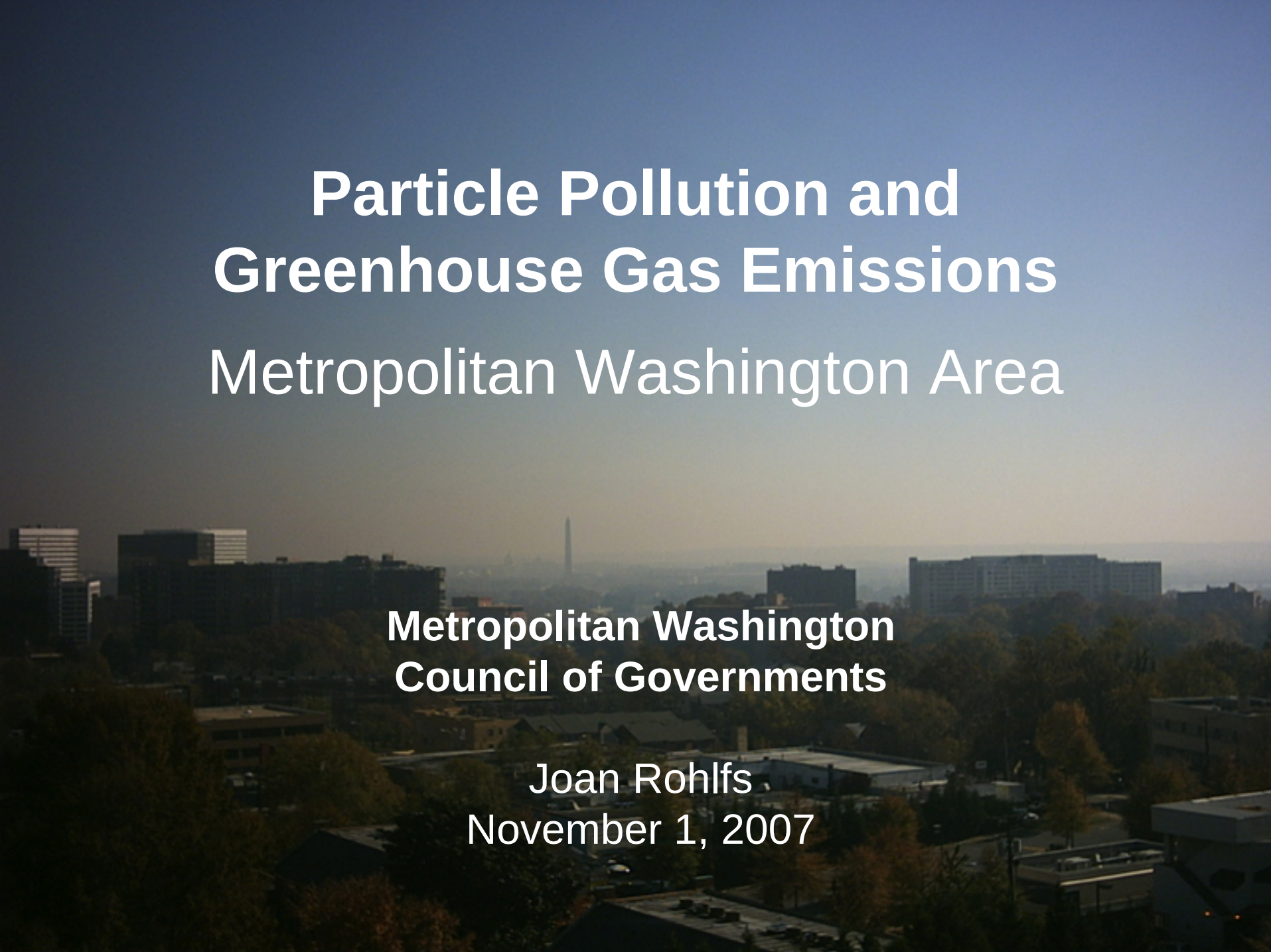


Particle Pollution and Greenhouse Gas Emissions

Metropolitan Washington Area

Metropolitan Washington Council of Governments

Joan Rohlfs

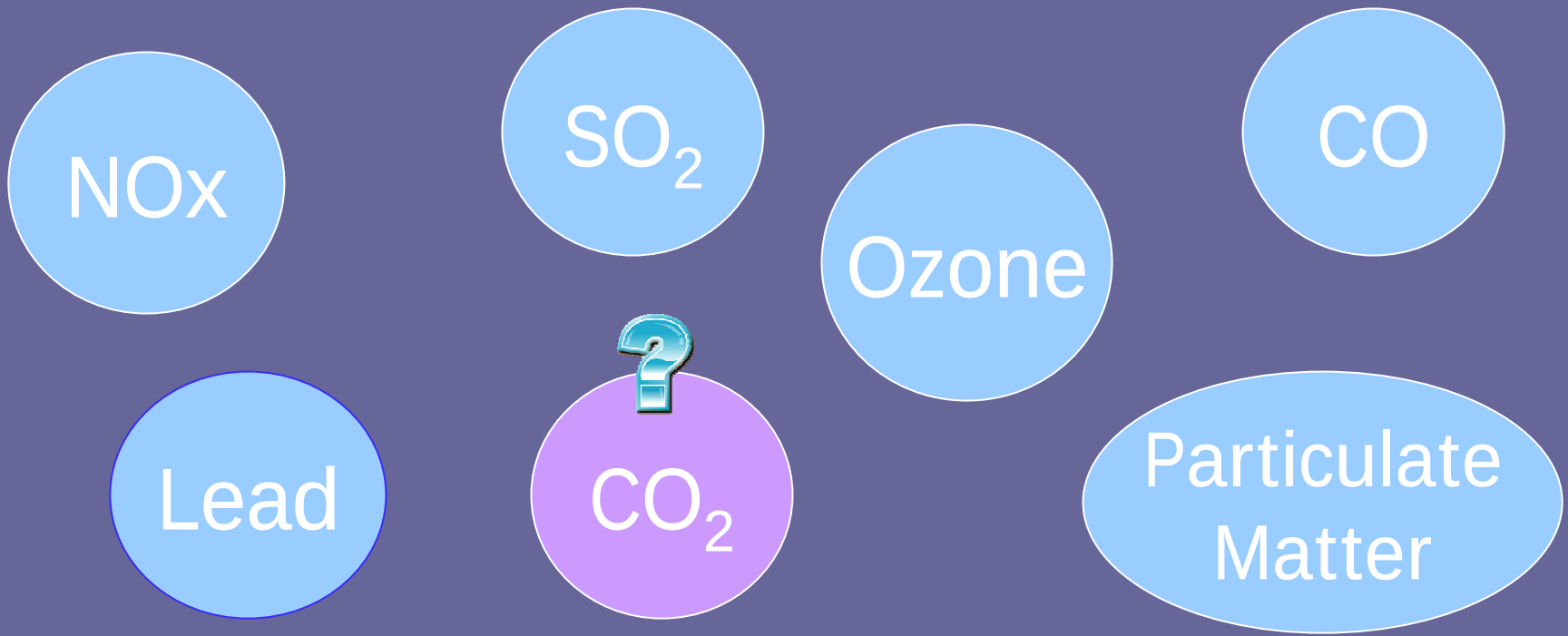
November 1, 2007

Outline

- Clean Air Act and the Metropolitan Washington Region
- Fine Particle Pollution
- Climate Change
- Measures with Co-Benefits
- Next Steps:
  - Regional Air Quality Plan for PM
  - Climate Change Initiative

Clean Air Act Amendments 1990

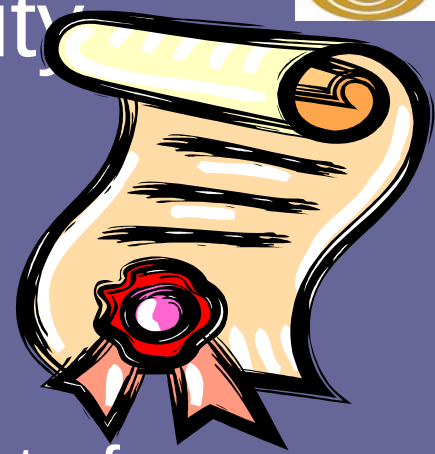
EPA set federal health standards for ambient pollutants



Fine Particle Pollution and Greenhouse Gases (CO_2)

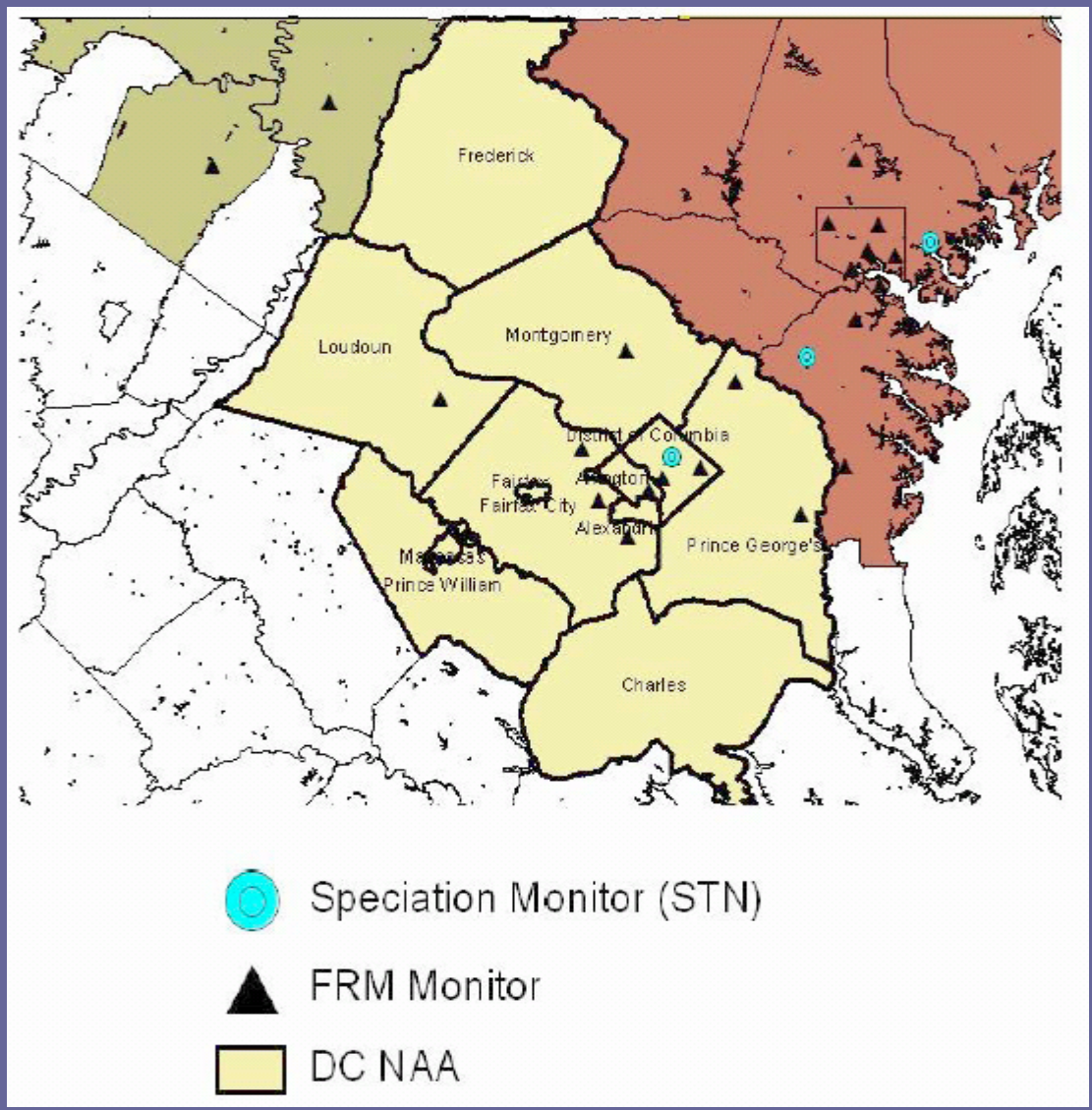
- Affect human health and the environment
- Activities causing fine particle pollution and CO_2 emissions are the same
- Measures having co-benefits will reduce fine particles and CO_2 emissions

Metropolitan Washington Air Quality Committee (MWAQC)



- Certified in 1992 by Mayor of the District of Columbia and governors of MD and VA
- Purpose: to prepare regional air quality plans
- Membership includes local government elected officials, state air and transportation planning officials, and the Transportation Planning Board chair

Washington DC-MD-VA PM2.5 NAA



AIR QUALITY INDEX

AQI Range	AQI Color	8-Hr O3 Range (ppb)	24-Hr $PM_{2.5}$ Range ($\mu g/m^3$)
201-300	**Purple**	125-374	150.5-250.4
151-200	**Red**	105-124	65.5-150.4
101-150	**Orange**	85-104	40.5-65.4
51-100	**Yellow**	65-84	15.5-40.4
0-50	**Green**	0-64	0-15.4

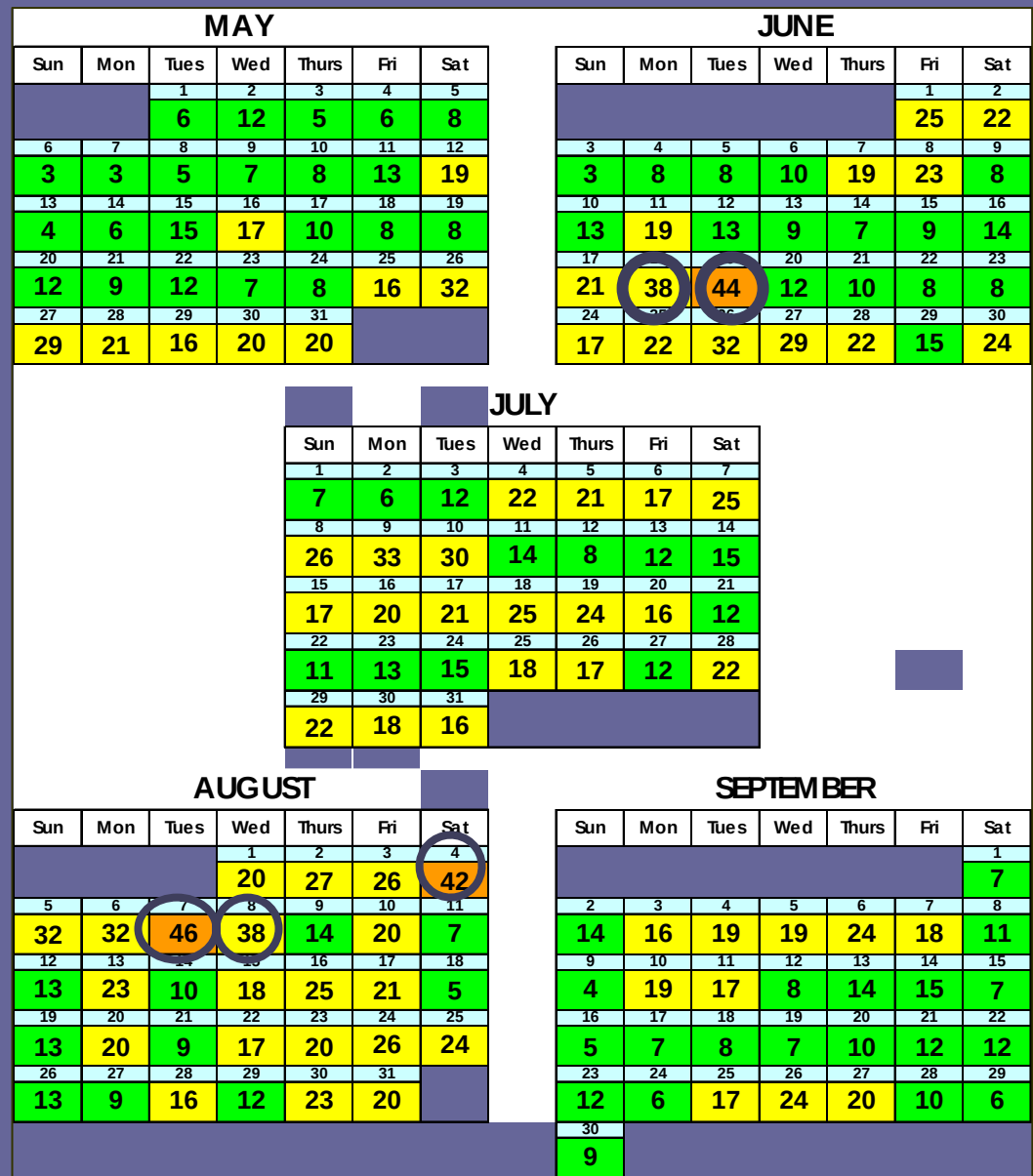
Federal Health Standard

← 100

Daily Peak Fine Particle Concentrations 2007

Maximum 24-Hour PM2.5 Concentration: August 7 (46 µg/m³)

Code Orange – 3 Days
Code Yellow – 70 Days
Code Green - 79 Days

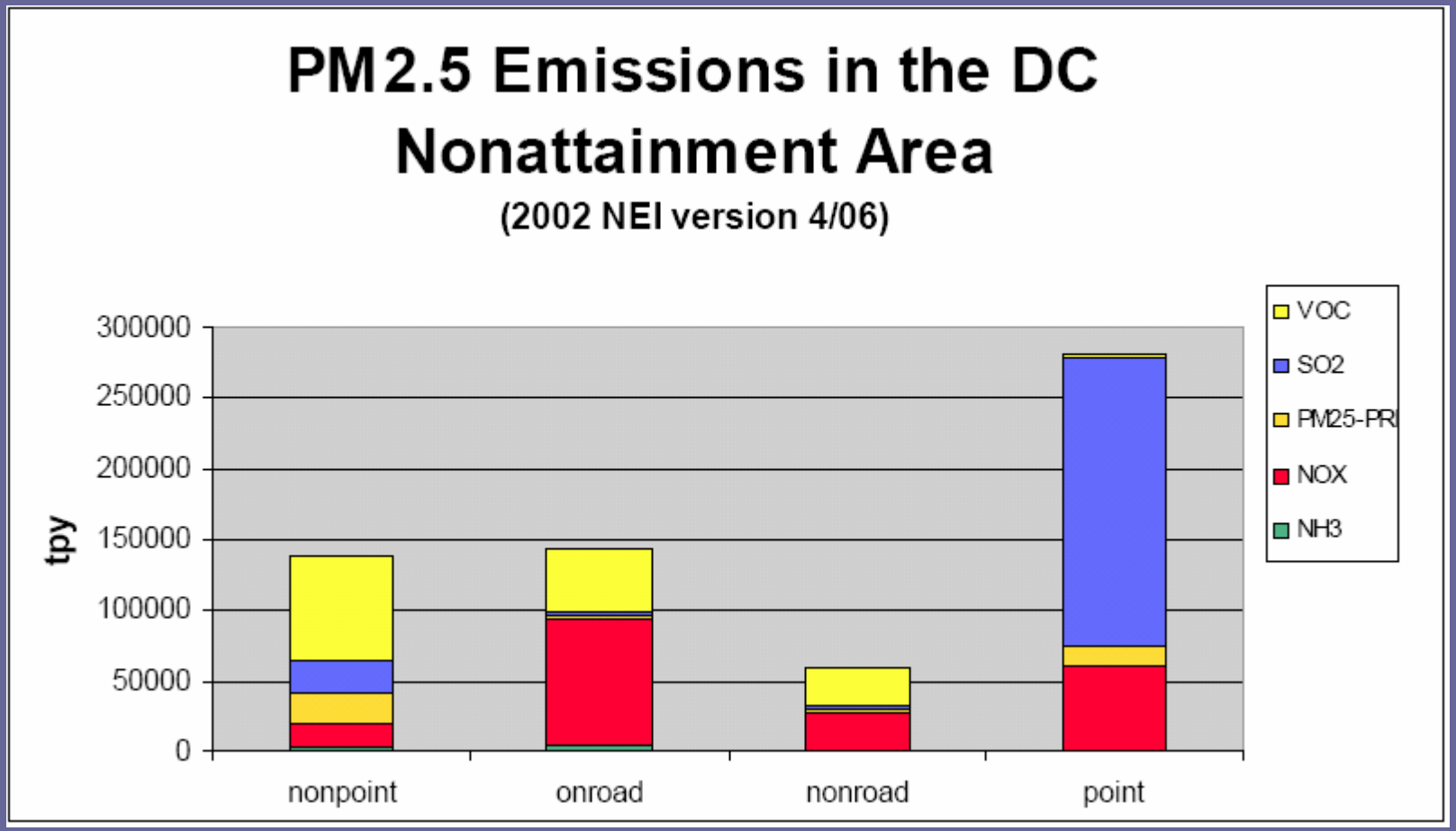


Air Quality Planning

- Washington region does not meet the National Ambient Air Quality Standards for ozone or fine particles
- The region prepares a plan (“SIP”)to meet the standard by a certain date
- Ozone SIP submitted May 2007; expect to meet ozone standard in 2009
- Currently the region is preparing a plan to reduce annual levels of fine particles by 2009

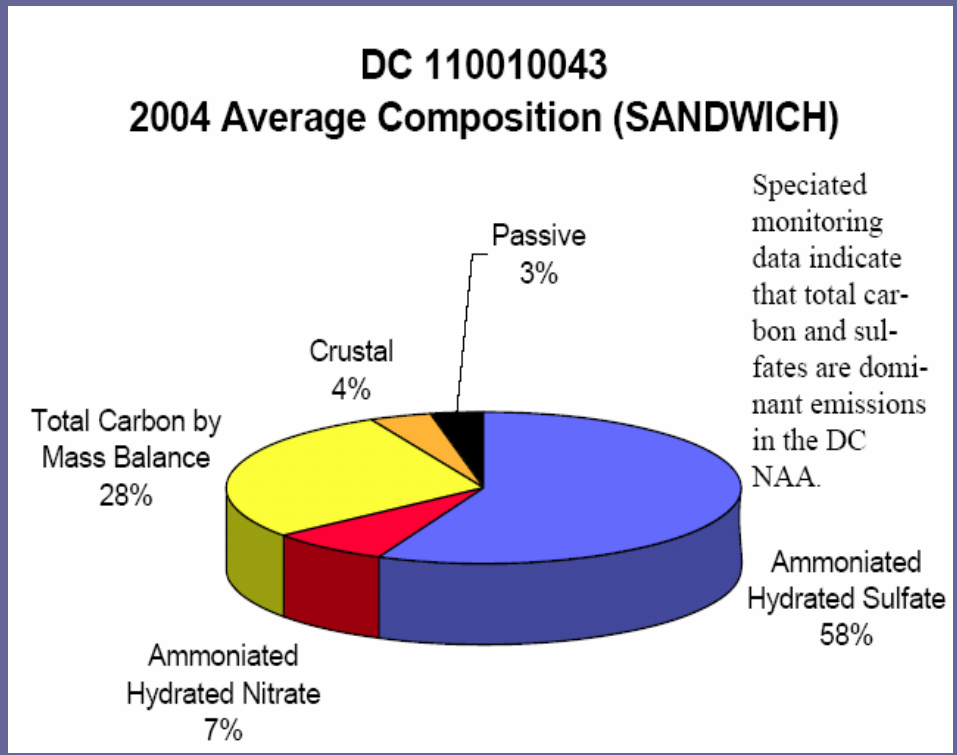
Air Pollution: Fine Particles

- Chemical, particulate matter or aerosol that modifies the natural characteristics of the atmosphere
- Created locally by emissions from coal combustion, cars & trucks, road construction
- Causes respiratory problems
- Impairs visibility


PM2.5 Emissions in the DC Nonattainment Area
(2002 NEI version 4/06)
tpy
300000
250000
200000
150000
100000
50000
0
nonpoint
onroad
nonroad
point
VOC
SO2
PM25-PRI
NOX
NH3

Sources & Composition of Fine Particles

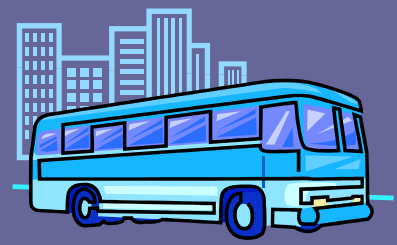
- Source Contribution
  - Coal combustion 46%
  - Motor vehicles 28%
  - Road construction 9%
  - Ammonium Nitrate 7%
  - Canadian fire 7%
  - Vegetative burning 3%



Battelle Institute 2004

Plan to Reduce Fine Particles

- **Point Source**
  - NOX SIP Call
  - Clean Air Interstate Rule (CAIR) - VA & DC
  - Maryland Healthy Air Act - MD
  - Utility Reductions (Possum Point Fuel Conversion) -VA
- **Area Source**
  - National Locomotives Rule
- **Nonroad Source**
  - 2004 Nonroad Heavy Duty Diesel Rule
- **Onroad Source**
  - Heavy-Duty Diesel Engine Rule
  - Tier 2 Motor Vehicle Emission Standards
  - Vehicle Inspection Program
- Supplemental Measures:
  - Telecommuting Initiative,
  - Tree Canopy Programs
  - Wind Energy Purchases,
  - Energy Efficiency in buildings,
  - LED Traffic Signal Retrofits,
  - Renewable Portfolio Standards



Measures having Co-Benefits: Fine Particles ($PM_{2.5}$)

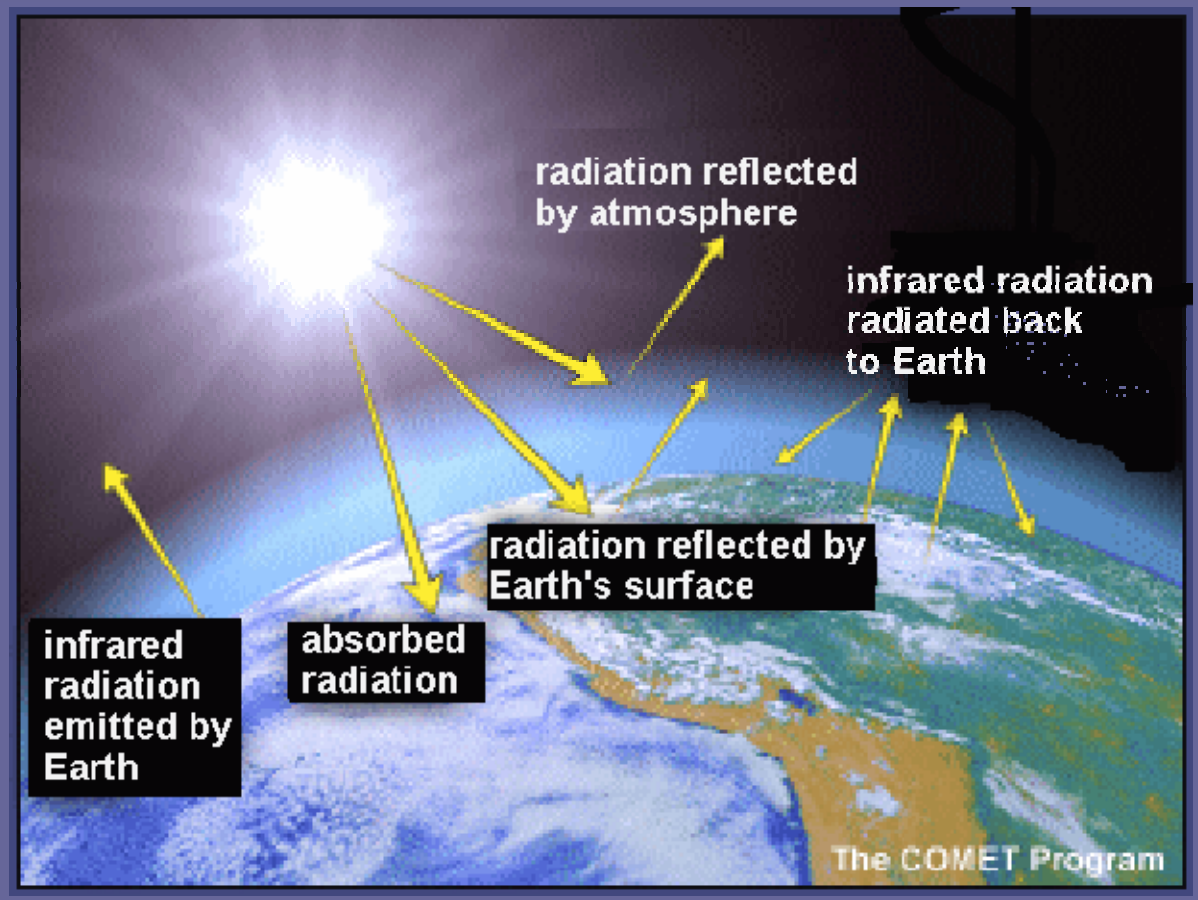
- Power plants and transportation combustion are two major sources of Fine Particles ($PM_{2.5}$) and CO_2
- Measures reducing both PM2.5 constituents and CO_2 from these sources are:
  - Telecommuting Initiative
  - Tree Canopy Programs
  - Wind Energy Purchases
  - Building Energy Efficiency
  - LED Traffic Signal Retrofits
  - Renewable Portfolio Standards


CLIMATE
CHANGE

Climate Change

- Variability in climate due to increase in heat trapping gases
- Increase in CO_2 largely due to combustion of fossil fuels
- Affects sea levels, weather patterns, ecosystems

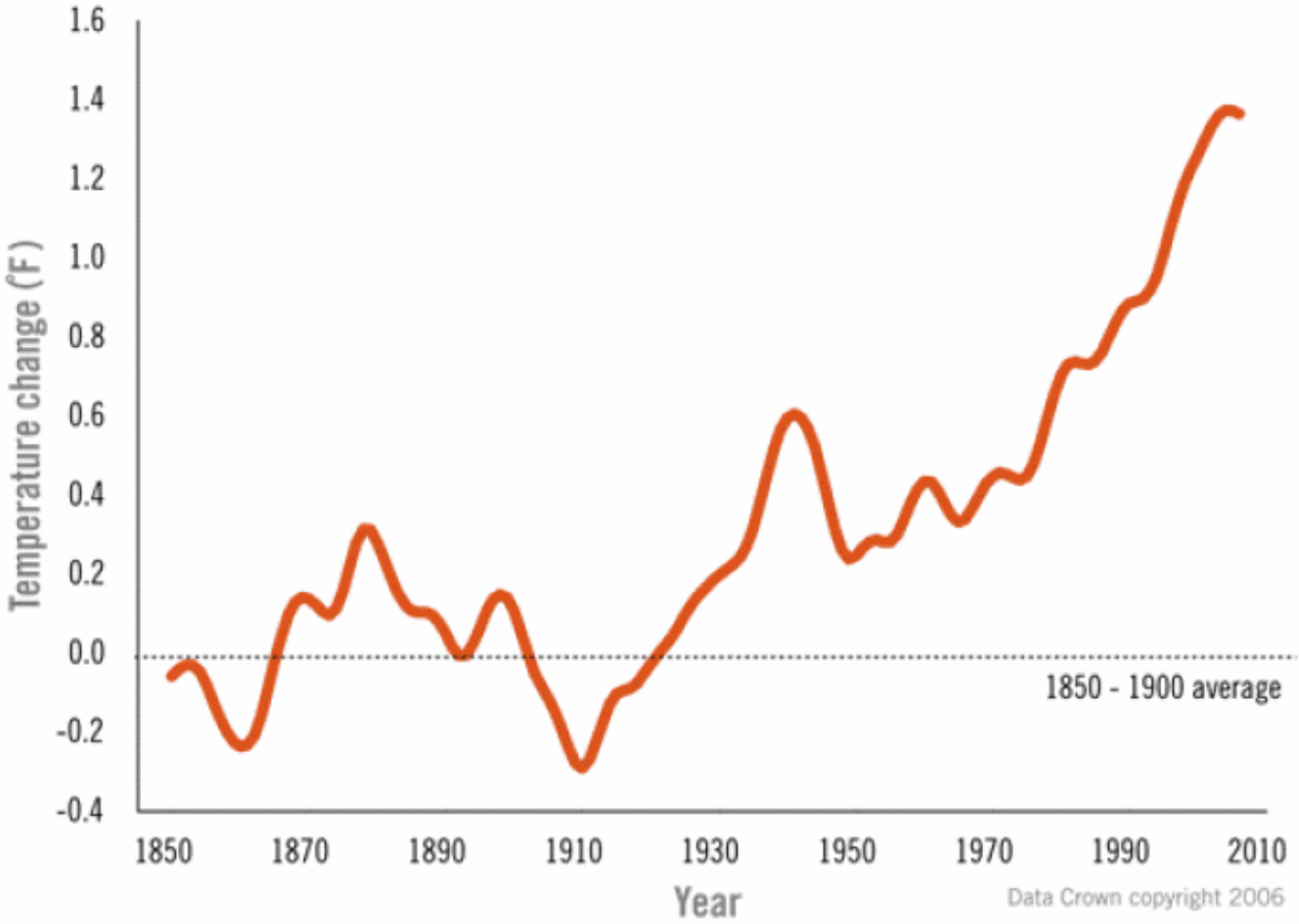
How Greenhouse Gases Warm the Earth



As the sun warms the earth, the earth emits infrared radiation (heat) to the atmosphere and to space. Greenhouse gases absorb this infrared radiation, further warming the earth.

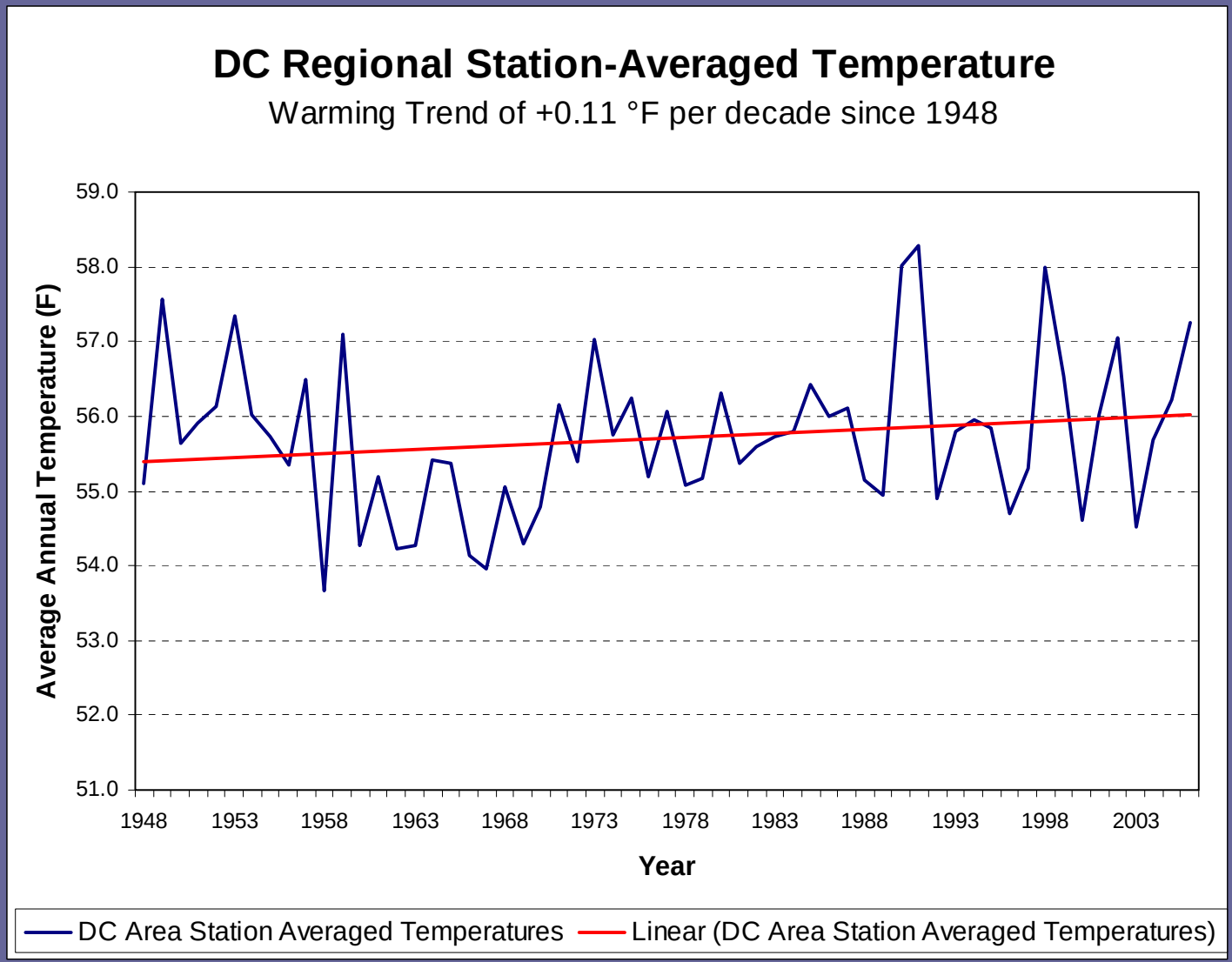
Photo Courtesy of The COMET Program at the University Corporation for Atmospheric Research (UCAR)

Increasing Global Surface Temperature



Source: Pew Center on Global Climate Change

Regional Temperature Trends of DC Metropolitan Area



Stations used in the regional average:

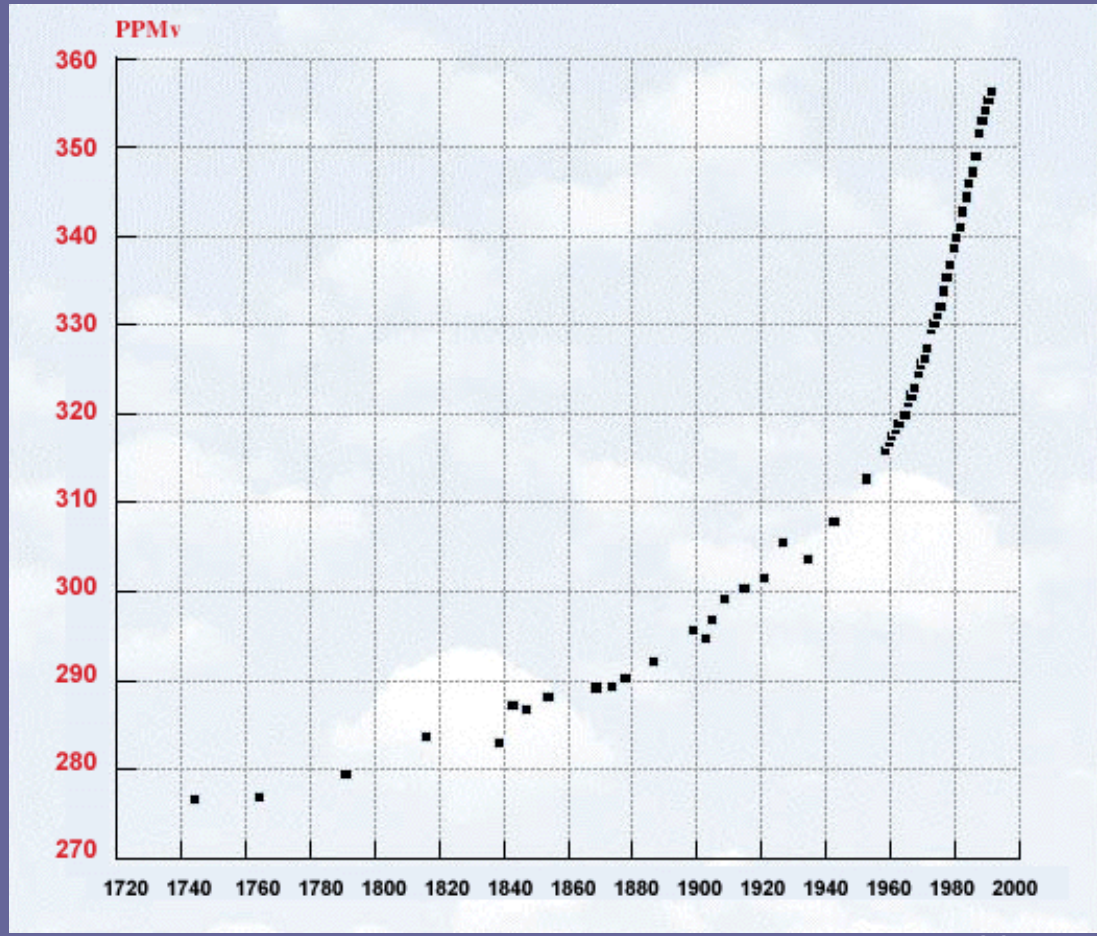
National Arboretum
Dalecarlia
National Airport
Dulles Airport
Woodstock, MD
Lincoln, VA
Louisa, VA

Source: NCSU Climate Summary Data

Carbon Dioxide Concentration Trends & Temperature-GHG Relationship

- 379 ppm CO2 in 2005, up from 280 ppm in 1800
- Since 1970s, 1.7 ppm/yr added via emissions
- To raise the global temperature by 1.0°C, a 125 ppm increase in CO2 is needed.

Global Atmospheric Carbon Dioxide Concentrations (PPMv)



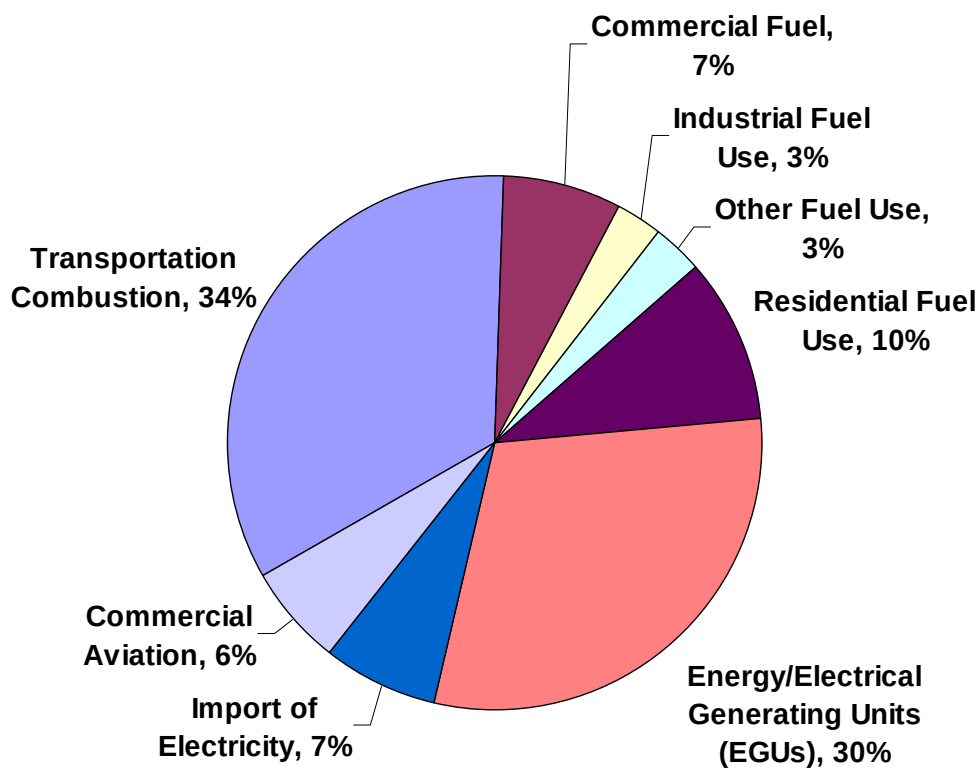
Source: World Resource Institute

Intergovernmental Panel on Climate Change

" Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas emissions"

IPCC Summary for Policy Makers, Climate Change 2007. The Physical Science Basis, working Group Report, February 2, 2007

Regional Greenhouse Emissions (2005)



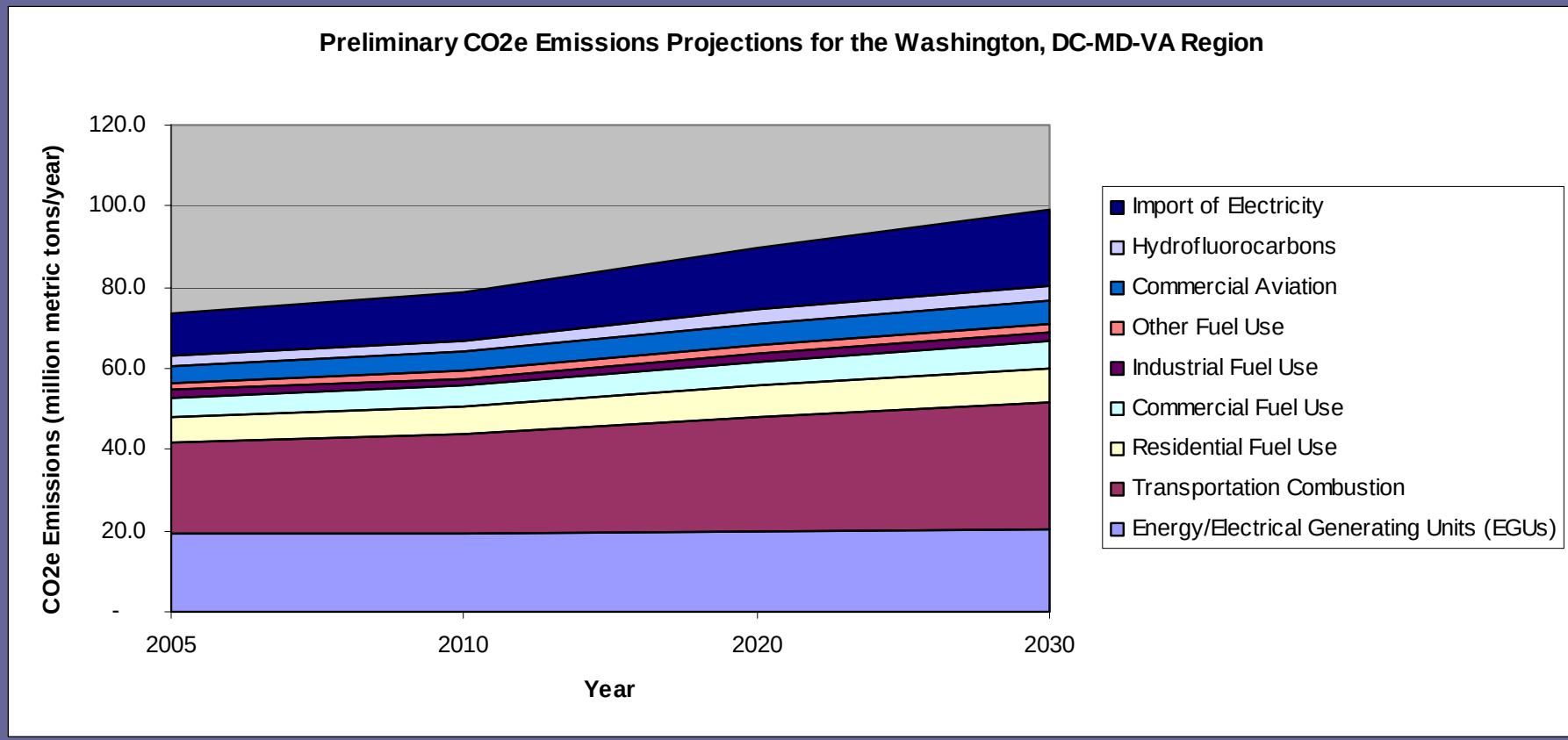
Source: MWCOG estimates.

Estimated Changes in Transportation Emissions, 2002-2030

	2002	2030	% Change
Households	2,893,646	4,162,621	44%
Employment	1,742,117	2,463,893	41%
Annual VMT (thous)	39,212	53,726	37%
NOx (tons/day)	259.23	34.90	-87%
VOC (tons/day)	101.12	39.41	-61%
CO_2 (tons/day)	23,273,168	34,450,922	48%

MWCOG Dept. Transportation Planning, June 2007

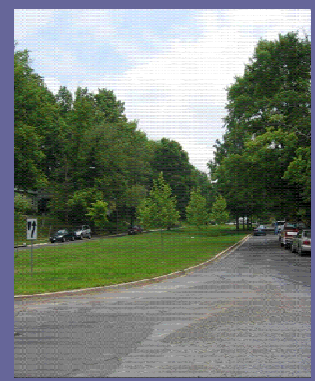
Estimated Washington Region CO_2 Emissions, 2005-2030 (Business As Usual)



MWCOG Dept. of Environmental Programs, Sept. 2007

Measures having Co-Benefits: CO_2

- **Power Plant Reductions**
  - Maryland Healthy Air Act
- Energy Efficiency & Renewable Energy
  - Wind Energy Purchases
  - Renewable Portfolio Standards
  - LED Traffic Signal Retrofits
  - Building Efficiency/Green Buildings
  - Urban Tree Canopy
  - Smart Growth development



Some GHG Reduction Goals

- Cool Counties (Arlington, Fairfax, Montgomery)
  - Stop growth in CO_2 emissions by 2010
  - 80% below current levels by 2050
- Mayor's Agreement (D.C.)
  - 7% below 1990 levels by 2012
- RGGI (Maryland)
  - 1990 levels by 2015
  - 10% below 2009 by 2019

The Next Steps

- Regional Plan to Reduce Particle Pollution ("SIP")
  - In December MWAQC will approve a draft plan for public hearing
  - Public hearings will be held in January-February 2008
  - Plan to be approved in March 2008

- COG's Regional Climate Change Initiative (April 2008)
  - Regional targets and goals for reducing greenhouse gases will be proposed
  - Best practices for mitigating greenhouse gases
  - Catalogue of local government measures to reduce GHG
  - Report on regional impacts from climate change
  - Recommendations on policy actions to reduce regional greenhouse gases
  - Recommendations on state and national policy on climate change and energy

Contacts

MWAQC mwcog.org/environment/air

District Dept. of the Environment
ddoe.dc.gov

Maryland Dept. of the Environment
mde.state.md.us

Virginia Dept. of Environmental Quality
deq.virginia.gov

Clean Air Partners cleanairpartners.net