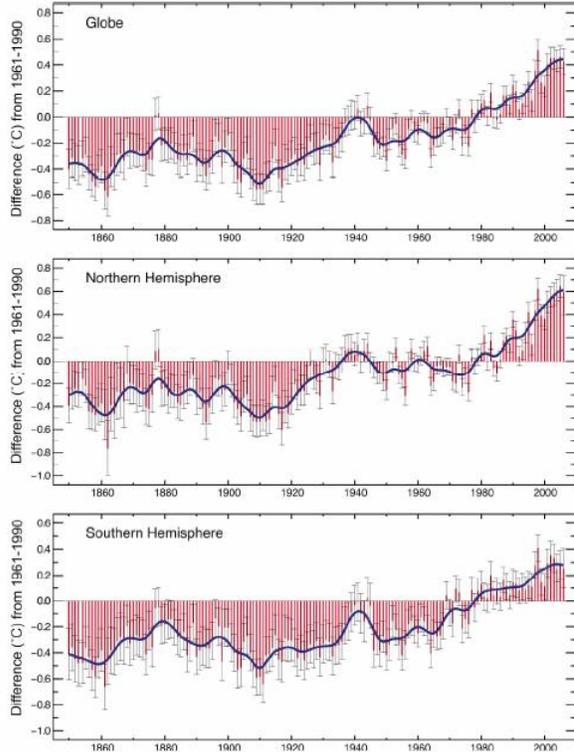
Figure 2: IPCC estimates of Carbon Dioxide and Methane over the past 650,000 Years



Note: Slide obtained from presentation by Benjamin DeAngelo, U.S. EPA, to Virginia Climate Commission March 27, 2006

Figure 3 shows the evidence for increased temperatures across the globe, as well as individually in the northern and southern hemispheres. The conclusion of the IPCC, as stated in the slide, is that *warming of the climate is unequivocal*. Over the last century, the accumulation of greenhouse gases (GHGs) in the atmosphere is estimated to have raised average global temperatures by more than 0.74°C (or 1.3°F). Before industrialization, the amount of carbon dioxide released to the atmosphere by natural causes was in balance with the amount absorbed by plants, oceans, and other “sinks.” More rapid warming in higher latitudes in the Northern Hemisphere could have potentially devastating implications for coastal areas of the U.S. and around the world due to sea level rise associated with melting polar sea and land ice.

Figure 3: Observed Global Warming



Observed Global Warming



Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level

Global average warming in the past century is 0.74°C (1.3°F)

U.S. temperatures warmed during the 20th and into the 21st century; temperatures are now approximately 0.56°C (1.0°F) warmer than at the start of the 20th century, with an increased rate of warming over the past 30 years

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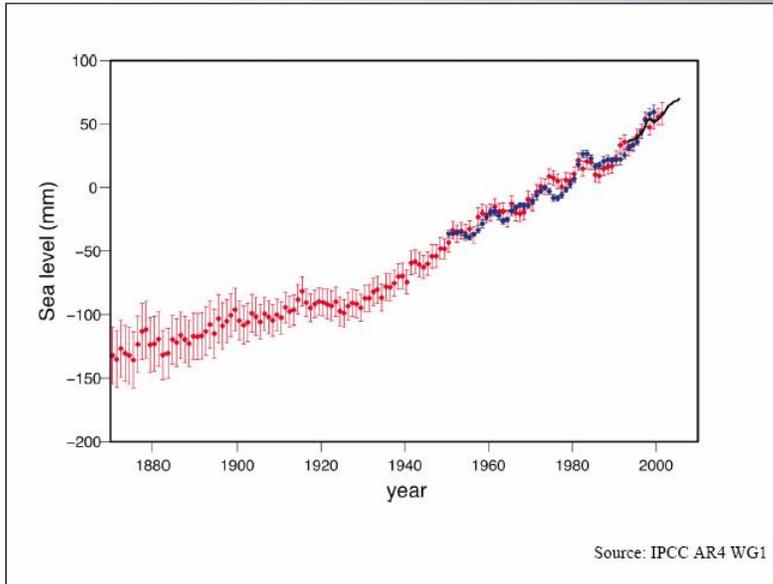
Note: Slide obtained from presentation by Benjamin DeAngelo, U.S. EPA, to Virginia Climate Commission March 27, 2008

Scientists are observing and tracking the evidence of global warming. Over the second half of the 20th century, the global mean sea surface height increased at a rate of about 1.8 millimeters (mm) per year, and there is evidence that this rate is increasing (see Figure 4). Other effects include changes in terrestrial ecology leading to the extermination of animal and plant species, increased melting of polar ice sheets, higher sea levels, extreme heat waves and drought, increased severity of hurricanes and other storms, increased precipitation, ocean acidification, and flooding. Scientists warn that an additional 2°C rise in average global temperature will result in dramatic and irreversible changes to the environment.¹

¹ Parry, Martin, et al., eds. 2007. *Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the IPCC. Cambridge University Press.

Figure 4: Observed Global Sea Level Rise

Observed Global Sea Level Rise

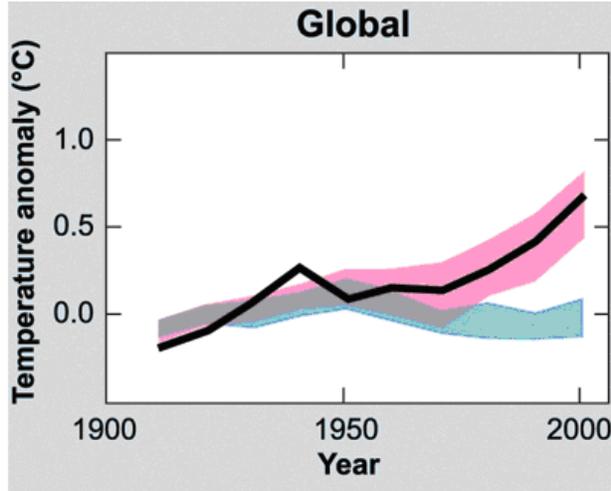


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Note: Slide obtained from presentation by Benjamin DeAngelo, U.S. EPA, to Virginia Climate Commission March 27, 2006

Much of this change in climate is attributable to human activities. The Intergovernmental Panel on Climate Change (IPCC) concludes "most of the observed increase in globally averaged temperatures since the mid-twentieth century is very likely due to the observed increase in anthropogenic (man-made) greenhouse gas concentrations." (IPCC Fourth Assessment Report 2007). Figure 5 shows summaries of the analyses provided by the IPCC illustrating the relationship between man-made emissions and climate change, as well as forecasts of potential increases through 2100 for various emissions and modeling scenarios.

Figure 5: Relationship Between Human Activities and Global Warming



Source: IPCC Report, Fourth Assessment Report, Nov. 2007

Temperature predictions by climate change models match well with observations during 1920 through 2000 proving the models are quite accurate now. These models predict that the temperature does not change much due to natural causes (shown in green). However when anthropogenic factors (shown in red) are added to it, global temperature rises at a fast rate as seen in the graph since 1960s.

Source: IPCC Report, Fourth Assessment Report, the Physical Science Basis, November 2007

Carbon dioxide (CO₂) from combustion of fossil fuels from power plants and vehicles, loss of carbon "sinks" due to deforestation, and methane emissions from landfills are the major human activities contributing to climate change. Mitigating, or controlling, greenhouse gas emissions to reduce the risks of global warming to the economy and environment will require action at the national, state, and local levels, such as developing and applying alternative energy sources and technologies. In some circumstances, preparing for and adapting to the consequences of climate change will be necessary.

The greenhouse gas emission reduction goals in proposed federal legislation and adopted by states and localities are based on what scientists say is needed to stabilize greenhouse gas emissions to below 2.5-3°C by 2050. Following a "business as usual" scenario, greenhouse gas emissions will grow to 14 billion tons globally by 2055. To stabilize greenhouse gas concentrations, carbon emissions will have to be reduced by at least 50% and as much as 85% by 2050, according to the 2007 Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC).

Recognizing the Risks: Potential Impacts of Climate Change on the Metropolitan Washington Region

Substantial effort has been devoted to assessing the potential impacts of climate change in the Mid-Atlantic region. The real challenge is assessing the risks of these impacts occurring and to what degree.²

The basic drivers of any impacts are changes in CO₂, sea level, temperature, precipitation, and runoff. Accordingly, any risk assessment begins with projections of future conditions associated with each of these. Table 1 presents the projected range of change from various studies for five key parameters that may adversely affect the region's future, along with the levels of confidence in the projections—critical to any credible risk assessment. In addition, consideration must also be given to changes in CO₂, sea level, temperature, precipitation, and runoff that have already been documented over the last century.

There is a very high degree of confidence in the likelihood of substantial increases in CO₂ concentrations in the coming decades. In the Mid-Atlantic region, this is expected to result in rising sea levels, higher air and water temperatures, and changes in precipitation patterns. These changes also are generally interconnected and hence generally have synergistic impacts on water and environmental quality. The Mid-Atlantic Regional Assessment (MARA) estimates are consistent with more recent estimates of the Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC) in 2007.

Table 1: Key Mid-Atlantic Projections for 2030 and 2095 Above 1990 Baseline Levels

Parameter	2030	2095	Confidence in Projection
CO ₂ change (%)	+20 to +30	+50 to +120	Very High
Sea level change (inches)	+4 to +12	+15 to +40	High
Temperature change (°F)	+1.8 to +2.7	+4.9 to +9.5	High
Precipitation change (%)	-1 to +8	+6 to +24	Medium
Runoff change (%)	-2 to +6	-4 to +27	Low

Source: Preparing for a Changing Climate: The Potential Consequences of Climate Variability and Change - Mid-Atlantic Foundations (January 2001).

Higher Sea Levels → Increased Flooding and Shoreline Loss, Degraded Water Quality

The shorelines of the Chesapeake Bay and its tributaries such as the Potomac River are among the region's most threatened resources, subject to the combined impacts of climate and land-use change. Wetlands such as coastal marshes and shoreline ecosystems provide important ecological functions, serving as nurseries and critical habitat, sources of dissolved organic carbon, modifiers of local water quality, and stabilizers of global levels of available nitrogen, atmospheric sulfur, CO₂, and methane. The implications of losing or submerging wetlands

² See: Preparing for a Changing Climate: The Potential Consequences of Climate Variability and Change - Mid-Atlantic Foundations (January 2001), which is a part of the Mid-Atlantic Regional Assessment (MARA); and (2) Climate Change Impacts in the Mid-Atlantic Region – A Workshop Report, compiled by Ann Fisher et al.

would serve to lose those important ecological functions and hence to further degrade water quality and hence negatively impact the living resources of the Bay and its tributaries. Submerged aquatic vegetation (SAV), which is critical elements of the Bay's shoreline ecosystems, would also be negatively impacted by increased water depth due to higher sea levels.³ In addition, wetlands serve to mitigate the impacts of storm surges, and their loss would increase the likelihood of flooding in many low-lying areas.

The confidence level for sea level rise is high, with the 2095 projection ranging from a low of 38 centimeters (cm) to a high of 102 cm. The Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC) report projects a "Chesapeake Bay local" sea level increase of approximately 70–160 cm by 2100, including natural subsidence, the "enhanced" rate of sea level rise in the bay (beyond that attributable to global sea level rise).

The impacts of rising sea levels on the Chesapeake Bay and its rivers include: a) heightened risk and vulnerability of inundation of wetlands and other low-lying lands by storm surges and coastal flooding; saltwater contamination of fresh water used for drinking water and irrigation for some smaller communities utilizing water from the Potomac estuary and c) degraded water quality in the Bay and its tributaries, potentially increasing the risk of harmful algal blooms that thrive from runoff, harming fish and crab populations. These ecosystems exist in a naturally changing environment, but the current and forecast rates of change are likely to overwhelm their inherent resilience.

Higher Air Temperatures → Increased Pollution and Health Risks, Changing Plant and Animal Species, More Frequent Forest Fires

Between 1948 and 2006, the average annual temperature in the Washington, DC metropolitan area, rose by 0.06°C (0.11°F) per decade (Figure 2). Temperature in the Washington region increased by 0.07°C (0.13°F) per decade since 1970 and is projected to increase through 2050 (Figure 3). Five of the last 10 years have ranked as the top 10 warmest in the United States, since record keeping began in the late 19th century.

A warmer climate could result in increased cases of vector-borne diseases and stronger, more frequent heat waves. Also, locally, there is a correlation between heat waves and the occurrence of high ozone days. Generally, the hotter the temperature, the more favorable the conditions are for ozone-producing chemical reactions in the air, which can lead to an increase in asthma cases and exacerbation of chronic respiratory diseases.

Longer growing seasons are expected in the region. Rising CO₂ will also affect crop yields, both detrimentally and beneficially. According to the Intergovernmental Panel on Climate Change (IPCC), in the middle latitudes (including the Mid-Atlantic region), climate change most likely will affect crops differently from region to region. Agricultural production may benefit from increased CO₂ concentrations on crop growth and a resulting increase in water use efficiency.

³ Comments by Dr. Christopher R. Pyke, Director of Virginia Institute of Marine Science's Climate Change Services and Chesapeake Bay Program STAC member; U.S. Senate Committee on Environment and Public Works Hearing on 'The Impact of Global Warming on the Chesapeake Bay' (September 26, 2007).

As temperatures rise, plants and animals currently in the southeastern United States may migrate north into the Mid-Atlantic. Today, more than half of the Mid-Atlantic region is covered by a maple-beech-birch deciduous forest. Over time, the southern pine and mixed oak-pine forests in the Southeast may become more dominant as they migrate north. Overall forest productivity may increase, but a shift in dominant forest types may detrimentally foster invasive species and reduce biodiversity. More frequent and severe forest fires are expected, threatening ecosystems and human settlements.

Higher Water Temperatures → *Decrease in some Living Resources, Increase in Harmful Algal Blooms, Degraded Water Quality*

Long-term temperature records indicate that Chesapeake Bay waters are warming. The close coupling of air and water temperatures in the bay and is likely to be a signal of climate change. Submerged aquatic vegetation (SAV), which is a critical element of the Bay's shoreline ecosystems, would be negatively impacted by higher water temperatures.⁴ In the case of oysters, which historically had been a major factor in serving to filter Bay waters - with resultant improvements in water quality; the additional stress of higher water temperatures could offset any potential benefits seen due to the increase in amount of saline waters where they can grow because higher water temperatures can make them more even more vulnerable to diseases.

Also, higher water temperatures, if coupled with both increased pollutant runoff in the spring (as a result of changes in precipitation patters) and higher air temperatures during summer months - will likely lead to increased frequency and duration of algal blooms. Some of those blooms may be deemed potentially harmful to human health (e.g., *Pfisteria*), and definitely would lead to degraded water quality (e.g., decreased Dissolved Oxygen levels).

⁴ Comments by Dr. Christopher R. Pyke, Director of Virginia Institute of Marine Science's Climate Change Services and Chesapeake Bay Program STAC member; U.S. Senate Committee on Environment and Public Works Hearing on 'The Impact of Global Warming on the Chesapeake Bay' (September 26, 2007).

Figure 6:

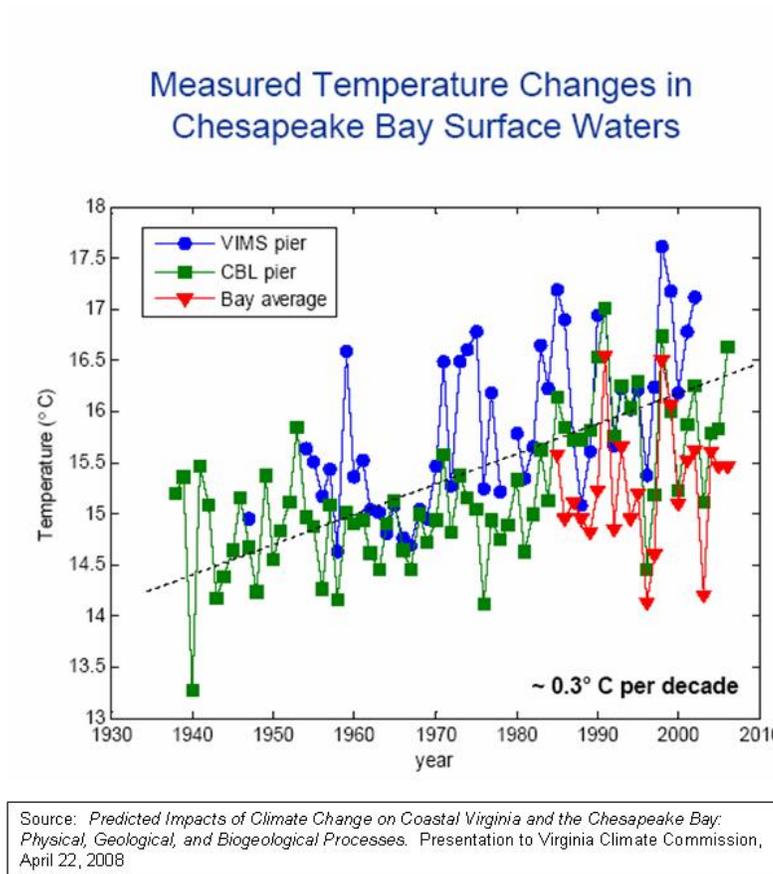
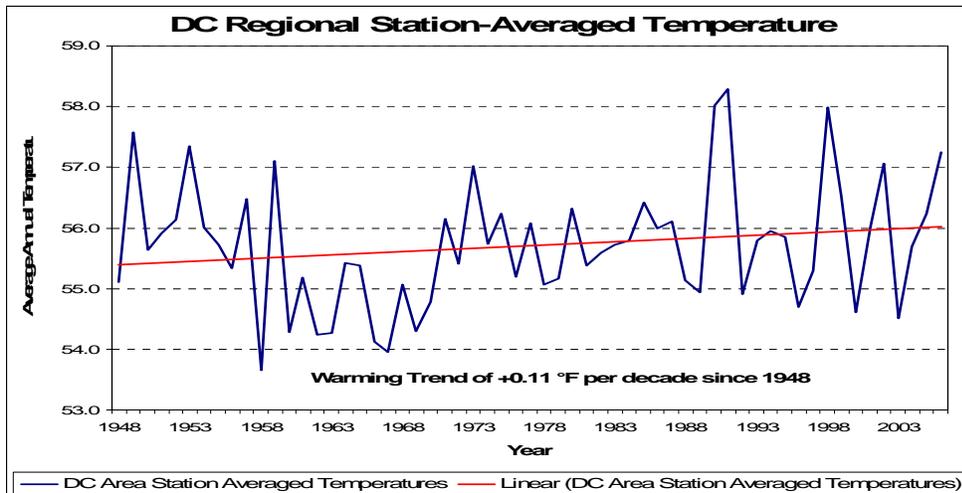


Figure 7: Average Annual Temperature in the Washington, DC, Metropolitan Area



Source: National Oceanic and Atmospheric Administration, National Climate Data Center data based on the average temperatures of the following stations: National Arboretum, Dalecarlia, KDCA (National Airport), KIAD (Dulles Airport), Woodstock, MD, and Lincoln and Louisa, VA.

Changes in Precipitation Patterns → *Heavier Rainfall, Flooding, Erosion, Prolonged Droughts, Increased Pollutant Runoff, Degraded Water Quality*

As the global climate grows warmer, evaporation will increase due to warmer oceans. Because the world is a closed system, this will cause heavier rainfall, with more beach and land erosion as well as coastal flooding. By the second half of the 21st century, precipitation in the Mid-Atlantic region is expected to increase overall.

The National Center for Atmospheric Research Report notes that climate changes consistent with the impacts of global warming are occurring now, such as significant changes in the seasonal timing of runoff in many mountainous areas. According to a report prepared for the Association of Metropolitan Water Agencies (AMWA Report)⁵, the “humid East and Midwest” can expect more rainfall in the winter and late spring, and potentially less rainfall in late summer and fall, with more extreme droughts.

Such changes in precipitation patterns have both water quality and water supply implications. Some implications of these changes would be lower base flows in surface waters and reservoir levels in the summer and fall. These impacts will also negatively impact groundwater levels - which does account for some of the region’s drinking water needs. In addition, decreases in precipitation during summer months may lead to increased demands for non-drinking water within the region. This could also result in an increase in the demand for irrigation water in the upper Potomac – which has at least the potential to impact the availability of downstream water supplies, and will at least increase the difficulty in meeting all of those increased demands in light of increased population growth in the region.

Increased storm intensity would also increase the flow of sediment and pollutants to the Bay and its tributaries. This would especially be true due to stormwater runoff in those areas that are not currently under stormwater management control. However, if precipitation patterns change significantly enough, then the suite of stormwater management controls (i.e., BMPs) that are currently in place throughout the region may also be operating at the maximum or exceeding their design capabilities (i.e., resulting in reduced performance and removal efficiencies)⁶. The combination of these two factors would lead to degraded water quality both within local streams as well as to the Bay and its tributaries, as increased sediment and nutrient runoff degrades water quality (i.e., excess nutrients lead to anoxic conditions/reduces levels of Dissolved Oxygen in water, and excess sediments smothers SAV growing in shallow waters).

Table 2 shows different levels of risk associated with natural severe weather events for different counties in the Washington, DC, metropolitan area and adjoining region. As climatic change increases the intensity of these events, their associated costs will increase as well.

⁵ Implications of Climate Change for Urban Water Utilities; Association of Metropolitan Water Agencies, 2007.

⁶ Comments by Dr. Christopher R. Pyke, Director of Virginia Institute of Marine Science’s Climate Change Services and Chesapeake Bay Program STAC member; U.S. Senate Committee on Environment and Public Works Hearing on ‘The Impact of Global Warming on the Chesapeake Bay’ (September 26, 2007).

Table 2 . Risks by Jurisdiction in Maryland Associated with Severe Weather Events Potentially Exacerbated by Climate Change

Event	High Risk	Medium-High Risk
Drought	Frederick, Montgomery, Howard, Carroll, Baltimore City and County, Harford	None
Extreme Heat	Baltimore City	Frederick, Prince George's, Charles, Calvert, Howard, Anne Arundel, Harford
Flash/River Flooding	Frederick	Montgomery, Carroll, Baltimore County, Anne Arundel
Thunderstorm	Frederick, Montgomery, Anne Arundel	Prince George's, Carroll, Howard, Baltimore County, Harford
Tornado	Frederick, Anne Arundel	Prince George's, Charles, Carroll, Baltimore County, Harford
Winter Weather (Snow and Ice)		Frederick, Montgomery, Prince George's, Anne Arundel, Howard, Carroll
Tidal/Coastal Flooding		Anne Arundel, Calvert

Sources: Maryland Emergency Management Administration, *Maryland Hazard Analysis*, Koontz, Michael, et al., GEOMET Technologies, Inc., and Towson University, Department of Geography, January 2000.

Taking Stock: Current and Projected Regional Greenhouse Gas Emissions

Developing a greenhouse gas inventory is an important first step in reducing the region's contribution to global CO₂ levels.⁷ The inventory provides a basis for developing an action plan and setting goals and targets for future reductions, helps to identify the largest sources of greenhouse gases, enables tracking of trends over time, and documents the impacts of actions taken to reduce emissions. The 2005 base year was chosen because data were readily available, and 2005 was reasonably consistent with the base years selected by Metropolitan Washington Council of Governments (COG) member jurisdictions in the Cool Counties agreement and the surrounding states for their climate programs.

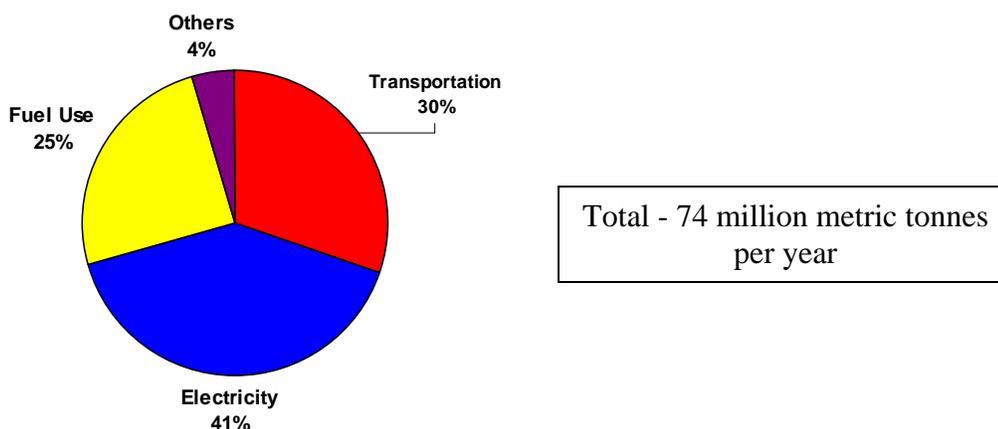
Base Year Regional Greenhouse Gas Emissions

In 2005, greenhouse gas emissions in the metropolitan Washington region totaled 74 million metric tons (MMt). As shown in Figure 8, the inventory includes emissions from electricity generation; on-road motor vehicle transportation; residential/commercial/industrial and commercial aviation fuel use; and other sources, including hydrofluorocarbons used as refrigerants and solvents, and methane from wastewater and landfills. In 2005 two sectors, transportation and electricity use, contributed over 70% of regional CO₂ emissions. The electricity generation inventory is a consumption inventory associated both with electricity generation within the region and imported power.

The inventory does not account for the 4.1 MMt of CO₂ emissions that are absorbed (or "sequestered") by the metropolitan area's 1.3 million acres of undeveloped forests and grassland. As development increases, these areas are expected to decline, reducing the region's overall capacity to absorb and temporarily store greenhouse gas emissions. Further research is needed to better project the anticipated loss of forest and grassland in the region.

⁷ Details on the Washington Region's greenhouse gas emissions inventory are in the Appendix A.

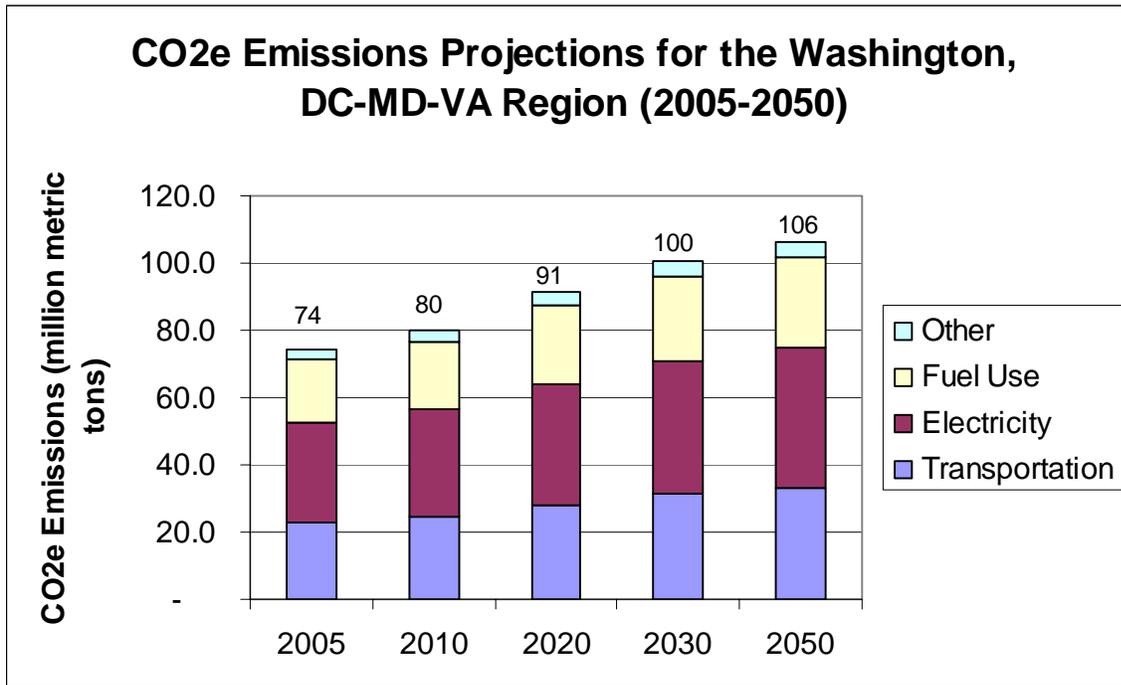
Figure 8. Washington Region Greenhouse Gas Emissions, 2005



Future Growth in Emissions: Business As Usual

The Washington metropolitan region is growing. According to COG’s Cooperative Forecasts, between 2005 and 2030, the region will gain 1.6 million new residents and 1.2 million new jobs. This economic prosperity will be accompanied by a growing demand for new buildings, increased demands on the regional transportation system, and creation of new businesses. To a great extent, how the region grows will determine the new energy and fuel demands. Based on current business-as-usual (BAU) projections of growth in population, housing, employment, and energy use, total emissions from energy consumption (electricity and fuel use) in the region will increase by 35 percent by 2030 and 43% by 2050 (Figure 9). The estimated increase in emissions does not account for expected gains in energy efficiency due to the Energy Security Act of 2007 and the changes in the corporate average fuel economy (CAFE) standards increasing automobile fuel efficiency to 35 miles per gallon by 2025. The benefits of the new federal CAFE standards are discussed later in this report.

Figure 9. Projected Growth in Regional Greenhouse Gas Emissions Under a Business As Usual Scenario



Equivalent CO₂ (CO₂e) is the concentration of CO₂ that would cause the same level of radiative forcing as a given type and concentration of greenhouse gas. Examples of such greenhouse gases are methane, perfluorocarbons and nitrous oxide.

Taking Aim: Setting Targets for Reducing Regional Emissions

The Climate Change Steering Committee is recommending goals to reduce regional greenhouse gases that are consistent with the climate science and with the goals adopted by state and local governments in the Washington region. The goals in proposed federal legislation and adopted by states and localities are based on what scientists say is needed to stabilize the projected rise in global surface temperatures to below 2.5-3°C by 2050. Following a BAU scenario, greenhouse gas emissions will grow to 14 billion tons globally by 2055, an approximate doubling from 2005 levels. A consensus of IPCC and U.S. scientists is that greenhouse gas emissions must be reduced by 50–85 percent by 2050 to avoid the dire consequences of global warming.⁸

In the metropolitan Washington region, state and local governments recognize the urgency of addressing climate change to protect their citizens and economies. The Maryland Commission on Climate Change recommends a statewide goal of reducing greenhouse gas emissions by 10 percent below 2006 levels by 2012, by 25–50 percent below 2006 levels by 2020, and by 90 percent below 2006 levels by 2050. The District of Columbia, a signatory to the U.S. Mayors Climate Protection Agreement, has pledged to reduce greenhouse gas emissions by 7 percent below 1990 levels by 2012. The Commonwealth of Virginia has a goal of reducing greenhouse gas emissions by 30 percent by 2025. And Fairfax, Arlington, Montgomery, and Prince George's counties have signed the Cool Counties agreement, committing to halt the growth of greenhouse gas emissions by 2010, and to reduce greenhouse gas emissions by 80 percent below 2006 levels by 2050.

Table 3: Climate Change Reduction Targets in Metropolitan Washington Region

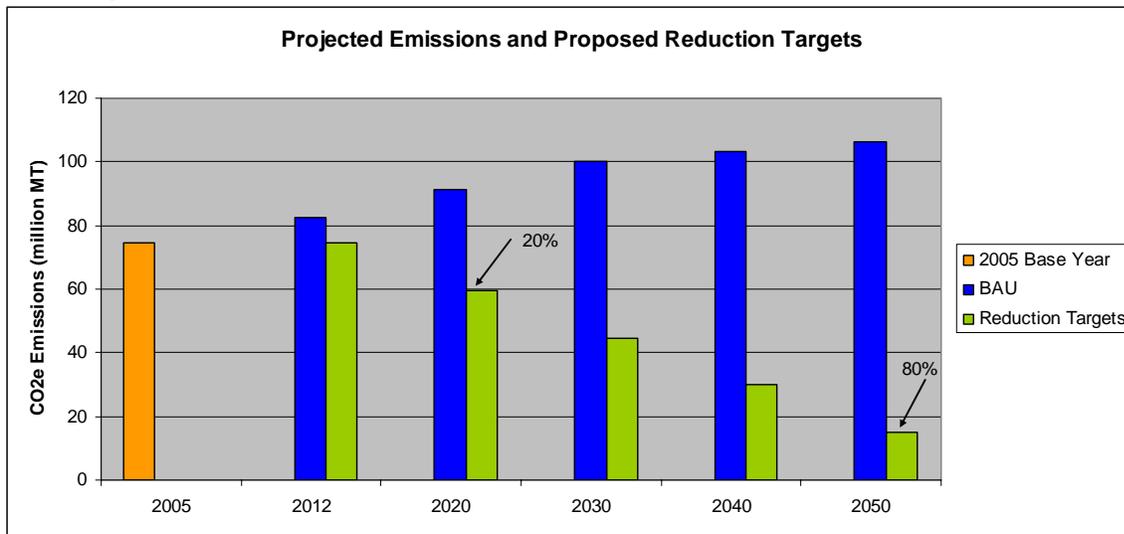
	Short term (2010-2012)	Medium Term (2020-2025)	Long Term (2050)
DC	7% below 1990 by 2012		
MD (state)	10% below 2006	25% or 50% below 2006	90% below 2006
Montgomery Co.*	stop emissions growth by 2010		Reduce 80% below 2006 by 2050
Takoma Park	7% below 1990 by 2012		
College Park	7% below 1990 by 2012		
Rockville	7% below 1990 by 2012		
VA (state)	Reduce 30% by 2025		
Arlington Co.*	stop emissions growth by 2010		Reduce 80% below 2006 by 2050
Fairfax Co.*	stop emissions growth by 2010		Reduce 80% below 2006 by 2050
City of Alexandria	7% below 1990 by 2012		
*Cool Counties	Stop GHG emissions growth by 2010; achieve a 10% reduction every five years thereafter until 2080		

⁸ 2007 Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC).

Recommended Targets for Reducing Regional Greenhouse Gas Emissions

Figure 10 depicts the Climate Change Steering Committee's recommendations for reducing regional greenhouse gas emissions for the targeted years 2012, 2020, and 2050. The Committee studied the IPCC report recommendations and reviewed greenhouse gas reduction goals set by states, cities and regions in the U.S. As a compromise between IPCC recommended reduction levels and those adopted by COG member local governments (Table 3), the Committee chose to set three goals. The goals include an early goal (2012) to force early action, a medium-range goal (2020) to encourage expansion of recommended policies and programs, and a long-range goal (2050) to stimulate support for research into technologies and clean fuels needed to stabilize greenhouse gas emissions.

Figure 10. Comparison of Projected Regional Greenhouse Gas Emissions Under BAU and Proposed Emission Reduction Scenarios: 2005–2050



2012 Target: Reduce BAU Emissions by 10 Percent Below 2005 Levels

Between 2005 and 2012, regional energy consumption and greenhouse gas emissions are expected to grow by about 10 percent under a BAU scenario. The Climate Change Steering Committee recommends establishing 2012 as a near-term goal. The goal is to stop projected growth in regional greenhouse gas emissions by achieving a 10 percent reduction in regional emissions between 2008 and 2012.

Strategy to Modify Individual and Household Behaviors

Changing the energy-consuming behavior of individuals and households offers a potentially significant gold mine for greenhouse gas reductions. Opportunities for education and outreach efforts include persuading consumers to purchase more energy-efficient cars, appliances, and heating and air conditioning units, and to consider alternatives for commuting to work other than by driving alone. Many of the measures are relatively easy to achieve through incentives from utilities and local governments working together.

Research performed by Vanderberg indicates that individuals contribute about one-third of U.S. greenhouse gas emissions through travel and household behaviors. Some of these carbon-emitting behaviors can be modified to generate emissions reductions in the near term. The average American contributed about 20 metric tons of CO₂.⁹ According to Vanderberg,¹⁰ most (63%) of the emissions are from personal car use, mass transit, and air travel, and the rest (37%) is from residential use of appliances, air conditioning, and heating.

A mass marketing campaign could be designed to promote energy efficient behavior. The campaign could be coordinated with Commuter Connections or Clean Air Partners. Both outreach organizations have experience with marketing research and designing campaign messages to encourage changes in behavior. Commuter Connections' objective is to reduce congestion by encouraging commuting alternatives to the single occupancy vehicle. Clean Air Partners' objective is to reduce air pollution by persuading individuals to reduce driving and to use less polluting products such as low-VOC paints.

List of Individual/Household Actions to Reduce GHG Emissions

Transportation

- Buy more efficient cars
- Carpool with two other people
- Cut shopping trips in half (walkable communities)
- Alter driving habits
- Get frequent tune-ups
- Maintain tire pressure

Households

- Insulate and weatherize house
- Install more efficient heating systems
- Reduce inside temp to 68°F/days, 65°F/nights (winter)
- Install more efficient hot water heaters
- Install more efficient refrigerators/freezers
- Reduce water heat by 20°F
- Change half bulbs to compact fluorescent lighting
- Install more efficient stoves
- Install efficient air conditioning systems

⁹ Energy Information Administration, International Energy Annual, U.S. Department of Energy, October 2007.

¹⁰ Vandenberg, Michael P. 2007. "The Carbon-Neutral Individual," *New York University Law Review* 82 (2007).

2020 Target: Reduce BAU Emissions by 20 Percent Below 2005 Levels

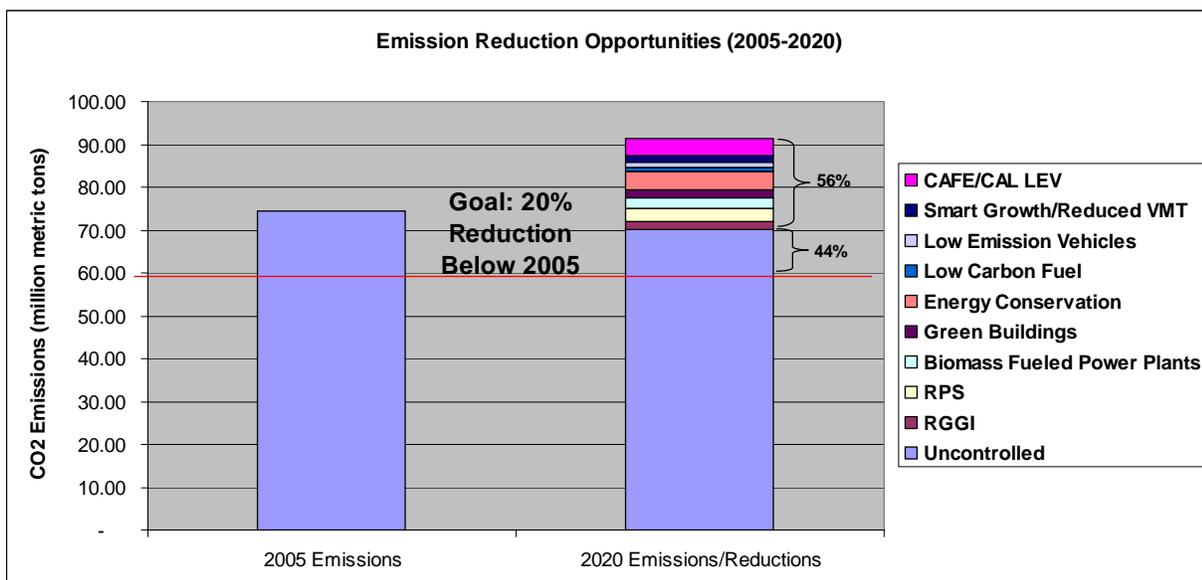
The Climate Change Steering Committee recommends an interim goal of 2020 to reduce emissions to 20 percent below 2005 levels. Some of the reduction will be achieved by a combination of federal, state, and local policies, such as the Energy Efficiency Act of 2007, the new federal CAFE standards, and regional cap-and-trade program for utilities, such as the Regional Greenhouse Gas Initiative (RGGI). To assess what would be involved in meeting the 2020 goal, the Climate Change Steering Committee prepared a preliminary analysis of current and potential future greenhouse gas reduction measures with an estimated reduction benefit by 2020 (Table 4). The measures in the Table 4 are a 23% percent reduction from the 2020 BAU. That reduction works out to be 56% of the quantity of reductions needed to reach the 2020 goal.

Table 4. Potential Regional Impacts of Federal, State, and Local Actions on Meeting 2020 Goal

Measure	% GHG Reduction	Assumption
RGGI	2%	Apply to DC/MD/VA, (may double count VA and DC)
RPS	3%	10% RPS, applied to all electricity, including imports (may double count RGGI reductions)
Biomass-Fueled Power Plants	3%	8% of electricity generation in Maryland
Green Buildings	2%	40% of buildings achieve a 10–30% reduction; assume all adopt
Energy Conservation	5%	Empower Maryland, Virginia Energy Plan, assume 15% (double count Green Buildings reductions)
Low-Carbon Fuel	1%	Displace 0.8 to 1.6% by 2012, guess 3% by 2020
Low-Emission Vehicles	1%	Above and beyond CAFE
Smart Growth/Reduced VMT	2%	Between 2% and 10% (Kirby and Ewing)
CAFE/CALEV2	4%	14% for transportation sector=4% for total GHG (DTP)

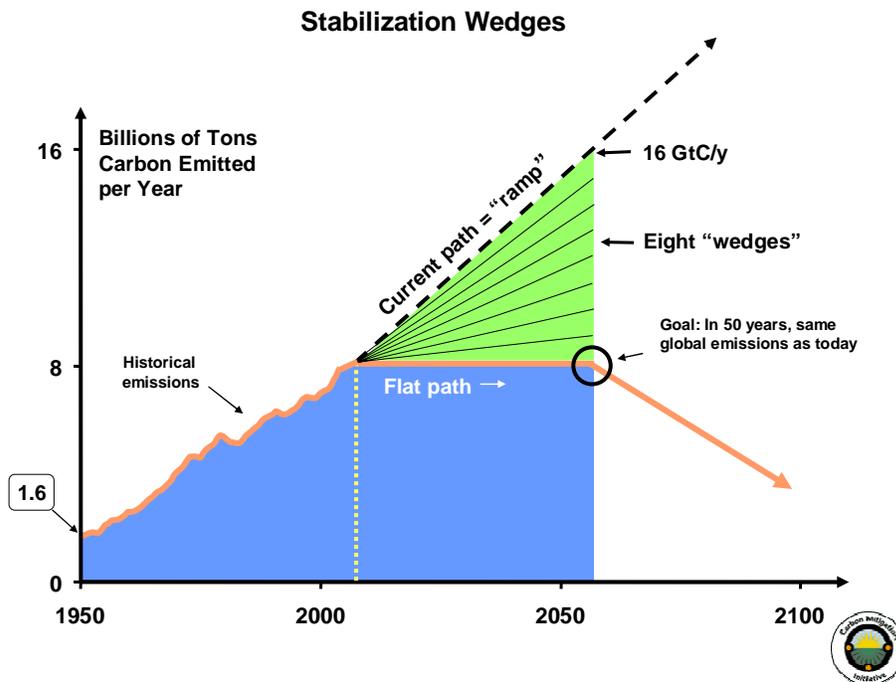
RGGI = Regional Greenhouse Gas Initiative; RPS = renewable portfolio standard; VMT = vehicle miles traveled; CAFE = corporate average fuel economy; CALEV2 = California Low Emission Vehicle Phase 2; DC = Washington, DC; MD = Maryland; VA = Virginia. MWCOG analysis, February 2008.

Figure 11. Regional Opportunities for Reducing Greenhouse Gas Emissions: 2005–2020



calling for aggressive action to address climate change. Reducing a rising BAU path to a flat path with no growth in CO₂ emissions would require cutting projected U.S. carbon emissions by 8 billion metric tons per year. Socolow and Pacala propose dividing the total amount into eight wedges of 1 billion metric tons of carbon emissions avoided (Figure 12).¹¹ The four categories of wedge strategies are energy efficiency and conservation; fuel switching and carbon capture and storage; renewable fuels and electricity/forest and soil storage; and nuclear fission. All of these strategies require a coordinated regional effort that will involve individual actions, state and local government actions, business actions, federal and state policy and regulations, academic research and development, and new technology.

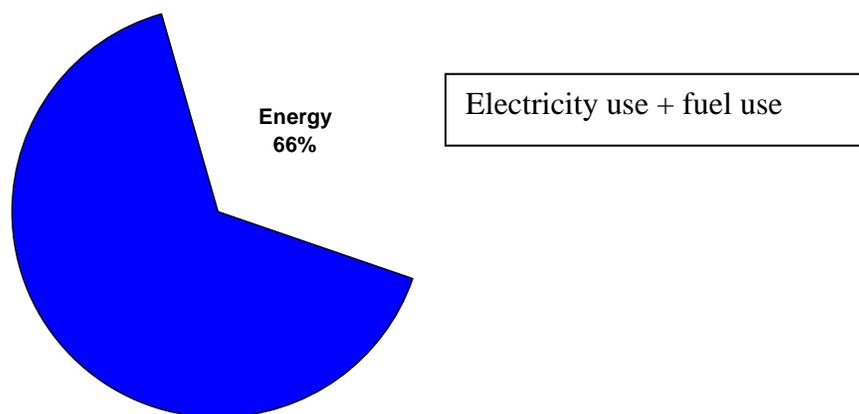
Figure 12. Approach for Stabilizing Greenhouse Gas Emissions by 2050



¹¹ Socolow and Pacala, presentation, February 3, 2005 at www.stabilisation2005.com. Based on article in Science 2004. One billion tons equals one gigaton of carbon or GtC.

The following sections on energy and transportation describe COG's current projections for the region in terms of population, employment, households, and transportation and land use. The current projections are the best information about the future based on known development and transportation projects. County and city planning offices provided the information for future projects in their jurisdictions to 2030. State and local transportation agencies provided information about transportation projects in the region's long-range transportation plan (CLRP).¹³

Taking Action: Mitigating Emissions From Energy Consumption



While local governments and the private sector are investing in energy efficiency and renewable energy, the region remains dependent on fossil fuel-powered energy sources to meet its growing demand for energy. Regional energy prices increased significantly between 2000 and 2005: electricity, 14 percent; natural gas, 53 percent; gasoline, 68 percent; and diesel, 78 percent. Since 2005, upward price pressures have continued, and there is indication that prices will decline in the near future.¹⁴ The energy sector accounts for approximately 66 percent (electricity and fuel use) of greenhouse gas emissions in the metropolitan Washington area. Any solution to reduce emissions in the region must address energy supply and demand into the future.

There are several ways to reduce emissions from energy consumption: improve energy efficiency, reduce demand for energy, and develop clean (alternative) energy sources. The COG Strategic Energy Plan promotes all three as goals to manage the region's energy resources. Some possible longer-term solutions, such as increased nuclear generation, carbon sequestration, hydrogen fuel cells, and widespread use of solar are not yet commercially available, face significant hurdles to implementation, or are not cost-effective. Technologies such as plug-in electric hybrids could also have implications for future electricity demand. Cap-and-trade and/or carbon tax programs are being widely discussed as possible options for reducing overall U.S. greenhouse gas emissions.

¹³ National Capital Transportation Planning Board, Constrained Long Range Plan, 2007-2011.

¹⁴ U.S. Department of Energy, Energy Information Administration, http://www.eia.doe.gov/overview_hd.html.

Current Initiatives for Reducing Greenhouse Gas Emissions From Energy Use

RGGI Will Cap Emissions from Maryland Power Plants

In 2007, Maryland joined the Regional Greenhouse Gas Initiative (RGGI), an agreement between states in the Mid-Atlantic and Northeast that caps emissions from coal-fired power plants in 2009. Each state will receive allowances to emit CO₂ and will allocate allowances to power plants through auctions or other means. The cap will be lowered by 2.5 percent per year from 2015 to 2019, for a total reduction of 10 percent by 2020. As emissions from Maryland power plants are capped, it is anticipated that the volume of electricity imported into the region will increase.

States Have Established Renewable Portfolio Standards

States in the region have adopted renewable energy portfolio standards (RPS), which establish a minimum percentage of electricity supply that must be derived from zero-emission renewable energy sources. Examples of renewable energy sources include solar energy, wind, biomass, methane, geothermal, ocean, fuel cells, hydroelectric power other than pumped storage generation, and waste-to-energy. This program displaces power generation from coal, oil, and/or gas-fired sources. The District of Columbia Renewable Energy Portfolio Standard Act of 2004 was adopted to “ensure that the benefits of electricity from renewable energy sources, including long-term reduced emissions ... accrue to the public at large.”

The increased supply of renewable energy will displace fossil fuel generated power in the PJM Interconnection area¹⁵, thus reducing greenhouse gas emissions as well as other air pollutants such as nitrogen oxide and sulfur dioxide. The total annual consumption of electricity in the region is approximately 57 million megawatt-hours (MWh). A 10 percent renewable requirement will reduce greenhouse gas emissions by approximately 3.5 MMtCO₂ annually. States in the region are adopting more aggressive RPS requirements, such as a 20 percent RPS requirement for 2022 in Maryland.

Table 5: Renewable Portfolio Standards, MD, VA and DC

State	Renewable Portfolio Standard (RPS)
District of Columbia	11% by 2022 (mandatory)
Maryland	20% by 2022 (mandatory)
Virginia	12% by 2022 (voluntary)

¹⁵ PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. Acting neutrally and independently, PJM operates the world’s largest competitive wholesale electricity market and ensures the reliability of the largest centrally dispatched grid in the world.

States Have Established Energy Efficiency Goals

States in the region are improving their energy efficiency. EmPOWER Maryland was adopted to reduce state government energy consumption by 15 percent by 2015. The initiative is composed of seven steps: improve building operations, expand use of energy service performance contracting, increase the state agency loan program, require energy-efficient buildings, purchase ENERGY STAR® products, and expand the community energy loan program. The Virginia Energy Plan (2007) includes goals to reduce the rate of growth of energy use by 40 percent by 2017, and to reduce greenhouse gas emissions from energy use by 30 percent by 2025. The District is evaluating the creation of a Sustainable Energy Utility, which will fund additional energy efficiency programs into the future.

Local Governments Are Adopting Energy-Efficient Green Buildings Policies

COG's Intergovernmental Green Building Group supports COG's vision of making the region a national leader in green building, with local governments leading in innovation and stewardship. In December 2007, COG adopted a regional green building policy. A key component of the policy identifies the Leadership in Energy and Environmental Design Green Building Rating System™ (LEED) as the region's preferred green building system for rating commercial construction and high-rise residential projects. In addition, local governments are embracing LEED standards in municipal buildings and other public buildings. Depending on the energy efficiency and renewable energy components of these programs, green buildings will decrease demand for electricity; displace power generation from coal, oil, and gas-fired sources; and reduce greenhouse gases and other air pollutants.¹⁶

Localities Are Expanding Their Purchase of Green Power

One of the recommendations of COG's Strategic Energy Plan is to increase the share of regional energy provided by alternative and renewable sources. Since 2004, local governments in the region have been expanding their purchase of wind power to satisfy a portion of their electricity demand and to help improve air quality in the region. The government agencies purchase wind energy directly from an electricity supplier or purchase renewable energy certificates (RECs) that ensure that such wind energy is placed on the electric grid. Many companies and individuals have also opted to purchase green power to satisfy their energy demands. The current renewable energy purchase program is expected to involve purchase of 104,000 MWh of power or wind energy RECs annually, reducing greenhouse gas emissions by approximately 65,000 metric tons of CO₂ annually.

Governments and Businesses Are Benefiting From Energy Performance Contracting

Governments and businesses in the region conduct energy audits of buildings and operations (including fleets) to establish a performance baseline from which to measure future benefits from the energy efficiency measures they implement. Local governments are managing and analyzing data from utility bills to establish a baseline assessment of energy use. Energy managers use a variety of software tools to set up databases on energy consumption for municipal facilities.

¹⁶ Green Building Report link - http://www.mwccog.org/store/item.asp?PUBLICATION_ID=304).

Beyond simply identifying the sources of energy use, an energy audit seeks to prioritize the energy uses according to the most and the least cost-effective opportunities for energy savings by reducing waste and improving energy efficiency. The Energy Efficiency Partnership for Greater Washington is an example of businesses using savings from energy efficiency improvements to pay for the building retrofits. The Partnership goal is to reduce greenhouse gas emissions and energy consumption in targeted buildings by 20-50 percent.¹⁷

Local Jurisdictions Are Implementing Incentives to Promote Green Energy and Conservation

The Montgomery County Clean Energy Rewards Program provides incentives to residents, small businesses, and community organizations purchasing clean energy products certified by the county's Department of Environmental Protection. The county estimates the program will provide incentives for 31,900 MWh of clean energy, reducing consumption of electric power and production of nitrogen oxide emissions from coal, oil, and/or natural gas-fired generation. At current funding levels, this program could reduce greenhouse gas emissions by approximately 20,000 metric tons of CO₂ annually. Montgomery County is also considering legislation that will establish a differential energy tax that will reflect the global warming potential of different fuels.

Further information on local jurisdiction initiatives and best practices in the Washington region are presented in the Climate Change Steering Committee's report in February, 2008: *National Capital Region: Best Practices and Policies to Reduce Greenhouse Gases* which is available online at <http://www.mwcog.org/uploads/pub-documents/8ldcXQ20080328151326.pdf>

¹⁷ Presentation by Patrick Sweeney, Pepco Energy Services, to COG Climate Change Steering Committee, "Energy Efficiency Partnership for Greater Washington," October 27, 2007.

Recommendations for Mitigating Greenhouse Gas Emissions from Energy Consumption

The Climate Change Steering Committee reviewed policies and initiatives in other states and regions of the U.S. and identified initiatives that would help reduce greenhouse gas emissions from energy consumption in the region. The Committee's review yielded a number of recommendations that are within control of COG member governments or could be accomplished through individual actions. There are many other steps that require federal or state action, or action by businesses or individuals for the region to achieve its greenhouse gas reduction goals. In addition to the following recommendations for local action, the Committee recommends advocacy positions for state and federal action. to achieve maximum regional greenhouse gas reductions from improved energy efficiency, reduced energy consumption and use of low-carbon fuels. The Committee makes the following recommendations:

Energy Efficiency Measures

Regional Green Building Policy

- Implement a 2007 COG regional green building policy requiring all new private-sector commercial buildings to meet a regional LEED-certified standard or equivalent.
- Set energy performance goals for public buildings.
 - Benchmark energy performance in all buildings using common metrics (such as kWh/sf or BTU/sf) and readily-available tools such as Energy Star's Portfolio Manager.
 - Set a goal for improving the energy performance of existing public sector buildings, to be achieved through retrofits for greater energy efficiency.
 - Develop educational campaigns for public sector employees to encourage energy conservation as a smart business practice.
- Develop incentives and educational outreach to improve the energy efficiency of existing private commercial and residential buildings.
- Identify best practices for improving energy utilization in existing buildings including energy performance contracting
- Develop policies and programs that promote implementation of green affordable housing.

Energy Conservation and Efficiency

In collaboration with energy utilities and other stakeholders:

- Develop regional energy conservation goals and timetables.
- Develop a regional energy conservation and efficiency plan that supports meeting regional greenhouse gas emission reduction goals.

Local Governments Leading by Example: Energy Use

- Identify best practices to support reducing overall local government energy use by 15% by 2012.
- Examine the feasibility of setting a regional percentage goal for incorporating ENERGY STAR[®] standards in new buildings.

- Evaluate feasibility and cost of setting regional green power utilization goals for local governments. Evaluate regional cooperative purchase and/or reverse auctions to facilitate green power implementation among COG members.
- Examine options for an LED (light-emitting diode) or other energy efficient street lighting standard across the region.
- Promote regional energy performance contracting to reduce energy use in public buildings.
- Consider a regional cooperative purchasing approach to facilitate cost-effective implementation.
- Develop a long-term goal for carbon neutrality for all government buildings.

Outreach and Education.

- Implement a regional public education campaign.
 - Encourage participation in Cool Capital Challenge
 - Develop a “Top 10 Things You Can Do” list that encourages individual energy efficiency activities (e.g., Table 4).
 - Partner with Clean Air Partners greenhouse gas emission reduction campaign and other existing regional campaigns.
 - Educate governments and businesses about the benefits of conducting energy audits of buildings and operations.

Reduce Energy Consumption/Demand Management

- Develop partnerships with the private sector and other organizations.
 - Partner with the Greater Washington Board of Trade Green Committee and Potomac Conference to assist businesses with taking action to reduce greenhouse gas emissions and implement best practices.
 - Identify regional environmental and community group partners.
 - Partner with electric, gas, and water utilities on regional energy conservation and energy efficiency program outreach.
 - Partner with schools, universities, and local governments to establish the region as a leader in green teaching.

Clean Energy Sources

Renewable Energy

- Establish the region as a leader in the production and use of renewable energy.
- Promote adoption of a 20% RPS (Regional Portfolio Standard)

Regional Greenhouse Gas Reduction Initiative

- Examine the feasibility of expanding RGGI to the District of Columbia and Virginia.
- Collaborate with RGGI to support implementation of energy conservation and renewable energy projects in the Washington region.

Potential Advocacy Positions

Local Energy and Climate Policy:

- Revise local building codes and ordinances to promote energy efficiency.
- Examine potential options for removing barriers that may prevent implementation of solar panel or other small-scale renewable energy installation.

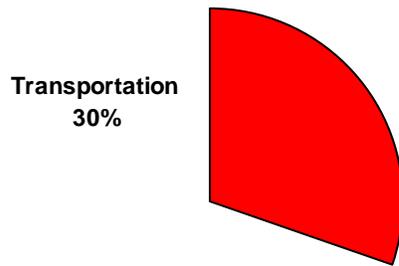
State Climate Policy:

- Advocate for the establishment of a 20% RPS in the District of Columbia and Virginia by 2020.
- Advocate for the creation of state financial incentives for implementation of renewable energy and energy efficiency.
- Encourage state governments to meet the same energy conservation and green power goals as local governments in the Washington region.

Federal Climate Policy

- Encourage the federal government to meet the same energy conservation and green power goals as local governments in the Washington region.
- Advocate for national financial incentives to promote the use of renewable energy implementation.
- Organize a consortia of local governments to apply for Energy Efficiency Block Grant funds.
- Support federal climate change legislation, including cap-and-trade mechanisms, to limit greenhouse gas emissions consistent with scientific recommendations to achieve climate stabilization

Taking Action: Mitigating Emissions From Transportation and Land Use



Emissions from transportation are approximately 30 percent of the overall regional CO₂ emission inventory, thus the ability of the transportation sector to reduce emissions will have a large bearing on the region's ability to meet its greenhouse gas emission reduction goals. The region is growing by many measures. Between 2002 and 2008, population, households, and employment have each grown by approximately 11 percent, increasing the number of vehicle trips from 20 to 22 million and total vehicle miles traveled (VMT) from 146 to 160 million miles per day. The fastest rate of growth in the region is occurring in the outer suburbs, leading to significant increases in VMT and congestion in these areas (Figure 9).

There are three ways to reduce transportation emissions: reduce VMT, increase vehicle fuel efficiency, and reduce the carbon content of fuel (e.g., use alternative fuels). Each of these strategies will play a role in helping the region reduce greenhouse gas emissions from the transportation sector, and most also offer co-benefits, including improved air quality, increased opportunity for walking, and reduced traffic congestion. This section briefly explores projected trends in transportation and land use in the region, discusses current initiatives for reducing VMT and greenhouse gas emissions, and offers recommendations for adopting new transportation and land-use guidelines that will help reduce greenhouse gases and the risk of climate change.

Projected Transportation and Land Use Trends in the Metropolitan Washington Region

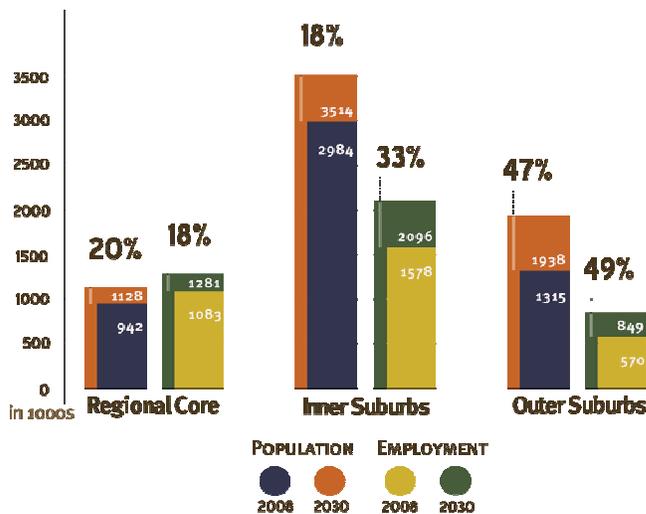
Population and Employment Will Increase Significantly

Between 2005 and 2030, regional economic growth will generate nearly 39 percent additional jobs, attracting approximately 64,000 new residents a year and fueling increased demand for transportation options. Most of the population growth will be in Fairfax, Loudoun, Montgomery, and Prince William counties. Population in the outer suburbs will experience the fastest growth—a 47 percent increase by 2030, compared to 18–20 percent in the regional core and inner suburbs.¹⁸

The region is anticipating a population/employment imbalance by 2030, which is expected to increase traffic congestion and VMT. Between 2005 and 2030, the regional shares of population and household growth for the outer suburbs are 46 and 40 percent, respectively. However, local planners do not anticipate sufficient job growth within the outer jurisdictions to provide employment for all of the new residents located there. The regional share of employment growth in the outer suburbs during this time is only 28 percent. This imbalance is expected to cause more commute trips from the outer jurisdictions to jobs located outside of the region’s activity centers, including trips to the regional core and inner suburbs. This problem is likely to be exacerbated by the lack of adequate transit facilities servicing the outer suburbs.

Figure 14: Projected Changes in Population and Employment by Location

Change in Population and Employment Forecast, 2008-2030



Source: TPB, “Long-Range Transportation Plan, 2007 Update.”

¹⁸ MWCOG, “Growth Trends to 2030: Cooperative Forecasting in the Washington Region,” 2007.

Regional VMT, Transit and Highway Congestion, and Greenhouse Gas Emissions Will Rise

VMT is a function of several different factors, including land-use patterns, access to and availability of alternative transportation choices, fuel prices, other fees and taxes that affect the cost of driving, congestion, and individual lifestyles and behavior.

Only 30 percent of the region’s employment growth and 20 percent of its household growth is expected to occur near Metrorail and commuter rail stations.¹⁹ As the outer suburbs rapidly grow, traffic and transit congestion, vehicle trips, VMT, congested lane miles, and greenhouse gas emissions all will continue to rise.

Between 2008 and 2030, the projected regional growth in population and jobs, coupled with the imbalance of the location of these jobs in relation to housing, will lead to additional vehicles, trips, and congestion in the region’s transportation system. Transit work trips are forecast to increase by 31 percent, as a rising number of people commute to work, exacerbating current crowding problems on the Metrorail system.

Fuel Efficiency and New Federal Standards

The Washington metropolitan region ranks high in the purchase of hybrid vehicles, but has a fairly low average fleet fuel economy (approximately 17-20 miles per gallon [mpg]). TPB analyzed the 2007 federal CAFÉ standards contained in the federal energy bill to assess the impact on the region’s efforts to achieve greenhouse gas reduction targets. The 2007 federal energy bill will improve overall fleet fuel economy through 2020 to 35 mpg for cars and light trucks. TPB’s analysis (Table 6) indicates that the 2007 CAFE standard by itself will not achieve the necessary reduction but it’s a step in the right direction. Mobile-source CO₂ emissions will still exceed 2005 levels by 7.8 percent in 2020 and 8.1 percent in 2030. This represents a large improvement over the baseline, but falls far short of the 20 percent decrease by 2020 and the 44 percent decrease by 2030 that would be consistent with the proposed regional goal.

Table 6: CO₂ Emissions from Cars, Trucks, and Buses (in Millions)

Scenarios	2005	2020	2030
Baseline Emissions	24.89	31.02	34.45
% Change from 2005 levels	—	24.6%	38.4%
Emissions With CAFE Reductions	24.89	26.83	26.91
% Change from 2005 levels	—	7.8%	8.1%
COG CCSC Proposed Regional Goal	24.89	19.91	*16.43
% Change from 2005 levels	—	-20%	*-44%

*Interpolated from the 2050 goal of -80%.

Note: All figures are annual tons of CO₂ emissions in the 8-hour ozone nonattainment area.

COG = Washington Council of Governments; CCSC = Climate Change Steering Committee

¹⁹ The Regional Mobility and Accessibility Scenario Study: What if the Region Grew Differently? National Capital Region Transportation Planning Board, Metropolitan Washington Council of Governments. October 2006.

The analysis of CAFE shows it provides significant reductions but further improvements will be needed to meet regional reduction targets. The gradual increase in the mpg standard under CAFE ends in 2020, so the beneficial effects between 2020 and 2030 are due only to continuing turnover of the vehicle fleet. Further, the CAFE standard applies only to light-duty vehicles, which account for about 80 percent of regional CO₂ emissions; heavy duty vehicles, which contribute the remaining 20 percent, are unaffected. Clearly, it will take some combination of further increases in fuel economy, shifts to alternative fuels that generate less life-cycle CO₂ emissions, and reductions in VMT to reach the CO₂ goals currently under discussion. If approved, the California Low Emission Vehicle Phase 2 (CAL LEV II) program could provide further improvements in fleet fuel efficiency.

Current Metropolitan Regional Initiatives for Reducing Transportation Emissions

The Metropolitan Washington region has been working to reduce vehicle miles traveled since the early seventies when the Commuter Club was formed. In 1996 the program became known as Commuter Connections. Commuter Connections promotes a variety of programs to reduce single vehicle occupancy and to promote mass transit.

Public Transit Ridership Is Increasing

The Washington metropolitan region has a vast network of transit options, including Metrorail and Metrobus, local bus transit, commuter rail (VRE and MARC), and commuter bus. The recent hike in gasoline prices, coupled with improved transit access (including an increase in mixed-use and walkable community projects), have resulted in increased transit ridership. Also, employers are encouraging public transit by identifying employees' home locations served by public transit; keeping current transit schedules on hand and posted; arranging meetings with public transit operators and assist in developing transit support programs (Guaranteed Ride Home, SmartBenefits, etc.) and transit use monitoring programs; and arranging for the implementation of SmartBenefits for employees.

Bicycle/Pedestrian Initiatives Are Growing

The bicycle/pedestrian plan adopted in 2006 contains a list of projects designed to improve bicycle and pedestrian capacity throughout the region. Some large transportation projects, such as the Woodrow Wilson Bridge, include bicycle and pedestrian paths in their plans. In addition, higher priority is being placed on pedestrian safety and access. The District of Columbia and Arlington County have recently launched a bike-sharing program, and bike racks and lockers are now common features on mass transit.

Teleworking Is on the Rise

Employers are also allowing their employees to occasionally work at home, at a telework center, or an employer's satellite office during an entire work day instead of traveling to their regular work place. Regionally, more than 450,000 workers are teleworking, reducing traffic congestion and air pollution, increasing the area's economic vitality, and bolstering overall quality of life. The region's VMT declined by 50 percent between 2004 and 2007 because of teleworking. For

every 10% of employees who telework an average of 1.5 days per week, trips will be reduced by about 2–3%.

Ridesharing Services Are Growing in Popularity

Ridesharing services enable commuters to find other individuals who share similar commute routes and work hours. A free list of all alternative commuter options is available in the region through Commuter Connections at <http://www.commuterconnections.org> or by calling 800-745-RIDE. Also, upon request, Commuter Connections can provide data to identify potential carpool and vanpool partners. Ridesharing benefits include savings in fuel cost and overall expenses, reduced traffic congestion and wear and tear on roads, access to high-occupancy vehicle lanes, and reduced pollution and greenhouse gas emissions. Ridesharing with a guaranteed ride home component will reduce commuter trips by 0.5–3 percent.

Transit-Oriented Development

State and local governments in the Washington Region promote transit-oriented development (TOD) in several ways. State governments encourage TOD by investing state funds in transit station area planning initiatives and assisting with infrastructure improvements that facilitate transit access. Local governments also promote TOD through targeted infrastructure improvements, as well as developer incentives in local zoning and permitting processes. These can include density credits, reduced parking requirements, and even financing collaboration. Such efforts encourage efficient use of land around transit stations and stops, where residents and workers can access their homes and jobs without the use of a car.

Concentrated Mixed-Use Development

Localities in the Washington Region facilitate concentrated, mixed-use development through comprehensive planning of activity centers and use of various tools and regulatory authority to steer growth to preferred locations. Pursuit of a strategy of concentrated, mixed-use development around the region significantly reduces the region's development footprint, mitigating the environmental impacts of growth and decreasing reliance on automobile travel.

Recommendations for Reducing Greenhouse Gas Emissions From Transportation

Reducing greenhouse gas emissions from transportation and land use is a significant challenge in the face of anticipated growth in the region. The main strategies being considered are increasing fuel efficiency, lowering the carbon intensity of fuels/vehicles, and reducing vehicle miles traveled (VMT) through a number of strategies including smart growth planning, shifting transportation modes for existing trips, and reducing the number or length of trips.

Transportation Planning Options for Meeting Regional Greenhouse Gas Emission Reduction Goals

- Develop a “What would it take?” analysis, to assess what combinations of interventions would achieve the greenhouse gas reduction goals.

- Embark on expanded growth scenarios and planning, assuming more infill and mixed-use development and greater growth near transit stations, which could be accomplished through changes in zoning plans, overlays, and comprehensive plan rewrites.
- Encourage localities to revisit current land-use plans, in light of current shifts in the real estate market, coupled with high energy costs,
- Based on the “What would it take?” analysis, develop regional policies and plans to meet regional greenhouse gas emission reduction goals for the transportation sector.

Increase Fuel Efficiency

Traffic Engineering Improvements and Roadway Management

- Identify and promote best practices for traffic engineering improvements and roadway management to reduce VMT, congestion, and emissions of greenhouse gases.
- Identify locations of significant recurrent congestion, and prioritize investments to reduce congestion.
- Implement the Metropolitan Area Transportation Operations Coordination Program (improve coordination among transportation agencies for data sharing, incident mgt)
- Promote transit-supportive street designs.

Idling

- Increase enforcement of existing idling regulations to prevent extended vehicle idling.

Low Carbon (“Clean”) Fuels

Promote Clean Vehicles and Fuels

- Promote adoption of CALEV2 standards for all jurisdictions in the region.
- Promote/accelerate adoption of efficient clean fuel vehicles, including hybrids (cars, trucks, and buses).
- Assess the benefits from a “Cash-for-Clunkers” program and rebates or tax incentives for purchase of hybrid vehicles.
- Further explore alternative-fuel vehicles, such as biofuel-, electric-, or hydrogen-powered vehicles.

Regional Green Fleet Policy

- Establish a regional green fleet policy with measurable goals and timetables.
 - Target public and private fleets, transit, taxicabs, rental cars, and refuse haulers. Evaluate the benefits of specific “green fleet” conversion percentages.

Reduce VMT

VMT Reduction

- Collaborate with the Transportation Planning Board (TPB) to develop regional goals to reduce VMT by 2012 and 2020.
- Identify the percentage of auto trips under 3, 2, 1, and ½ miles, and develop a strategy to shift half of these trips to bike or pedestrian modes and evaluate the benefit.
- Evaluate the potential greenhouse gas emission reduction benefits and costs of using financial incentives (e.g., pay as you travel insurance or congestion pricing) to reduce VMT.
- Promote car sharing.
- Examine parking policies and their relation to VMT, and implement new parking policies to reduce VMT.
- Strengthen financial and other incentives (e.g., tax rebates, higher parking costs, and transit benefits) to encourage residents to drive less and purchase cleaner more, efficient vehicles and/or cleaner fuels.

“Conformity” Process for Greenhouse Gas Emissions

- Collaborate with TPB to develop a process similar to the one currently used to demonstrate conformity for ozone and particulate matter for greenhouse gas emissions.
- Make greenhouse gas reduction a stated goal of regional transportation planning activities, including the newly launched multi-stakeholder *Greater Washington 2050 Initiative*,²⁰ poised to generate additional growth scenarios, a growth compact, and quality growth strategies.

Smart Growth/Transit-Oriented Development

Many studies inside and outside of this region have demonstrated the VMT and greenhouse gas reduction benefits of compact community development that incorporates mixed use, transit accessibility and availability, infill development, higher densities, pedestrian infrastructure, and connected streets.

- Evaluate the benefits from achieving a range of possible goals (up to 95%) for directing new residential and commercial growth to designated regional activity centers, including growth around transit as well mixed-use higher-density development.
- Encourage local governments to evaluate opportunities to provide incentives (including zoning changes) to encourage mixed-use development, including workforce housing at transit stations and hubs to reduce sprawl and VMT.
- Consider establishing transit-oriented development as the region’s preferred growth strategy.

²⁰ <http://www.greaterwashington2050.org/>

Alternative Modes of Transportation

- Support expanded transit infrastructure and use.
 - With WMATA evaluate the greenhouse gas reduction benefits of specific incremental expansion of regional transit capacity and peak commuter rail service.
 - Evaluate the greenhouse gas reduction benefits of expanding existing and establishing new exclusive transit routes, lanes, on-ramps, corridors, and intercity high-speed rail.
 - Examine options to promote the increased use of existing transit capacity.
 - Evaluate funding requirements for transit incentives and an expanded metrocheck program.
- Consider developing specific targets for shifting modes from single-occupancy vehicles to transit, walking, and bicycling for commuting and noncommuting trips.
- Expand existing and fund new programs to enhance access to transit and alternative modes, commuter connections, guaranteed ride home, telework programs, bike/pedestrian access, and park/ride lots.
- Encourage new commercial construction to include a “travel management plan.”
- Promote the equalization of transit and parking benefits.

Bicycle/Pedestrian

- Fully fund the construction of bicycle/pedestrian paths in the region, as outlined in the regional bicycle/pedestrian plan.
- Provide incentives to developments that speed improvements in bicycle/pedestrian access, including improvements in sidewalks, curb ramps, crosswalks, and lighting.

Land Use Planning

- Preserve the region’s tree canopy.
 - Establish a goal and develop a program and plan to achieve “no net loss” in the region’s tree canopy.
 - Consider associated issues related to density and height requirements for buildings.
- Carefully plan the location and design of new development.
 - Promote regional policies that support walkable communities and affordable housing near transit, and that protect green infrastructure

- *[Integrate greenhouse gas emissions analyses and climate change considerations into local government comprehensive planning practices and policies.
 - Identify best practices enabling local governments to include greenhouse gas reduction and energy efficiency/conservation as elements in their local comprehensive planning.
 - Include practices that address climate change risk reduction and guide local zoning, building codes, site planning, and review.
 - In cooperation with COG’s Planning Directors Committee and local government environmental and energy planners, convene a working group to devise a consistent, standardized methodology for evaluating the greenhouse gas emissions from proposed individual development projects.]*

- Use comprehensive planning as a guide to land use.
 - Identify best practices for local governments to include greenhouse gas reduction and energy as an element in their local comprehensive planning.
 - Include practices that address climate change risk reduction and guide local zoning, building codes, site planning, and review.

Outreach and Education.

- Implement a regional public education campaign.
 - Develop a “Top 10 Things You Can Do” list that encourages individual energy efficiency activities
 - Partner with Clean Air Partners to promote “Top 10 Things You Can Do” list
 - Partner with Commuter Connections on promotion of alternative commuting options.
 - Establish a regional “Climate Action Week” to coincide with September “Car Free” activities or other appropriate events.

Taking Action: Regional Economic Development

Green Jobs/Green Economic Development

In the Washington region employment is projected to grow 39% by 2030. What types of jobs will be created in the next 20-25 years? Are we adequately training our workforce to assume these positions? What is the potential for environmental protection, greenhouse gas reduction, and green energy development to become a major economic driver and job creator in the Washington region?

What Type of Green Business and Jobs Will Be Created?

Currently the Washington region has the largest environmental services employment pool in the country, with nearly 14,000 environmental workers, according to Greater Washington Board of Trade. As headquarters of the U.S. Environmental Protection Agency and hundreds of environmental consulting firms and organizations, the region has a plethora of environmental scientists, biologists, lawyers, lobbyists, and other professional staff. Increasingly, however, policymakers see the opportunity to create “green collar” jobs at all skill levels. The Center for American Progress, for instance, views green job creation as an opportunity to create middle-skill jobs that serve as entry level or transitional jobs for urban residents. This may include jobs in manufacturing, construction, operations and maintenance (e.g. wind turbine manufacturing, solar panel installation, energy efficiency retrofits and green building construction.) In 2007, for example, 6,000 new jobs were created nationally in the field of solar energy, with many in construction and manufacturing. The American Wind Energy Association estimates that 500,000 new jobs (both direct and induced) were created in wind power. According to industry estimates, in 2006, there were 8.5 million jobs nationwide in renewable energy and energy efficiency.

Public policy plays an important role in stimulating the green economy and in creating new green jobs. The passage and expansion of renewable portfolio standards and increased purchases of renewable energy, for instance, have been important drivers for new investments in renewable energy, drawing major companies to the industry – including British Petroleum, General Electric, Sharp and Shell. Europe has experienced tremendous growth in green jobs as a result of accelerated investments in renewable energy. The looming threat of peak oil, coupled with potential federal and state climate change legislation, is shifting the economics of the green sector and it appears we are on the brink of a major green economic explosion, both nationally and regionally.

How Can the Washington Region Take Advantage of this Opportunity?

To ascertain the potential of green economic development/green collar job opportunities in the area, Washington DC has a project underway to evaluate the job demand of emerging and existing environmental industries and determine how they can use green policies as drivers to fill skill and employment deficits for Washington residents. Their hope is to create career ladders for people who are unemployed or under employed. Results of their research will be available in the summer 2008, and there may be opportunities to piggyback a regional analysis on this study.

The Delaware Valley Regional Planning Commission (Philadelphia region), for example, conducted an economic analysis in 2006 of new economic development opportunities, concluding

it needed to develop “Eco-Industry Clusters,” promote location efficiency and smart growth, and “Eco-brand” the Delaware Valley. They are currently working on a green jobs inventory, to evaluate the different categories and classes of potential jobs. An economic analysis of this type would be well-advised in the Washington region.

Financing Mechanisms

A regional climate change program will require funding for many regional efforts recommended by the Climate Change Steering Committee. Some potential financing mechanisms are currently under development, such as performance contracting as a mechanism to fund building retrofits and creation of a Sustainable Energy Utility, under consideration by the District of Columbia. The Climate Change Steering Committee discussed these and other options for financing energy efficiency initiatives and developed the following recommendations:

Recommendations

Green Jobs/Green Economic Development

- In collaboration with the business community, support and identify programs to promote green businesses and green collar job development in the region.
- Examine incentives for promotion of green businesses and develop an information database.
- Develop best practices or model regional policies to promote local government implementation of eco-business or green business zones.
- Examine options to promote cooperative green purchasing.
- Promote local food production options to reduce emissions. Coordinate with the Statewide Farm Program.
- Promote local vendors and suppliers to reduce transportation-related emissions associated with imports of goods and services.

Financing Mechanisms

- Evaluate the following financing mechanisms:
 - Redirect savings from energy efficiency.
 - Establish an energy fee/carbon tax.
 - Use performance contracting.
 - Establish a clean energy fund or sustainable energy utility.
 - Participate in cap-and-trade program revenues.
 - Develop a regional carbon offset fund that finances tree planting and canopy enhancements in the region.
 - Identify and secure additional financing for transit.
 - Identify and secure additional financing for building retrofits.

Taking Action: Preparing for the Impacts of Climate Change

The full scope of the impacts of climate change on the Washington region is yet to be analyzed. Risks and costs are critical to any set of decisions that will require an investment of substantial resources. That said, it's not too early for the region to begin a systematic investigation of high-priority program areas and initiate early planning. The state of Maryland has been actively addressing adaptation priorities and opportunities, but so far has focused mainly on coastal areas, which are particularly vulnerable.

Jurisdictions across the nation are undertaking a variety of actions to adapt to the impacts of climate change (Box 1). In the Washington metropolitan region, local governments and water and wastewater utilities are taking steps to reduce their "carbon footprint," and are beginning to face choices to directly address the current and potential impacts of climate change. Following are some potential actions for adapting to the risks of climate change.

Adaptation Planning Across the Nation

A substantial amount of adaptation planning is already underway elsewhere in the nation. The following examples from a recent survey of such work provide a flavor of the types of impacts and areas of adaptation being addressed (Heinz 2007).

- Boston is examining bridge scour, energy use, public health, flooding, sea level rise, wind damage to buildings, transportation, and water quality and supply.
- Chicago is looking at climate change impacts on aviation, buildings, energy demand, lake level increase, public health, transportation, and water supply.
- Fort Collins, Colorado, is planning to address flooding and water supply.
- King County, Washington, is focusing on biodiversity and ecosystems, climate science, economic impacts, land use, buildings and transportation, public health, safety, and emergency preparedness.
- A Los Angeles climate change action plan emphasizes massive tree planting to counteract heat-island effects and acknowledges the need to address drought, wildfires, sea level rise, and public health.
- New York is addressing air quality, flooding, heat waves, sea level rise, and heat islands.

Recommendations for Adapting to Climate Change in the Region

Adaptation Research

- Increase research efforts regarding how to best prepare for the effects of a warming regional environment.
- Analyze changes and risks to the Metropolitan Washington region, its transportation infrastructure, buildings, and population living in low-lying areas.
- The CCSC also recommends that COG develop regional adaptation policies based on the results of the study for infrastructure, land-use and emergency response planning.

- Partner with a major university to prepare a report on the expected changes to the region by 2050 as a result of climate change and possible adaptation strategies.

Regional Adaptation Workshops

- Conduct the following workshops to provide elected officials, program staff, and other stakeholders an opportunity to focus on risk assessment and potential adaptation strategies:
 - *Workshop 1: Capacity of the Regional Water Supply to Withstand a Prolonged Drought*—Explore the long-term (2030 and beyond) prospects for sufficient water supply in the event of an unprecedented drought coupled with the anticipated regional population growth-related rise in demand.
 - *Workshop 2: Vulnerability of Infrastructure, Residences, and Other Buildings to Increased Wind and Flood Risks*—Assess the risk that current building codes may be inadequate for future conditions. (Site-planning regulations generally prohibit development in flood-prone areas, as delineated by Federal Emergency Management Agency floodplain maps.)
 - *Workshop 3: Vulnerability to Spikes in Heat and Air Pollution*—Assess the capacity of the region’s emergency response and health care systems to respond to acute increases in heat and air pollution.
 - *Workshop 4: Opportunities for “No Regret” Actions²¹ That Provide Benefits Beyond Climate Change*—Drawing on the experience of other locales, explore opportunities to take actions (such as reducing demand for energy and water and expanding tree cover) that generally align with other program priorities, and also provide mitigation and/or adaptation benefits.

²¹ This term was coined by Dr. Robert Wilkinson, University of California–Santa Barbara. It is descriptive of such initiatives as Los Angeles’s massive tree-planting campaign.

Recommendation on Organizational Structure for COG's Climate Change Initiative

The Climate Change Committee Has Successfully Responded to its Board Charge

Part of the COG Board Resolution R31-07 (see Appendix C) included a charge to the Climate Change Steering Committee to provide a recommendation on “any need for a long term organizational structure for the regional climate change initiative.”

The Committee has been meeting on a regular basis since May, 2007. As provided in this report, the Committee has completed the following major tasks assigned to it by the Board:

- Prepared a report cataloging best practices and greenhouse gas reduction activities already underway in the region.
- Prepared an inventory of greenhouse gas emissions in the region for 2005 through 2050
- Recommended greenhouse gas emission reduction goals for 2012, 2020, and 2050.
- Examined local impacts of climate change on the region and conducted an initial review of adaptation strategies.
- Prepared regular advocacy recommendations for consideration by the Board including recommendations on federal energy and climate change legislation, Maryland and Virginia energy legislation, endorsement of grassroots greenhouse gas reduction campaign “Cool Capital Challenge”, and sent letter of concern regarding a proposed coal-fired power plant in Wise, Virginia.
- Tracked the work of the Maryland and Virginia Climate Commissions.

COG's Regional Climate Change Initiative Should Continue

This report contains a series of recommendations which may be classified as policy principles, policy positions, specific or quantitative action proposals, and proposals requiring further analysis or research that could lead to specified action in the future.

The committee believes that while it has satisfied the essential elements of its assignments under Resolution R31-07, a regional climate change initiative at COG should continue on an indefinite basis. Reasons for continuing the climate change initiative include:

- The region's climate is already changing, and even with aggressive action in the United States and globally, significant change is likely to occur at least through the middle of this century. There is a clear need for a regional program to be in place as the climate evolves, to help shape policy, to address impacts, to formulate adaptation strategies, and to analyze options for mitigating climate change.
- Climate change remains a very high profile issue for COG's members, the District of Columbia, the state of Maryland and Commonwealth of Virginia, among the business community, among the majority of the states, before the United States Congress, and internationally. It clearly is very high on the regional agenda and therefore appropriately must remain a high priority for COG.
- Climate Change is a cross-cutting issue that affects all of COG's major program areas: environment, transportation, metropolitan development and regional planning, public

health, public safety, and human services. An ongoing climate change program is and can be an integrative and synergistic force to help achieve COG's overarching goal of supporting initiatives to enhance the region's quality of life.

- The committee is recommending regional greenhouse gas emission reduction goals for 2012, 2020, and 2050. While the committee has identified a number of initiatives that will help meet the recommended goals, preparation of detailed recommendations for achieving these goals, including the associated analysis required for many of the goals, warrants continuation of the regional climate change initiative.
- Tracking of progress and refinement to the regional climate action plan warrant continuation of the regional climate initiative.
- Successful advocacy on behalf of the interests of COG's members necessitates an active climate change program at COG.
- The Greater Washington 2050 Coalition has identified climate change as a central driver that will shape the region and regional policies for years to come. A supporting structure for climate change is essential for assisting the work of the Coalition.

Proposed Governance Structure for Ongoing COG Climate Change Initiative

The committee considered several options for continuing COG's Climate Change initiative.

- Establishment of Regional Climate Action Public-Private Partnership housed at COG.
- Incorporation into the Metropolitan Washington Air Quality Committee.
- Merger with the Greater Washington 2050 Coalition.
- Incorporation into a regional COG Environmental Policy Committee.
- Incorporation into a regional COG Climate and Energy Policy Committee.

The committee concluded that the last option above, **formalizing the creation of a COG Climate and Energy Policy Committee reporting to the COG Board is the preferred option at this time.** Membership on the Climate and Energy Policy Committee should be broader than the current Steering Committee and open to elected and senior policy officials from all COG member governments, state agencies, federal agencies, the business community, environmental and civic community, and other potential stakeholders including liaisons from other COG policy committees. It would be assigned oversight for COG's existing technical committees on energy (the Energy Advisory Committee), green building (the Intergovernmental Green Building Group), and be supported by COG's Alternative Fuels Partnership.

The fundamental roles of the Climate and Energy Policy Committee would be to (1) supervise and facilitate the implementation of the recommendations contained in this report; (2) to direct the design and development of a regional climate change outreach program; (3) to provide ongoing recommendations on advocacy positions on climate and energy policy; (4) to assist other COG policy committees and the Greater Washington Coalition as required.

The committee believes that several of the other recommendations are also potential options for future consideration as regional and national policy evolves.

- A public-private partnership might very well be an outgrowth of this effort and the committee at some point in the future may recommend creation of such an entity, given

the huge role the community and private sector must play to achieve the regional climate change goals recommended in this report.

- If federal law and regulation require preparation of regional greenhouse gas reduction plans analogous to regional air quality implementation plans, then potentially the responsibility would appropriately be assigned to the Metropolitan Washington Air Quality Committee, perhaps with somewhat augmented representation.
- Once the work of the Greater Washington 2050 Coalition is completed, further consideration of the structure would be appropriate.
- While not the recommended approach at this time, the possibility of creating an overarching regional environmental policy committee or other entity that integrates across the various environmental programs should be reconsidered in the future. As of now, the nature of the work programs for COG's water resources, air quality, climate and energy, and airport policy have required dedicated committees to address the significant number of policy and technical issues. However to facilitate effective communication, coordination, and programmatic efficiency, period forums or leadership meetings should be considered as a means of insuring better integration of cross-cutting policy development across the various committees.

Conclusions and Recommendation

The committee concludes that creation of a permanent COG Climate Change initiative is essential given the long-term nature of this challenge. To provide oversight and direction for the initiative, a COG Board Climate and Energy Policy Committee should be established with a broad membership from COG members, state and federal representatives, and broad business and stakeholder representation.

Next Steps for COG's Climate Change Initiative

This report contains a series of analyses and recommendations that provide a framework and structure to guide COG's and the region's climate change program. Three science-based but nevertheless aggressive regional greenhouse gas reduction goals will be established as a major outcome from the work of the committee during the past year. The analytical work, consensus building, and associated plan for achieving these goals and related initiatives will be the central focus for work over the coming months and years ahead. Crafting a regional outreach effort, tracking progress, and continuing to advocate regional positions on national, state and local policies are also integral to the success of the regional climate initiative. In some areas of the work during the past year, such as the examination of likely climate impacts on our region and potential adaptation strategies, the committee only had time for an initial examination. It is essential that such work be carried out as part of the next phase of the effort.

Context for COG's Climate Change Initiative Going Forward

COG's Climate Change initiative is not being conducted in isolation, but rather in a rapidly changing political and technical environment. In January, 2009, there will be a new President, and with all of the current candidates pledging action on climate change, a greatly increased focus is likely. The U.S. Congress will soon be actively considering national climate change "cap-and-trade" legislation that may result in national climate policy guidance and funding authorizations shaping U.S. climate programs for at least several decades. Putting a price on carbon will almost certainly accelerate efforts to reduce greenhouse gas emissions.

Maryland has already taken a number of far-reaching steps toward reducing greenhouse gas emissions and soon will issue the report of its Climate Commission. Virginia's Climate Commission is scheduled to make recommendations in December, 2008. In both states, actions are probable in the next legislative session. The District of Columbia is actively considering creation of a Sustainable Energy Utility and has state of the art green building requirements in place that will dramatically change the landscape for energy efficiency. The District is promoting green jobs, pedestrian and bicycle friendly communities that may become regional and national models. Many of COG's local government members are leading by example by actively pursuing cutting edge policies on energy efficiency and conservation, smart-growth development, building conservation improvements, fleet enhancements, use of green power, and other actions. The National Capital Region Transportation Planning Board is actively assessing a range of policies and measures focused on meeting the regional greenhouse gas reduction goals that could profoundly change transportation planning in the region. High and rising gas prices and more broadly increasing energy prices are factors that seem likely to persist, leading to changes in behavior as well as driving new and much more efficient and environmentally friendly technology.

COG's Greater Washington 2050 initiative is looking broadly at regional growth and development policies, many of which are likely to be driven by climate change considerations. The continued work on the regional climate program will help inform the Greater Washington 2050 Coalition's efforts to craft a new regional compact to guide our region's growth and development in the years ahead.

The Greater Washington Board of Trade's "Green as a Competitive Advantage" conference held in October, 2007, and subsequent creation of a "Green Committee" of 30 leaders from the top companies in the region is now actively organizing and motivating the region's business community to take action to reduce regional greenhouse gas emissions and support environmentally friendly policies. A partnership between government and the private sector is critical to achievement of regional greenhouse gas emission reduction goals.

Creation of green jobs, implementing energy and climate-friendly patterns of growth and development, and major investments in new energy efficient technology, represent exciting business opportunities that are expected to contribute greatly to the continued vitality of the regional economy. In a region with the most educated workforce in the country, the Washington metropolitan area will undoubtedly be in the forefront of addressing the imperatives associated with climate change and helping shape national policy.

Individuals are also taking action. One mechanism endorsed by the committee, the "Cool Capital Challenge," has provided a way for individuals as well as public and private entities to commit to steps to reduce their contribution to greenhouse gas production. People are purchasing energy efficient light bulbs, energy efficient appliances, conserving at home and changing their travel modes and vehicles. That the Washington region is a leader in ownership of hybrid-electric vehicles is but one indicator of individual commitment across the region.

Given that approximately 96% of the greenhouse gas emissions in the region come from the daily activities of individuals and businesses, participation in the regional effort to reduce greenhouse gas emissions is fundamental to its ultimate success. Through a combination of new technology, new patterns of growth, changes in transportation modes, as well as changes in the way we do business as individuals and in our places of work, the region can move forward toward achieving its collective climate change goals.

COG's Climate Change Program Direction in the Coming Year

The recommendations contained in this report fall broadly into several categories. Certain recommendations, such as the regional greenhouse gas emission reduction goals, are quantitative and time-specific. A significant number of the recommendations set the direction for regional policy, but require further analysis to support a definitive and quantifiable proposal, for example, setting a regional green power purchase goal, or a regional vehicle miles of travel (VMT) reduction goal. Other recommendations reflect policy principles to guide the region and COG's members as the climate change program moves forward.

A number of the recommendations can be carried out in the near term while others will take time to reach their conclusions. Most of the recommendations will be best achieved in partnership with regional stakeholders.

The emission reduction benefits and costs also vary greatly, as well as economic co-benefits associated with many of the initiatives. The financial feasibility of many of the recommendations, and establishment of priority rankings still is to be conducted.

To help define the work program in the coming year and beyond, the committee has developed the following matrix (Table 7) that contains, classifies, and analyzes all of the recommendations included in this report. The matrix provides a sense of implementation timing, with many of the initiatives listed as having an immediate time frame. The initiatives identified as immediate necessarily will be the focus in the next year.

Regional Climate Action “Implementation” Plans and Tracking Progress

The establishment of regional greenhouse gas emission reduction goals for 2012, 2020, and 2050 creates an imperative to develop detailed plans for achieving the goals, as well as tracking progress toward the goals.

In the coming year, as the climate initiative proceeds with implementation actions that can or are moving ahead now, coupled with evaluating and quantifying additional emission reduction efforts, a plan, or building blocks of a plan can be developed that demonstrate how the region is moving toward achievement of its goals. Actions by the states as well as by COG’s members will need to be enumerated, in some cases reconciled, and incorporated into a regional progress report and ultimately a regional plan. A system for quantitatively tracking progress, thorough updating the regional greenhouse gas emissions inventory, will need to be devised.

Financing COG’s Climate Change Initiative

There is a need for additional funding support to fully execute the work tasks identified in the recommendations. Significant funding exists in COG’s FY 2009 environmental and transportation planning work programs and budgets to support much of the staff work required to advance the regional climate change initiative and carry out many of the recommendations contained in this report, but more resources are needed. Additional funding will be sought from foundation sources and government agency grants to enable earlier action and more complete implementation of the program covered in this report. A detailed work program and funding plan will be crafted by mid-summer, 2008 to help target potential funding sources to support the initiative. In-kind contributions from partners and stakeholders could help carry out some of the work and these opportunities need to be identified. Consultant support may also be needed to supplement the capacity of the COG staff.

Table 7. Recommendations: Summary and Preliminary Assessment

Recommendations	Emission Impact	Implementation Timing	Cost	Economic Co-Benefits	Potential Partners
I. Regl GHG Reduction Goals					
a. 2012: Reduce 10% by 2012	Medium	Immediate	Low	Medium-High	Fleet, Energy, and Building Managers, General Public, Board of Trade, Procurement Officers
b. 2020: Reduce 20% below 2005	High	Midrange-Long Term	Low-Medium	Medium-High	COG Members, Federal Government, Board of Trade, WMATA, MWAA, Procurement Officers
c. 2050: Reduce 80% below 2005	High	Midrange-Long Term	Medium-High	Medium-High	All
II. Energy					
a. Regional green building policy	High	Immediate-Midrange	Varies	Medium-High	IGBG, Facilities Managers, GSA, USGBC
b. Energy conservation and efficiency goals, plan	Medium-High	Immediate-Midrange	Low-Medium	High	Energy Advisory Committee, State Energy Offices, Utilities, Universities, Businesses, General Public, ACEEE
c. Energy Use: identify best practices	Medium-High	Immediate-Midrange	Low-Medium	High	Energy Advisory Committee, State Energy Offices, Utilities, Universities, Businesses, General Public, ACEEE
d. Energy Use: Energy Star goals for new buildings	Medium-High	Immediate-Midrange	Low-Medium	High	EPA, Energy Advisory Committee, Board of Trade, AIA, Trade Asscns
e. Green Power: utilization goals	Medium-High	Immediate-Midrange	Medium-High	Medium	EPA Green Power Partnership, Energy Managers, Utilities, Procurement Officers
f. Green Power: regional cooperative purchase	Low-Medium	Immediate-Midrange	Medium-High	Medium	Energy Advisory Committee, Energy Managers, Utilities, Procurement Officers
g. Regional street lighting standard	Low-Medium	Immediate-Midrange	Medium-High	Medium	Energy Managers, Utilities, Board of Trade, Private Sector
h. Regional energy performance contracting	Low-Medium	Immediate-Midrange	Medium-High	Medium	Energy Managers, State Energy Offices, Utilities, Private Sector
i. Promote 20% RPS	High	Immediate-Midrange	Medium-High	Medium	Energy Advisory Committee, Energy Managers, Utilities, State Energy Offices
j. RGGI - Expand to DC & VA	Medium-High	Immediate-Midrange	Medium-High	Low-Medium	Maryland, RGGI States, EPA
k. Citizen Outreach Campaign	Medium-High	Immediate-Midrange	Medium-High	Low-Medium	Clean Air Partners, Commuter Connections, Wise Water, Recycling Committee, IGBG
III. Transportation and Land Use					
a. Evaluate "what would it take" scenarios to achieve GHG reduction goals for transportation	Medium-High	Immediate	Low	Low	
b. Develop policies based on results	Medium-High	Midrange-Long Term	Medium-High	Varies	NVTC, WMATA, DOTs
c. Develop conformity process for GHGs	Medium-High	Midrange-Long Term	Medium-High	Low	TPB, DOTs
d. Direct development to activity centers	Low-Medium	Midrange-Long Term	Varies	High	Planning Directors, MDPC, TPB, Board of Trade, DOTs, WMATA
e. Traffic engineering and roadway improvements	Low-Medium	Midrange-Long Term	Varies	High	DOTs, TPB
f. Promote clean vehicles and fuels: CAL LEV	Medium-High	Midrange-Long Term	Low-Medium	Medium	State Air Agencies, State Legislature
g. Promote clean vehicles and fuels: incentives for early retirement	Low-Medium	Immediate-Midrange	Medium-High	Low-Medium	Local and State Govt
h. Alternative Modes: expand transit capacity	Medium-High	Midrange-Long Term	Medium-High	Medium-High	Transit Authorities, TPB, DOT
i. Alternative Modes: promote increase transit use	Low-Medium	Immediate-Midrange	Low-Medium	Medium-High	Commuter Connections, TPB, DOTs, Local Govt, Transit Authorities
j. Alternative Modes: enhance access	Low-Medium	Immediate-Midrange	Medium-High	Medium-High	TPB, DOTs, Local Govt, Transit Authorities
k. Alternative Modes: exclusive transit routes	Low-Medium	Midrange-Long Term	Medium-High	Medium-High	TPB, DOTs, State and Federal Govt, Transit Authorities
l. Equalize transit and parking benefits	Low	Immediate-Midrange	Low	Low	State and Local Govt
m. VMT Reduction: goals	Medium-High	Midrange-Long Term	Medium-High	Low-Medium	TPB, DOTs, Local Govt, Transit Authorities
n. VMT Reduction: shift short trips	Low-Medium	Immediate-Midrange	Low	Medium-High	Local Govt, Transit Authorities, Commuter Connections
o. VMT Reduction: financial incentives	Low-Medium	Immediate-Midrange	Medium-High	Low	State and Local Govt
p. Car Sharing	Low-Medium	Immediate-Midrange	Medium-High	Low-Medium	Local Govt, Zipcar, Flexcar
q. Bicycle/pedestrian programs	Low-Medium	Immediate-Midrange	Medium-High	Medium-High	TPB, DOTs, Local Govt, WMATA
r. Anti-idling initiatives: rules and enforcement	Low-Medium	Immediate	Low-Medium	Low-Medium	Local Govt, Police
s. Land Use Planning: Tree canopy preservation	Low-Medium	Midrange-Long Term	Low-Medium	High	State and Local Forestry Agencies, U.S. Forest Service, Casey Trees, Center for Chesapeake Communities
t. Land Use Planning: Promote location & design of new development around regional activity centers	Medium-High	Immediate-Midrange	Low-Medium	High	Local Planning Agencies, Local Developers, Greater Washington 2050
u. Land Use Planning: Promote walkable communities and affordable housing near transit	Medium-High	Midrange-Long Term	Medium	High	MDPC, Planning Directors, Local Planning Agencies, Local Developers, WMATA
v. Comprehensive Planning: best practices	Low-Medium	Immediate-Midrange	Low-Medium	Medium-High	MDPC, Planning Directors, Local Planning Agencies, Local Developers
w. Comprehensive Planning: environmental review	Low-Medium	Immediate-Midrange	Low-Medium	Low-Medium	MDPC, Planning Directors, Local Planning Agencies, Local Developers

Table 7. Recommendations: Summary and Preliminary Assessment

Recommendations	Emission Impact	Implementation Timing	Cost	Economic Co-Benefits	Potential Partners
IV. Economic Development					
a. Promote green business & green jobs	Low	Immediate-Midrange	Medium-High	Medium-High	Board of Trade, Universities, Sustainable Business Alliance
b. Promote eco-business or green business zones	Low	Immediate-Midrange	Medium-High	Medium-High	Board of Trade, Universities
c. Promote cooperative green purchasing	Low-Medium	Immediate-Midrange	Low-Medium	Medium-High	Procurement Officers, Board of Trade
d. Promote local food production options	Low-Medium	Immediate-Midrange	Low-Medium	Medium-High	State and Local Govt, Farmer's Cooperatives, Regional Agricultural Workgroup, Community Supported Agriculture, Freshfarm Markets
e. Promote local vendors and suppliers	Low-Medium	Immediate-Midrange	Low-Medium	Medium-High	State and Local Govt, Farmer's Cooperatives, Economic Development Authorities
f. Evaluate financing mechanisms or GHG reduction & Energy Eff. Projects	Medium-High	Immediate-Midrange	Low-Medium	High	Chicago Climate Exchange, Others
g. Regional offset fund for tree canopy enhancement	Medium	Immediate-Midrange	Medium	Medium	State and Local Forestry Agencies, U.S. Forest Service, Casey Trees, Center for Chesapeake Communities
h. Identify funding for transit	Medium-High	Immediate-Midrange	High	High	State and Federal Govt, WMATA
i. Identify funding for building retrofits	Medium-High	Immediate-Midrange	High	High	State and Federal Govt, ESCOs
V. Adaptation					
a. Partner w/ university to develop 2050 Impacts Report	Low	Immediate-Midrange	Medium	Medium	University of Maryland, NOAA
b. Develop adaptation policies based on report	Low	Midrange-Long Term	Medium	Medium	
c. Conduct regional adaptation workshops	Low-Medium	Midrange-Long Term	Medium	Medium	University of Maryland, NOAA
VI. COG Climate Change Program					
a. Develop CC Plan for 2012 by 2009	Low	Immediate	Low-Medium	Medium-High	TPB, EAC, IGBG, MWAQC, Board of Trade, Member Jurisdictions, WMATA, State Energy Offices, Utilities, Air Agencies
b. Develop CC Plan for 2020 by 2010	Low	Immediate	Low-Medium	Medium-High	TPB, EAC, IGBG, MWAQC, Board of Trade, Member Jurisdictions, WMATA, State Energy Offices, Utilities, Air Agencies
c. Develop tools to evaluate measures and track progress annually	Low	Immediate	Low-Medium	Low	EPA, States, US DOE, ICLEI, Air Agencies
d. Rec. governance structure for COG CC program	Low	Immediate	Low	Low	
e. Dev. Sustainable funding for COG CC program	Low	Immediate	Low	Low	
f. Advocate for GHG reduction policies at fedl, state, and local levels	Medium-High	Immediate	Low	Medium-High	States, NACAA

Key:

Emission Impact:

- Low - Minimal emission reduction expected.
- Medium - Some emission reduction anticipated.
- High - Significant emission reduction anticipated.

Cost:

- Low - Relatively low cost.
- Medium - Moderate financial costs.
- High - Expensive option to implement.

Economic Co-Benefits:

- Low - Action will have limited impact on other areas of the economy.
- Medium - Some economic synergies are anticipated.
- High - Significant enhancement to the economy or sector are possible.

TERMS AND DEFINITIONS

Adaptation. Actions taken to respond to the effects of climate change. Examples include building sea walls, constructing facilities at higher elevations, and reservoir expansion.

BAU. Business as Usual. Scenario assuming no additional new measures to reduce emissions.

Cool Counties. On July 16, 2007 at the National Association of Counties Annual Conference in Richmond, Virginia, 12 pioneering counties representing 17 million people launched “Cool Counties.” The Cool Counties initiative seeks to marshal the resources of all 3,066 counties across the nation to address the challenges climate change poses to our communities.

Participating counties commit to four smart actions:

- reducing our own contributions to climate change through our internal operations;
- demonstrating regional leadership to achieve climate stabilization and protect our communities;
- helping our community become climate resilient;
- urging the federal government to support our efforts.

CO₂e. Carbon Dioxide Equivalent. Emissions of any greenhouse gas (methane, nitrous oxide, HFCs) can be expressed in terms of its equivalent emissions of CO₂ through adjustments using the respective Global Warming Potential (GWP).

Climate Change. Any long-term significant change in the “average weather” that a given region experiences. Average weather may include average temperature, precipitation and wind patterns. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years. These changes can be caused by dynamic process on Earth, external forces including variations in sunlight intensity, and more recently by human activities. In recent usage, especially in the context of environmental policy, the term "climate change" often refers to changes in modern climate (see global warming). Current studies indicate that radiative forcing by greenhouse gases is the primary cause of global warming. Greenhouse gases are also important in understanding Earth's climate history. According to these studies, the greenhouse effect, which is the warming produced as greenhouse gases trap heat, plays a key role in regulating Earth's temperature. (wikipedia)

GHG. Greenhouse Gas. A gas, such as water vapour, carbon dioxide, methane, and hydrofluorocarbons (HFCs), that absorbs and re-emits infrared radiation, warming the earth's surface and contributing to climate change (UNEP).

GWP. Global Warming Potential. A measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale which compares the gas in question to that of the same mass of carbon dioxide (whose GWP is by definition 1). (wikipedia)

Global Warming. Global warming is the increase in the average temperature of the Earth's near-surface air and oceans since the mid-twentieth century, and its projected continuation. The Intergovernmental Panel on Climate Change (IPCC) concludes "most of the observed increase in globally averaged temperatures since the mid-twentieth century is very likely due to the observed

increase in anthropogenic (man-made) greenhouse gas concentrations" via the greenhouse effect. Natural phenomena such as solar variation combined with volcanoes probably had a small warming effect from pre-industrial times to 1950 and a small cooling effect from 1950 onward. (wikipedia)

IPCC. Intergovernmental Panel of Climate Change. The Intergovernmental Panel on Climate Change (IPCC) is a scientific body tasked to evaluate the risk of climate change caused by human activity. The panel was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), two organizations of the United Nations. (wikipedia)

Kyoto Protocol. The Kyoto Protocol is an international agreement reached in 1997 in Kyoto, Japan to address the problems of climate change. The Kyoto Protocol commits 38 industrialized countries to cut their greenhouse gas emissions. The Kyoto Protocol has a target of reducing greenhouse gas emissions to six percent below 1990 levels by 2012.

Mayor's Agreement. On February 16, 2005 the Kyoto Protocol, the international agreement to address climate disruption, became law for the 141 countries that have ratified it to date. On that day, Seattle Mayor Greg Nickels launched this initiative to advance the goals of the Kyoto Protocol through leadership and action by at least 141 American cities. By the 2005 U.S. Conference of Mayors Annual Meeting in June, 141 mayors had signed the Agreement – the same number of nations that ratified the Kyoto Protocol. In May of 2007, Tulsa Mayor Kathy Taylor became the 500th mayor to sign on. Under the Agreement, participating cities commit to take following three actions:

- Strive to meet or beat the Kyoto Protocol targets in their own communities, through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns;
- Urge their state governments, and the federal government, to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol -- 7% reduction from 1990 levels by 2012; and
- Urge the U.S. Congress to pass the bipartisan greenhouse gas reduction legislation, which would establish a national emission trading system.

Mitigation. Actions taken to reduce the probability and risk of future climate change. Includes all measures to reduce emissions of greenhouse gases.

Mmt. Million metric tons.

MPO. Metropolitan Planning Organization. A federally required planning body responsible for transportation planning and project selection in its region.

PJM. PJM is the regional electricity grid operator for the mid Atlantic.

RPS Renewable Portfolio Standards establish a minimum percentage of electricity supply that must be derived from renewable energy sources such as solar energy or wind energy.

TPB. National Capital Region Transportation Planning Board. Serves as the Metropolitan Planning Organization (MPO) for the metropolitan Washington region.

UNFCCC. The United Nations Framework Convention on Climate Change (UNFCCC or FCCC) is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992. The treaty is aimed at stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The treaty as originally framed set no mandatory limits on greenhouse gas emissions for individual nations and contained no enforcement provisions; it is therefore considered legally non-binding. Rather, the treaty included provisions for updates (called "protocols") that would set mandatory emission limits. The principal update is the Kyoto Protocol, which has become much better known than the UNFCCC itself.

VMT. Vehicle Miles Traveled.

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Appendix A

Regional Greenhouse Gas Emissions Inventory Methodology

Projections for 2020 and 2030 were developed by applying U.S. Department of Energy (DOE) *Annual Energy Outlook 2007* growth factors to the 2005 base year emissions by sector (Table A1).

Table A1. Growth Factors for the Projection Inventory

Emission Source	2020	2030	Growth Factor
Energy/Electrical Generating Units and Electricity Import	20%	33%	EIA Total Electric Power
Transportation Combustion	25%	38%	COG DTP
Residential Fuel Use	22%	33%	COG Population
Commercial Fuel Use	25%	39%	COG Employment
Industrial Fuel Use	10%	19%	EIA Total Industrial Energy
Other Fuel Use	18%	31%	EIA Total Energy Consumption
Commercial Aviation	35%	40%	EIA Jet Fuel
Hydrofluorocarbons	25%	39%	COG Employment
Wastewater	22%	33%	COG Population
Landfills	22%	33%	COG Population
Others:			
Population	22%	33%	COG
Households	23%	35%	COG
Employment	25%	39%	COG

Sources: U.S. Department of Energy, Energy Information Administration (EIA), *Annual Energy Outlook 2007*. Transportation growth percentage calculated based on the Metropolitan Washington Council of Governments (COG) Department of Transportation Planning (DTP) projections. COG Round 7.a Cooperative Forecast projections for Population, Households, and Employment are provided for comparison purposes.

Data Sources—Electricity: Local utilities provide annual electricity consumption information, and the U.S. Environmental Protection Agency's (EPA's) Clean Air Markets Division reports annual CO₂ emissions from local power plants. Emissions associated with imported power are based on net electricity imports and regional emission factors for electricity generation (0.528–0.62 Mt CO₂/MWh) provided by DOE's Energy Information Administration.

Data Sources—Fuel Use: CO₂ emissions from fuel use were developed using data on commercial, residential, and industrial consumption of natural gas, distillate oil, and residual oil by state and emission factors for each fuel type, scaled to the region using population data (U.S. DOE 2006, MWCOG 2008, and U.S. Census). CO₂ emissions from aviation were based on total U.S. aviation emissions scaled to the region's share of total flight miles (U.S. EPA 2008b, U.S. Department of Transportation 2005). Growth rates are based on COG Cooperative Forecasts for population and employment, as well as U.S. Department of Energy projections for total energy consumption and jet fuel (U.S. DOE 2006).

Data Sources-Transportation: Networks for 2002, 2010 and 2030 were from the air quality analysis of the 2006 Constrained Long Range Plan (CLRP) and the FY2007-2012 Transportation Improvement Plan (TIP). The travel demand component for this work was based upon execution of the COG/TPB's Version 2.1D#50 travel forecasting process, see [COG/TPB Travel Forecasting Model, Version 2.1/TP+, Release D, Calibration \(Report\)](#), September 17, 2004. Inputs to the process include Round 7.0a Cooperative Forecast land activity assumptions, and CLRP and TIP network inputs contained in the conformity report adopted by the TPB in October 18, 2006. COG/DTP staff developed emission factors using EPA's Mobile6.2 emissions factor model, dated September 24, 2003, using locality specific inputs such as vehicle registration data. Emission factors were developed using inputs from the

conformity analysis of the 2006 CLRP and FY 2007- FY 2012 TIP for network, local roads, auto access to transit, transit and school bus.

Data Sources—Other Sources: Estimates were developed by scaling total U.S. emissions of HFCs to the region using regional and national employment data. HFC emissions from wastewater were developed using the EPA's State Inventory Tool with the default inputs, including biological oxygen demand and regional population. Methane from landfills based on information provided by the Maryland Department of the Environment.

APPENDIX B

National Capital Transportation Planning Board (TPB) Vision

Goal 5. The Washington metropolitan region will plan and develop a transportation system that enhances and protects the region's natural environmental quality, cultural and historic resources, and communities.

Objectives

1. The Washington region becomes a model for protection and enhancement of natural, cultural, and historical resources.
2. Reduction in reliance on the single-occupant vehicle (SOV) by offering attractive, efficient and affordable alternatives.
3. Increased transit, ridesharing, bicycling and walking mode shares.
4. Compliance with federal clean air, clean water and energy conservation requirements, including reductions in 1999 levels of mobile source pollutants.
5. Reduction of per capita vehicle miles traveled (VMT).
6. Protection of sensitive environmental, cultural, historical, and neighborhood locations from negative traffic and developmental impacts through focusing of development in selected areas consistent with adopted jurisdictional plans.

Strategies

1. Implement a regional congestion management program, including coordinated regional bus service, traffic operations improvements, transit, ridesharing, and telecommuting incentives, and pricing strategies.
2. Develop a transportation system supportive of multiple use and higher density (commercial and residential) in the regional core and regional activity centers as a means of preserving land; natural, cultural and historic resources; and existing communities.
3. Support regional, state and federal programs which promote a cost-effective combination of technological improvements and transportation strategies to reduce air pollution, including promoting use of transit options, financial incentives, and voluntary emissions reduction measures.
4. Develop a regional tourism initiative to encourage air and train arrival in the region, and additional transit access and automobile parking at the termini of Metrorail/rail services.
5. Provide equivalent employer subsidies to employees with the intent of "leveling the playing field" between automobile and transit/ridesharing.
6. Plan and implement transportation and related facilities that are aesthetically pleasing.
7. Implement a regional bicycle/trail/pedestrian plan and include bicycle and pedestrian facilities in new transportation projects and improvements.
8. Reduce energy consumption per unit of travel, taking maximum advantage of technology options.

**METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS
777 North Capitol Street, NE
Washington, DC 20002-4290**

RESOLUTION SUPPORTING DEVELOPMENT OF COG CLIMATE CHANGE INITIATIVE

WHEREAS, a growing number of local governments, including localities in the Metropolitan Washington region, are adopting strong policy resolutions calling for cities, communities and the federal government to take collective actions to reduce greenhouse gases to protect the local and global environment; and

WHEREAS, local actions can help encourage national leadership, by providing working models of greenhouse gas reduction initiatives that reinforce other high-priority policy objectives and stimulate private actions, by businesses and citizens; and

WHEREAS, the Metropolitan Washington Region has a history of supporting a clean and sustainable environment through efforts such as the Green Building Program, Energy Star, the Strategic Energy Plan, Alternative Fuels Clean Cities Partnership, Clean Air Partners, Wise Water Use Program, the Environmentally Preferable Purchasing Program, the Clean/Green Fleet Program, Commuter Connections, and others; and

WHEREAS, the failure to reduce greenhouse gases can undermine the quality of life in our region and its economic and environmental sustainability.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS THAT:

1. The Metropolitan Washington Region, building upon existing priorities and programs, commits to developing a regional climate change initiative including implementation of best practices to reduce emissions of greenhouse gases.
2. The COG Board Chair shall appoint an interdisciplinary "Climate Change Steering Committee" to advise the Board on the development of a regional climate change program; including a recommendation on any need for a long term organizational structure for the regional climate change initiative. Elements of the regional climate change program to be considered by the steering committee shall include:
 - a. Preparing a catalogue of greenhouse gas reduction activities already underway in the region.
 - b. Preparing an inventory of greenhouse gas emissions in the region and the establishment of a regional greenhouse gas reduction goal or target based on an appropriate baseline.
 - c. Identification of specific activities and best practices to achieve greenhouse gas reduction and a method for measuring progress in meeting reduction targets.
 - d. Examination of local impacts of climate change on the Washington region.
 - e. Examination of the feasibility of establishing a carbon offset fund, or other appropriate carbon reduction funding mechanism, for the Washington region.
 - f. Recommendations on regional climate change policy and potential advocacy positions on federal, state and local climate change actions and proposals.
3. The Climate Change Steering Committee shall have tenure for one year from the date of its first meeting and it shall report at least bi-monthly to the COG Board on its activities and progress. It shall be further charged with development of a climate change work program and identification of resources and funding to support its mission. To ensure its initial success, the Board shall provide up to \$100,000 from the FY 2007 COG contingency fund as seed money for this initiative to cover staff support, and for match to federal, state, local, and private foundation grants.

