

Environmental Data, Forecasts and Metrics

Considerations for Greater Washington 2050 Coalition

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May 30, 2008

Environmental Factors Shaping 2050

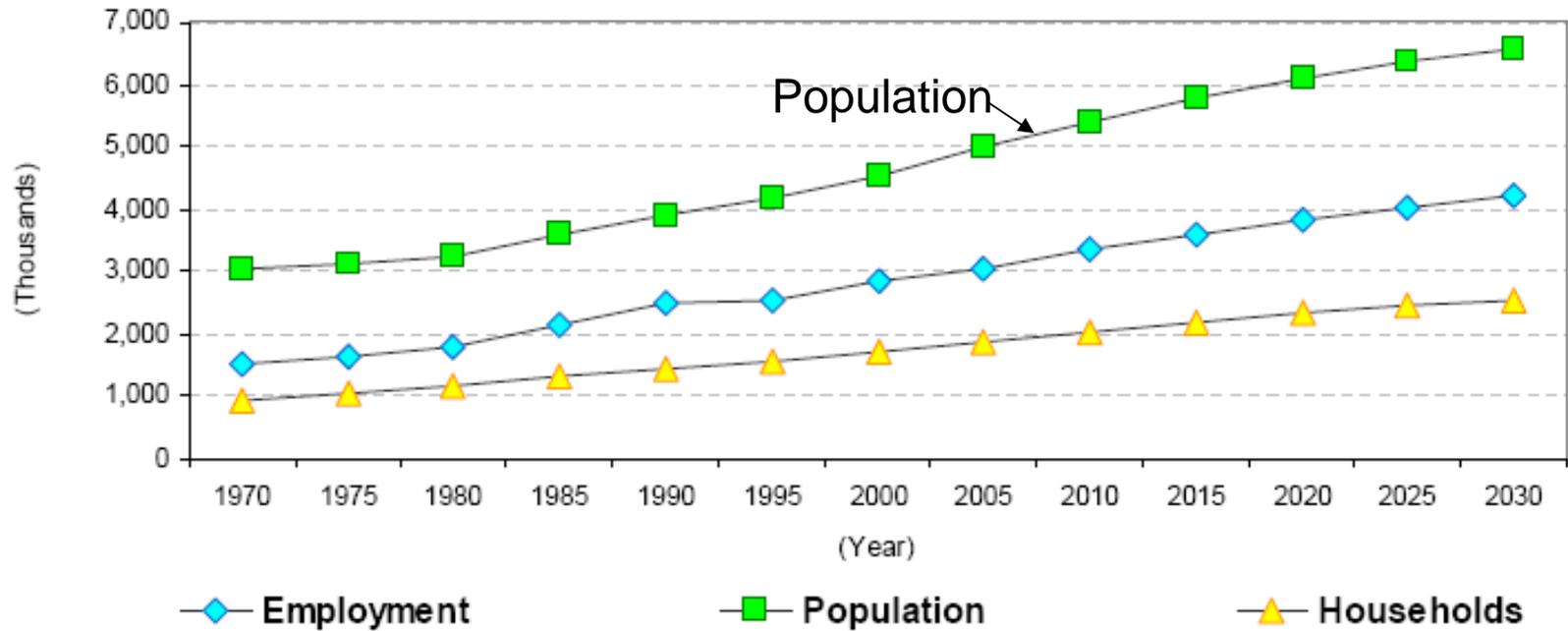
- Population, Employment, Households
- Water Supply
- Wastewater Capacity/Pollution Caps
- Land Cover/Watershed Health
- Air Quality
- Solid Waste disposal/recycling
- Energy
- Climate Change

Metrics, Constraints, and Policy Principles

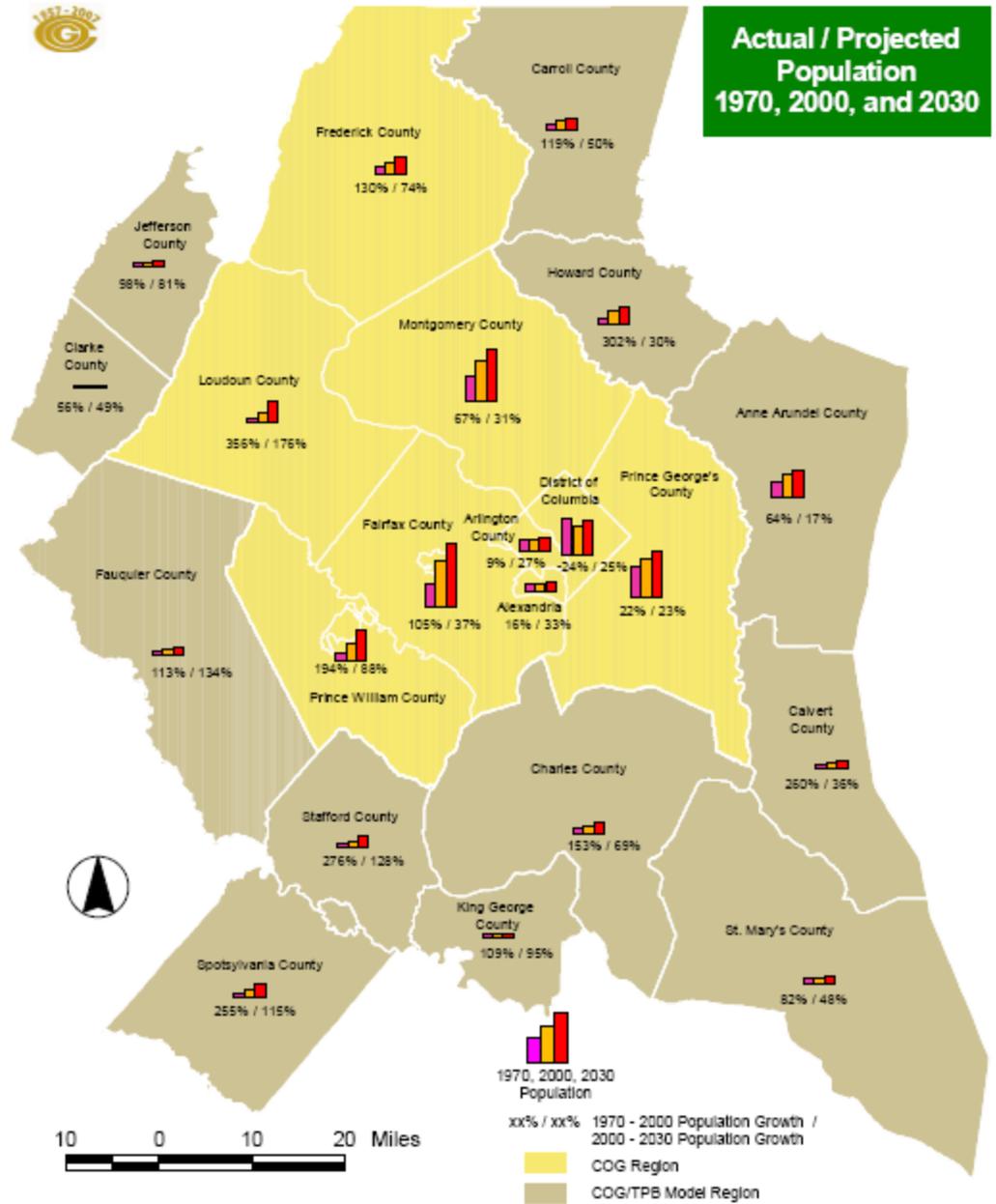
- Metrics enable comparison of different scenarios
- Constraints are factors that could affect how much growth can take place or where growth can take place
- Policy principles are factors to help guide growth to achieve policy objectives and goals

Round 7.1 Forecasts Through 2030

Historic and Forecast Growth Washington DC-MD-VA MSA¹



Source: Round 7.1 Cooperative Forecasts
¹Based on the 1983 definition of the Washington Metropolitan Statistical Area (MSA)



Source: Round 7.1 Cooperative Forecasts
 Notes: The southern portion of Spotsylvania County is not included in the TPB model area. Independent cities in Virginia are included in county totals.

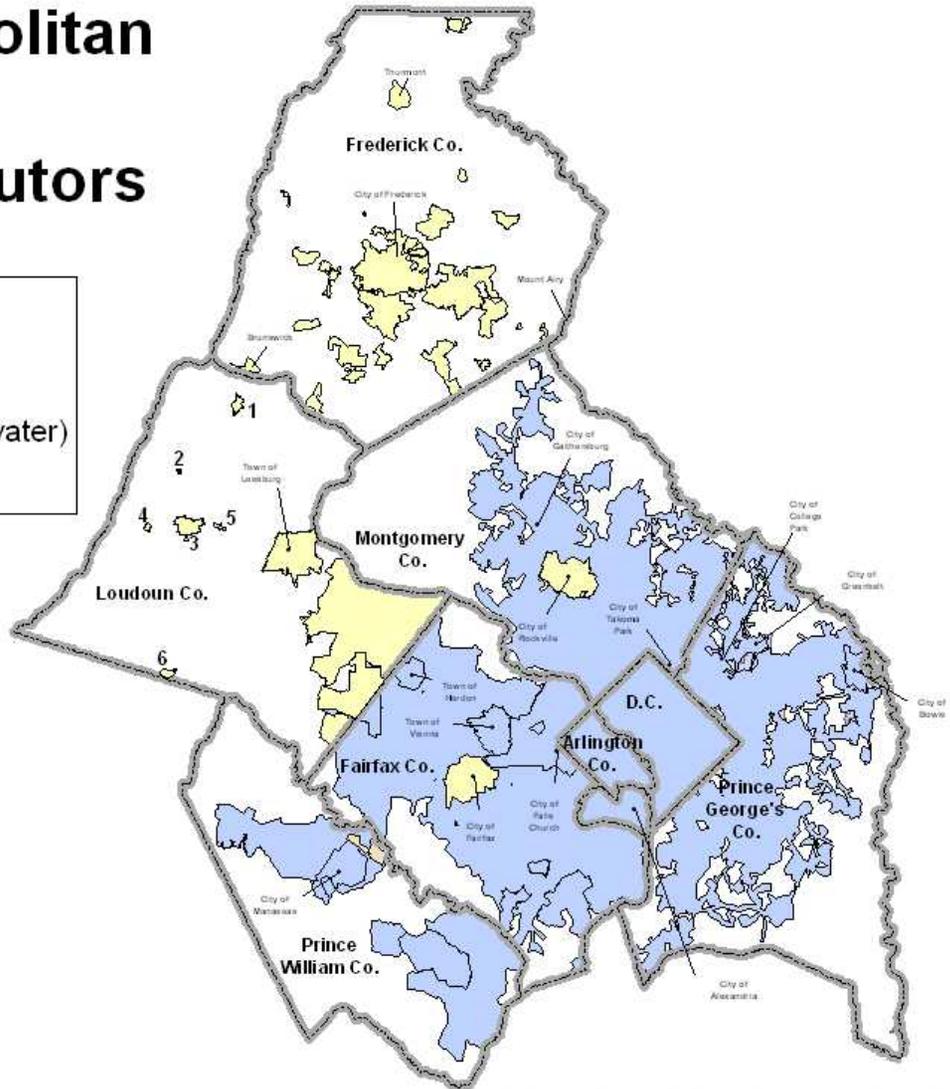
Water Supply



Service Areas for Washington Metropolitan Region Water Suppliers & Distributors

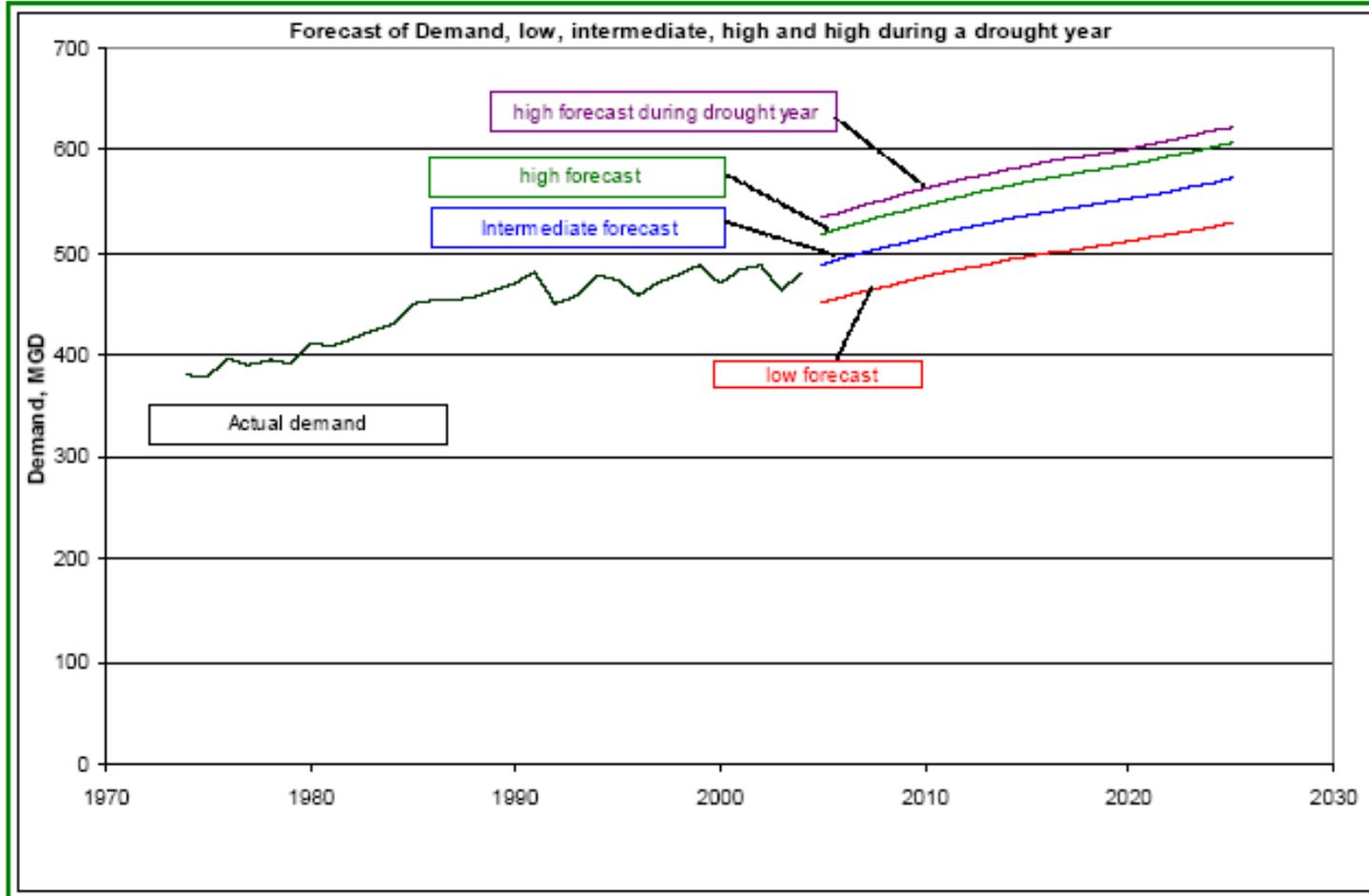
Legend

- CO-OP (most reliable)
- Mixed (Surface Water and Groundwater)
- Groundwater (least reliable)



Department of Environmental Programs, Metropolitan Washington Council of Governments, Washington, DC
Billed on May 31, 2007
RFD EPOIS/PROJECTS/DRM/1/Water_Supply_2007.mxd

Forecast Water Demand – Potomac River System in 2025



Water Supply - Observations

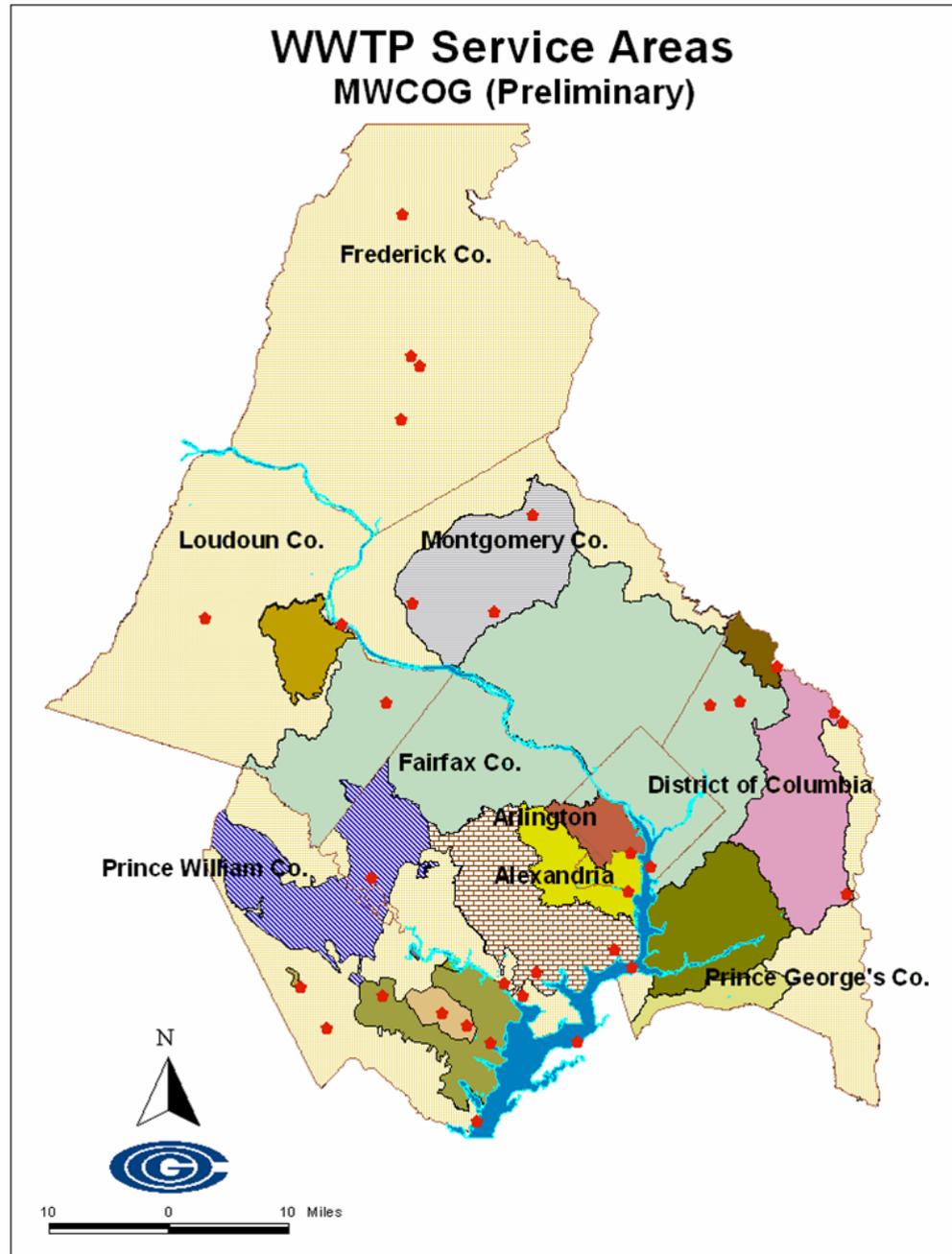
- Potomac River System supplies 95% of water for the region
- Designed to handle forecasted growth through 2025 and potentially 10-20 years longer; more back-up reservoir storage will be needed
- Climate change/more severe droughts will stress water supply system
- Growth in areas outside Potomac system may be constrained by water supply – may drive more jurisdictions to seek use of Potomac system

Water Supply and Scenarios

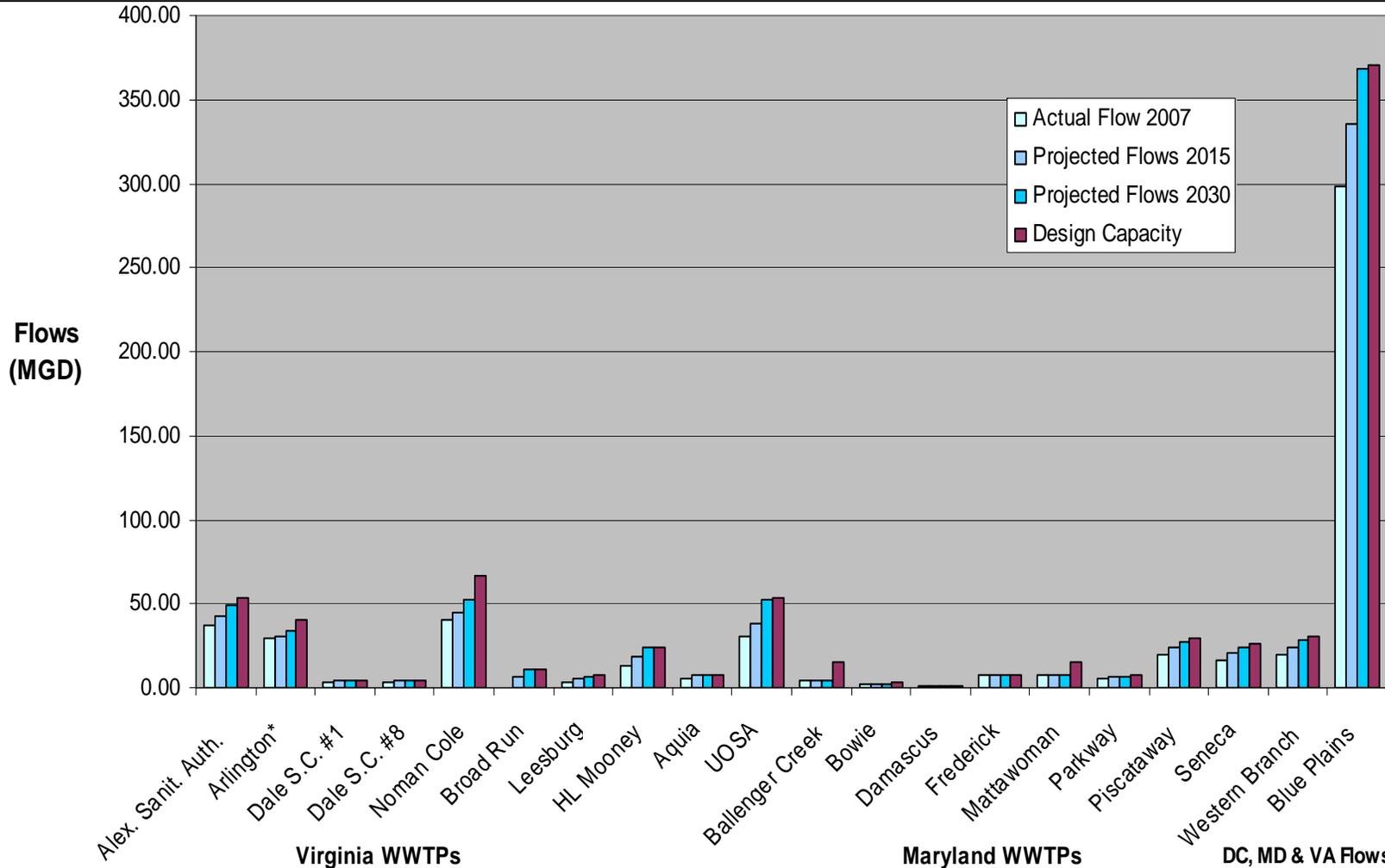
- Analysis of growth scenarios will need to take into account water supply sources. Potomac is the most reliable system.
- Water supply could be a constraint on growth, especially outside Potomac River system.
- Significant changes to growth patterns, e.g., more growth in inner jurisdictions or shift from west to east will require evaluation of water supply infrastructure capacity

Wastewater Capacity/Pollution Caps





COG Region Major Wastewater Treatment Plants Flow vs. Capacity

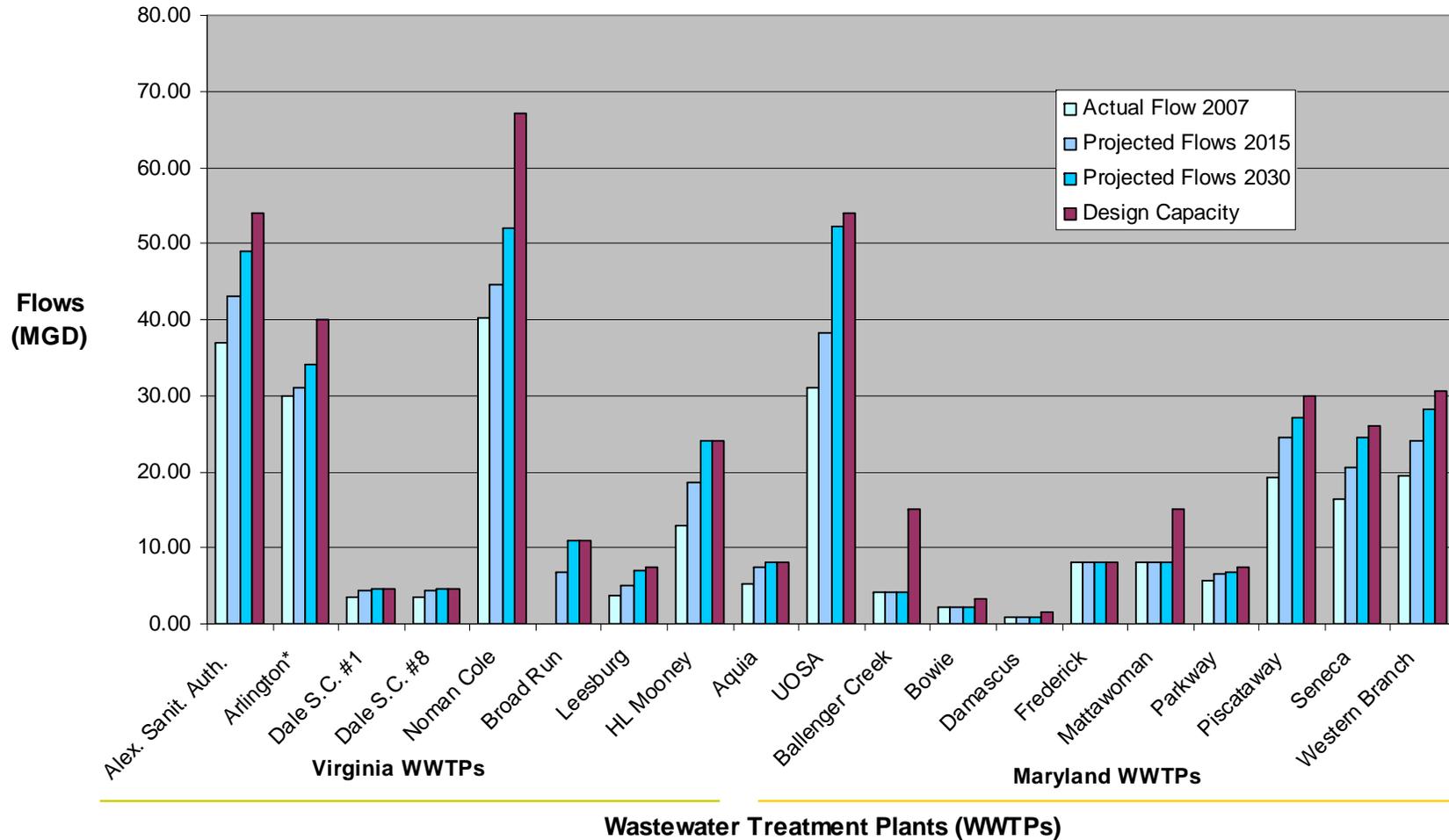


Wastewater Treatment Plants (WWTPLs)

Source: MWCOG/DEP, Preliminary Data, May 2008 for plants >1.5 mgd



COG Region Major Wastewater Treatment Plants Flow vs. Capacity – w/o Blue Plains



Source: MWCOG/DEP, Preliminary Data, May 2008 for plants >1.5 mgd



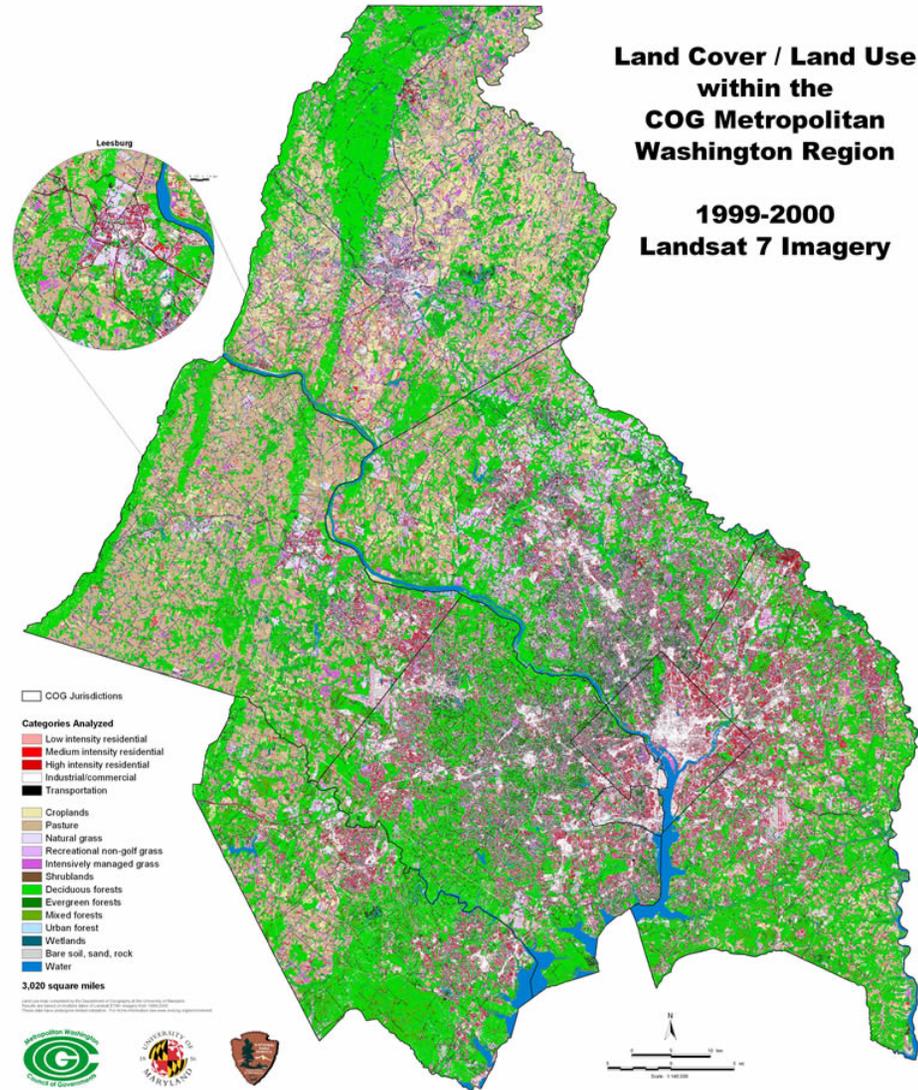
Wastewater Capacity - Observations

- Many wastewater plants reach design capacity by 2030
- All plants have nutrient caps near to current limit of technology to protect Chesapeake Bay
- Accommodating further growth beyond caps will require new technology, nutrient trading, or other offsets.
- Growth capacity for areas on septic systems likely limited

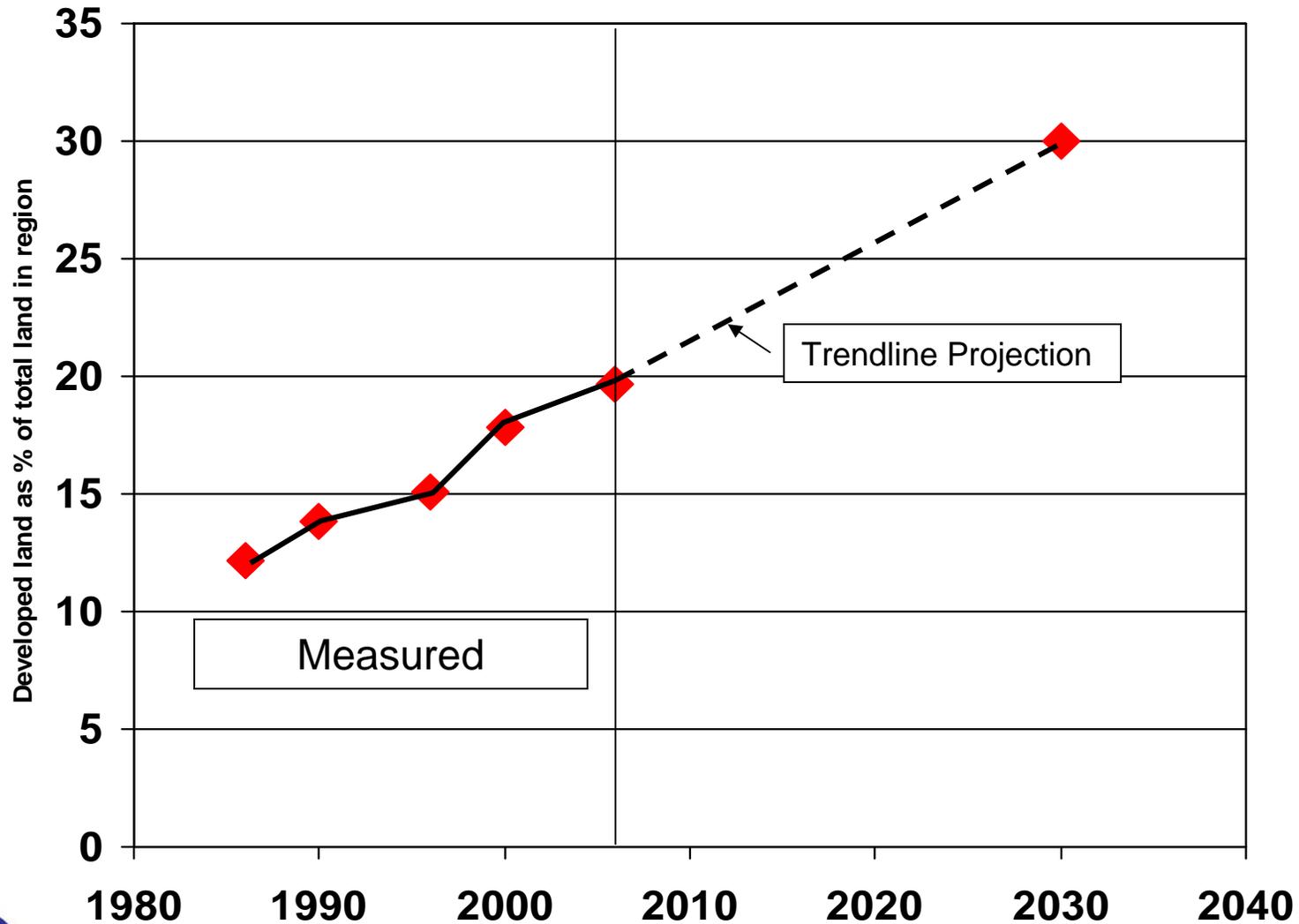
Wastewater Capacity and Scenarios

- Wastewater capacity could be a constraint on growth in some areas after 2030.
- Significant changes to growth patterns, e.g., more growth in inner jurisdictions or shift from west to east will require evaluation of wastewater infrastructure capacity

Land Cover/Watershed Health

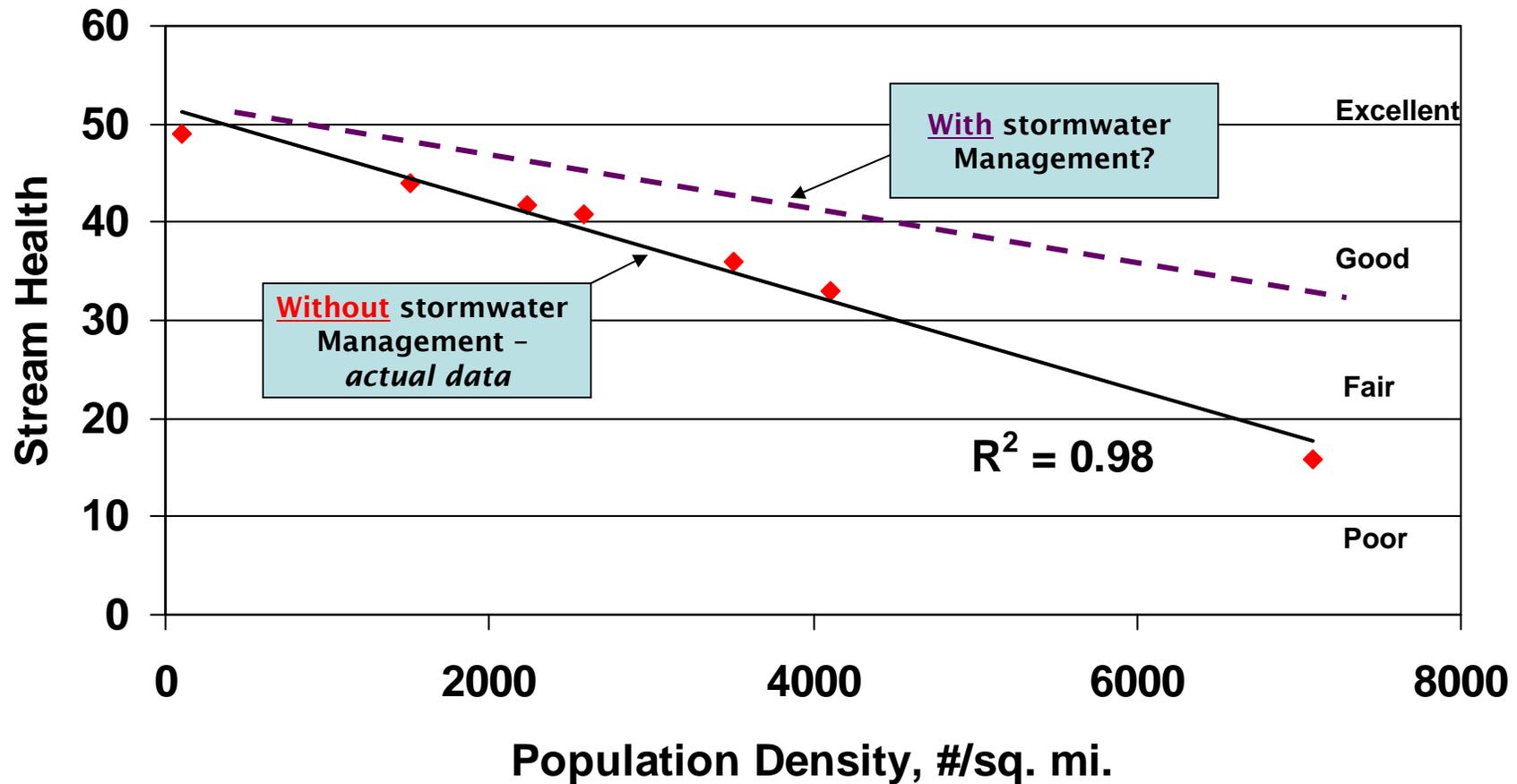


Increase in Developed Land within the COG Region



(1986 -2006 land use derived from GIS analysis of Land sat imagery)

Population Density vs. Stream Health



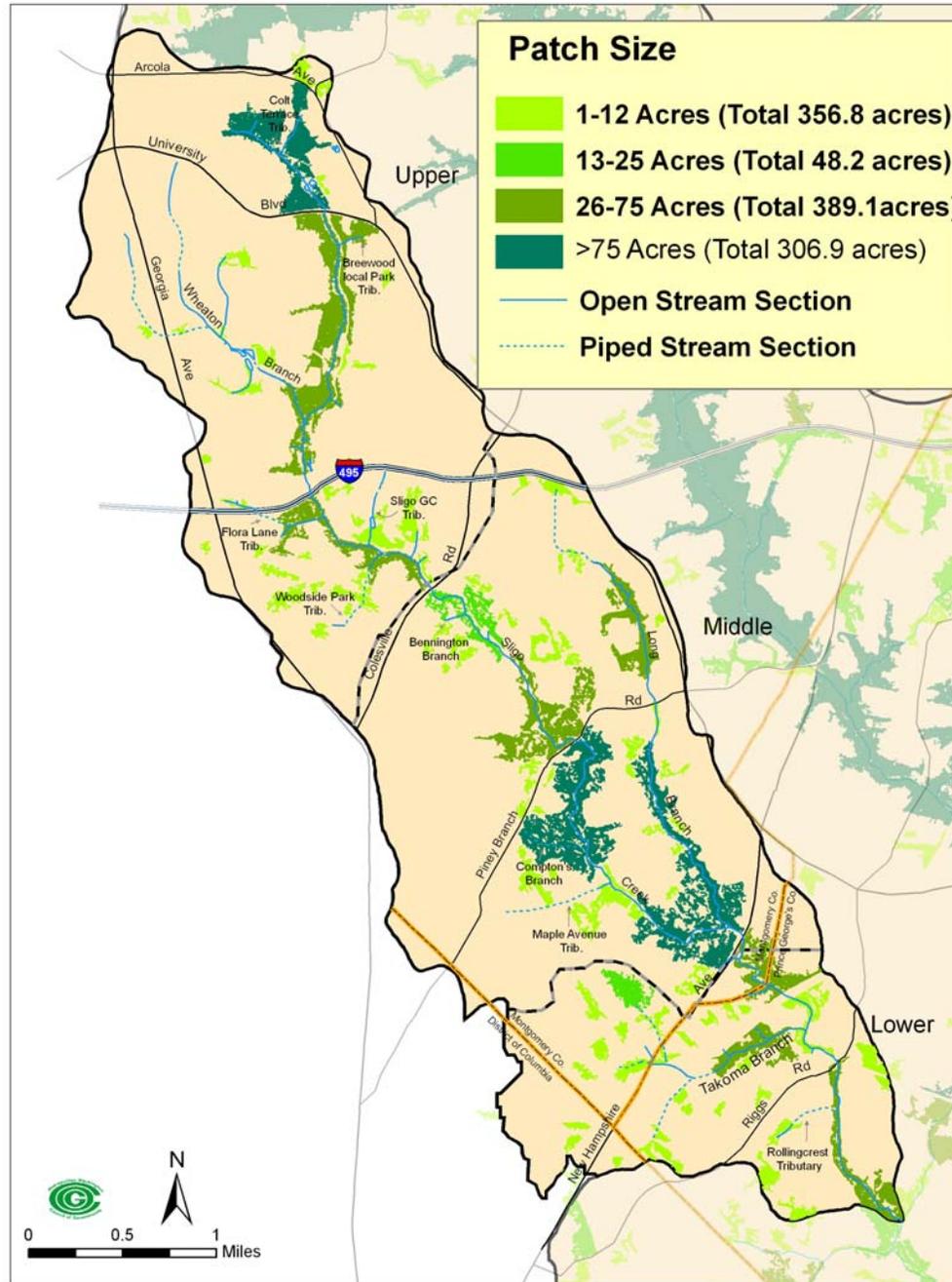
Source: MWCOG/DEP, 2008. Preliminary data from 6 subwatersheds in the Anacostia and 1 in Loudoun County



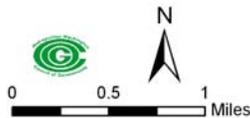
Potential Metric: Forest Patch Size

Data for Sligo Creek
based on 2000 fine
satellite imagery
(Ikonos)

Larger patch sizes
important for
maintaining
environmental
diversity



Source: MWCOC/DEP



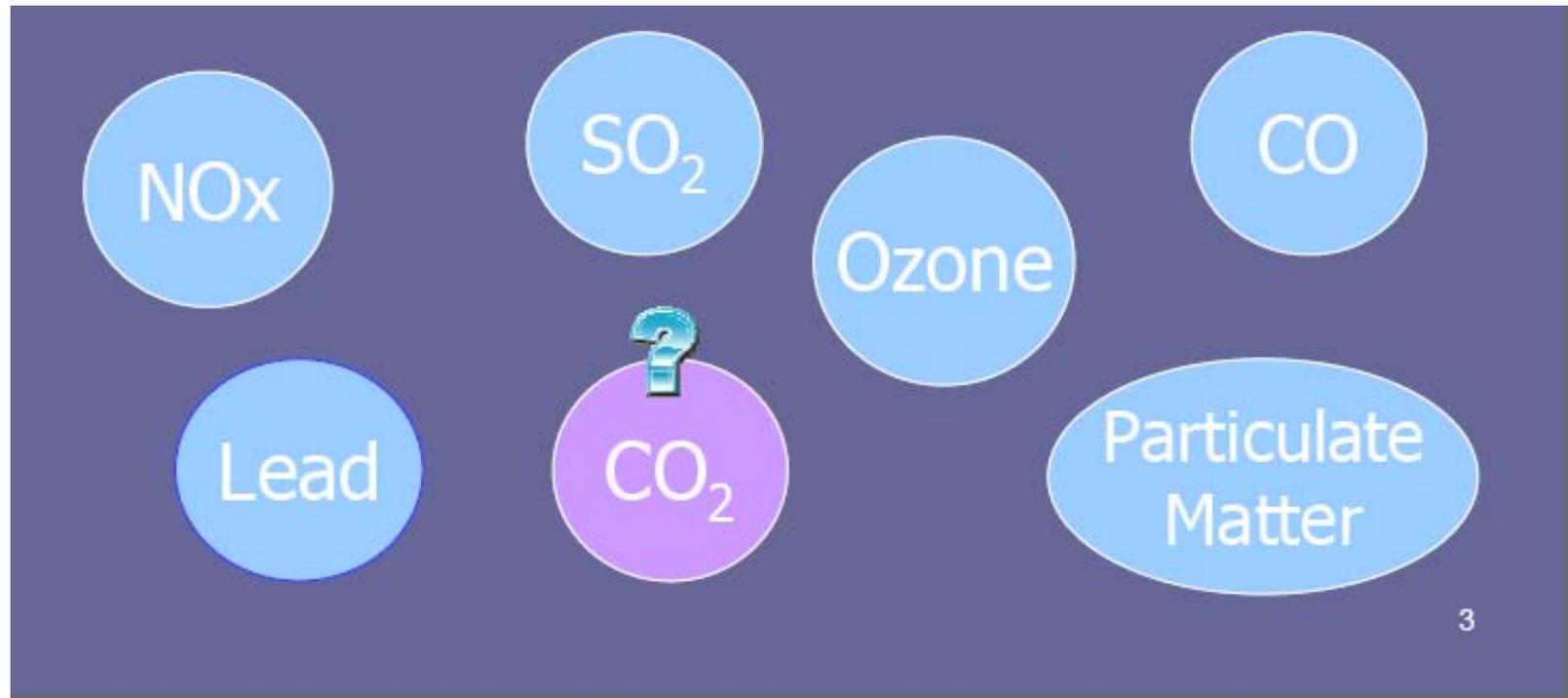
Land Cover/Watershed Health Observations

- Region losing forest cover/green space at 28 acres/day
- Forest preservation, especially large contiguous parcels, important for many reasons – watershed protection, habitat, air quality, climate change, recreation, ...
- Strong relationship between population density and watershed health

Land Cover/Watershed Health And Scenarios

- Proposed metric – population density/stream health relationship
 - Need refinement with additional watershed data
 - Need analysis to demonstrate benefits of stormwater management
 - Use on regional basis or watershed basis?
- Possible metric – parkland area per capita?
- Potential Policy principles – forest protection
 - Preserve contiguous parcels over 75 acres.
 - “No net loss of forest cover”
 - Need current regional forest cover database to support these principles and track changes

Air Quality

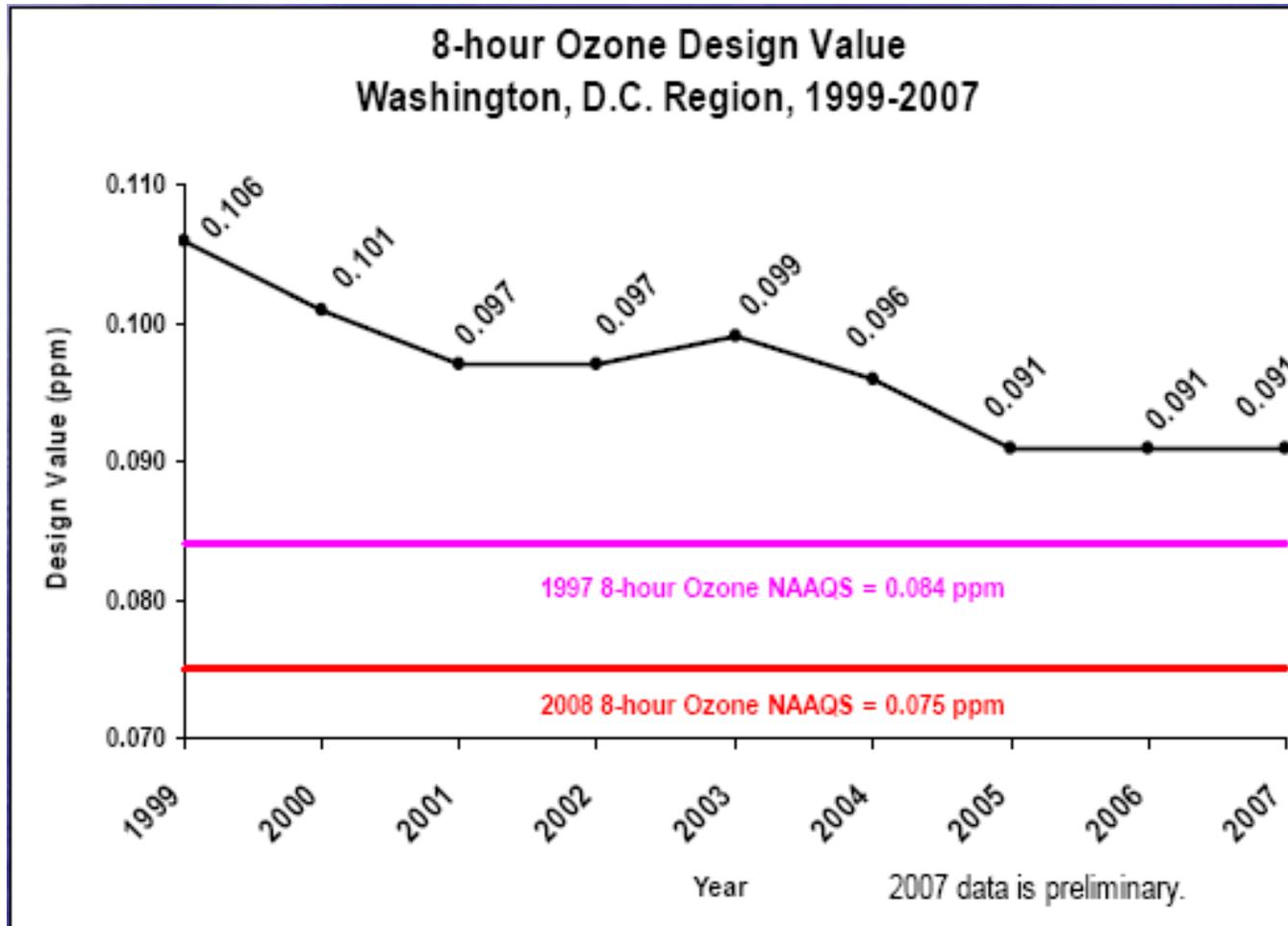


Air Quality Attainment

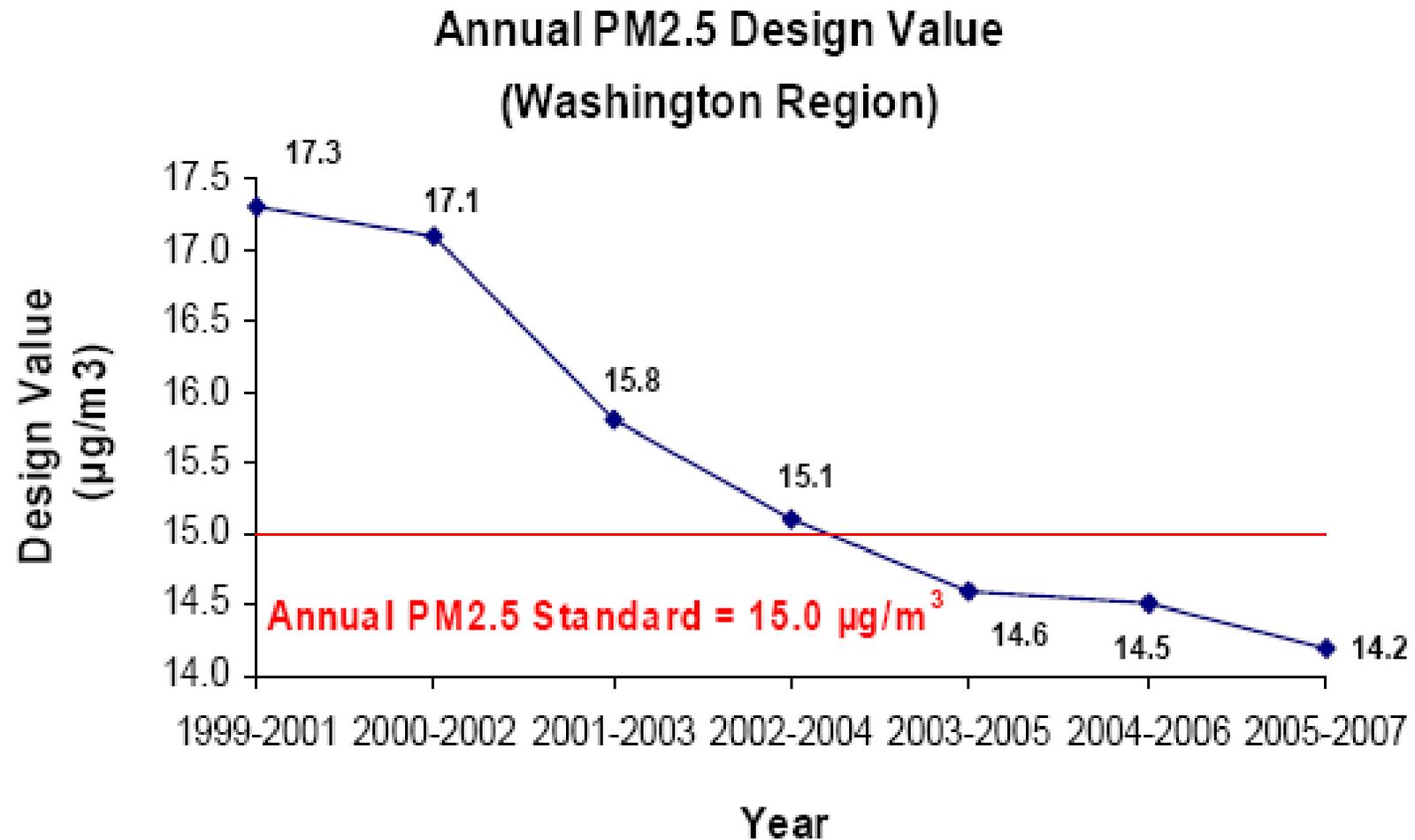
- Federal Standards We Meet:
 - Nitrogen Oxides
 - Lead
 - Carbon Monoxide
 - Sulfur Dioxide
 - 1-hour ozone
 - Particle (Annual)

- Federal Standards We Do Not Meet:
 - 8-hour ozone (1997, 2008)
 - Particle (daily)

8-Hour Ozone Trend: 1999-2007



Small Particle Trend – 1997-2007

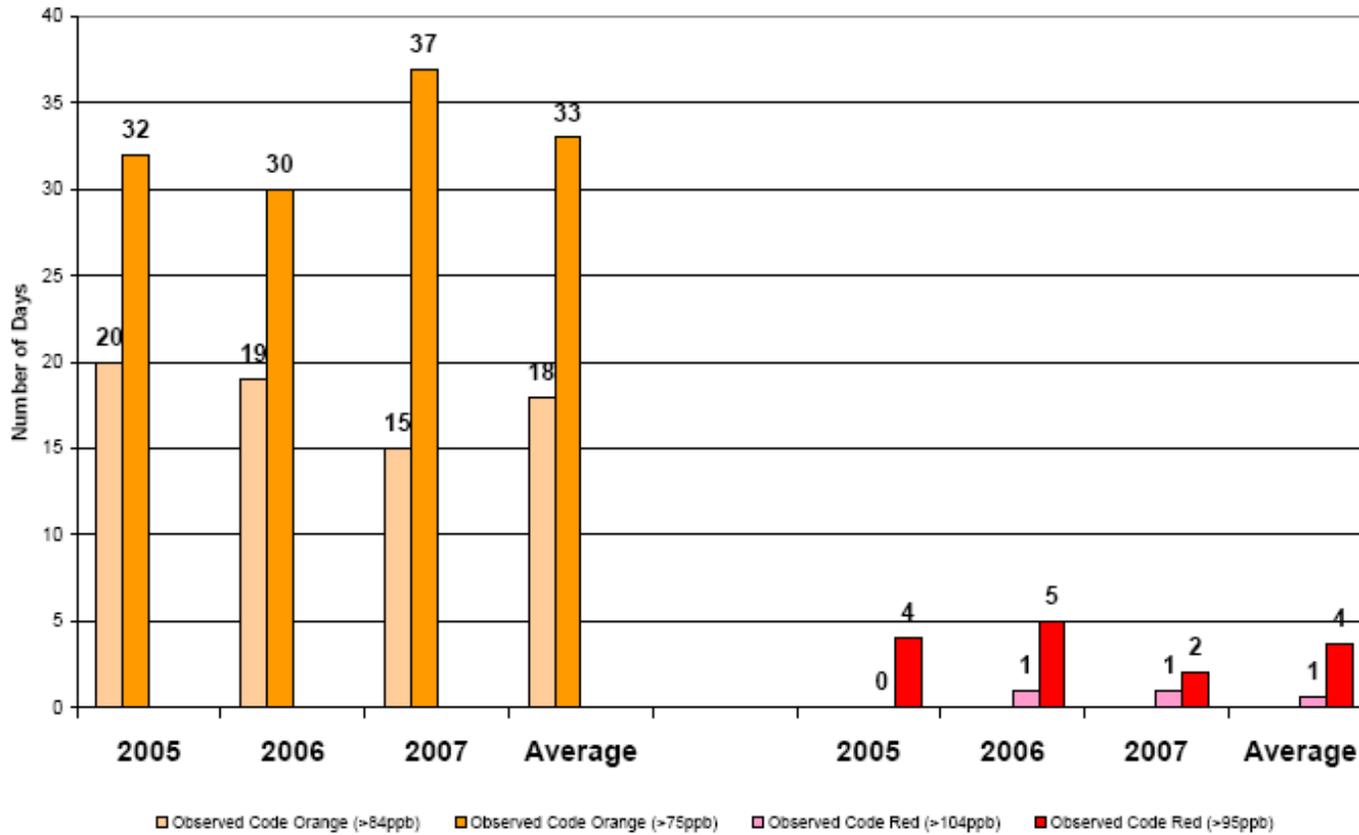


Impact of More Stringent AQ Standard (8-hr Ozone)

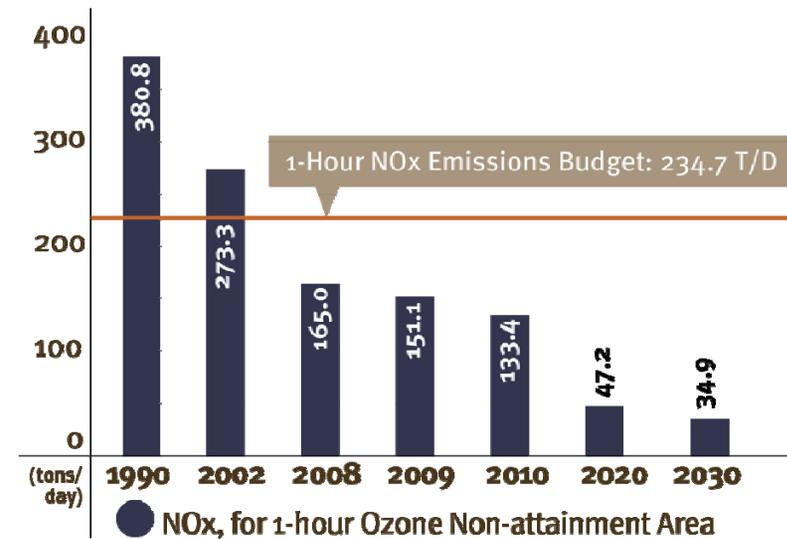
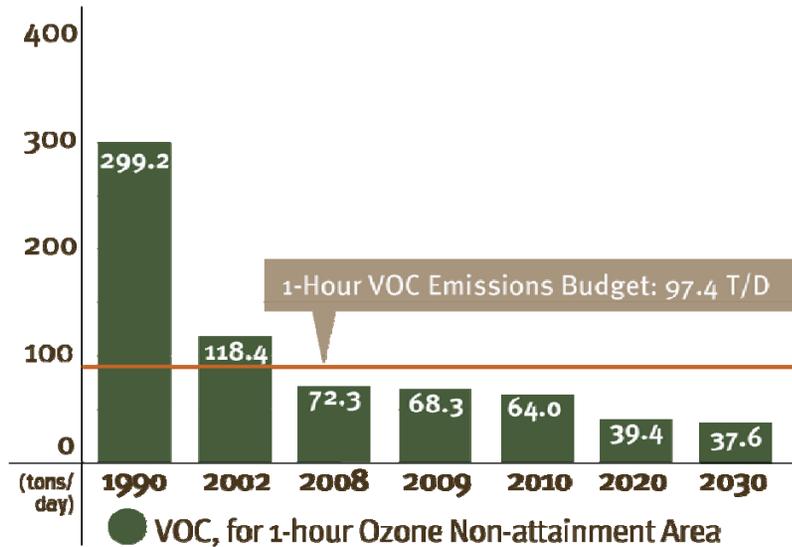


How Many More Orange and Red Days?

Comparison of the Number of Observed Days Between the Old and New Ozone Standards (2005 - 2007)



Transportation Emissions: 1990-2030



Source: 2007 CLRP

Air Quality Observations

- Air quality has improved in the past decade and is expected to improve further over the next 5-10 years
- We still do not meet federal standards for ozone and small particles
- Significant improvement in regional transportation emissions projected to 2030
- AQ Standards likely to become more stringent in years ahead

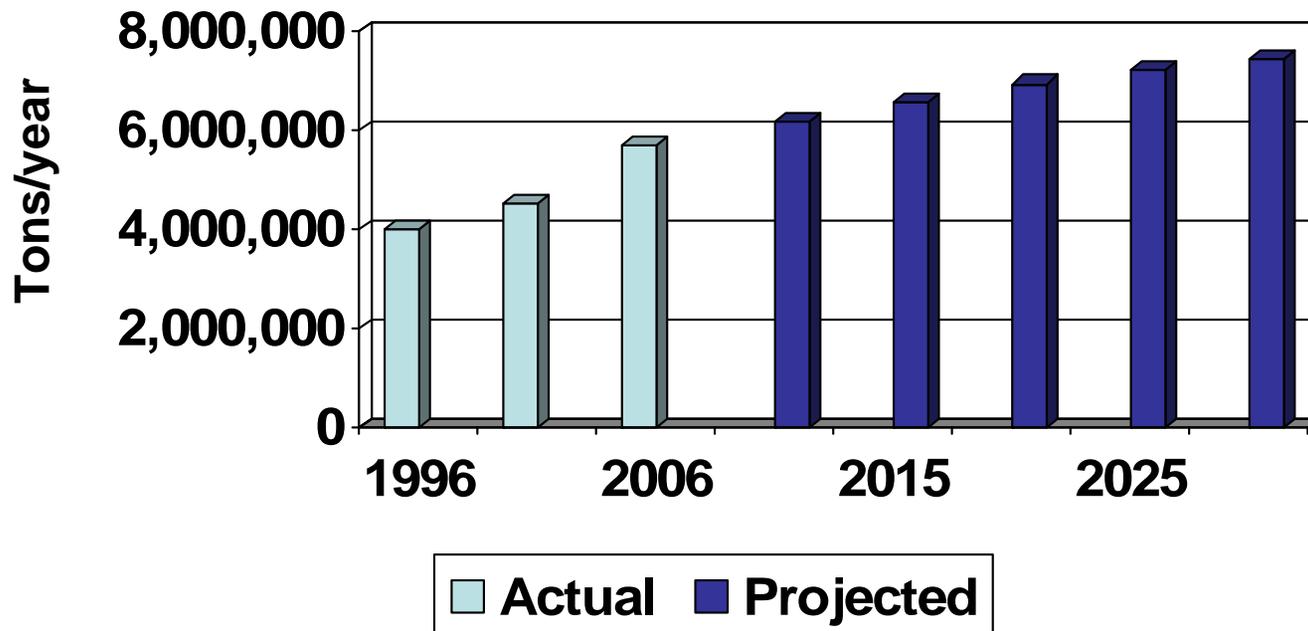
Air Quality and Scenarios

- Metrics
 - Air emissions could be used as a metric for scenario analysis – methodology in place for transportation, would need development for other sectors
- Potential Policy principles
 - Meet all federal air quality health standards
 - Continuous improvement in air quality

Solid Waste and Recycling



Annual Solid Waste Generation - COG Region: 1996 - 2030



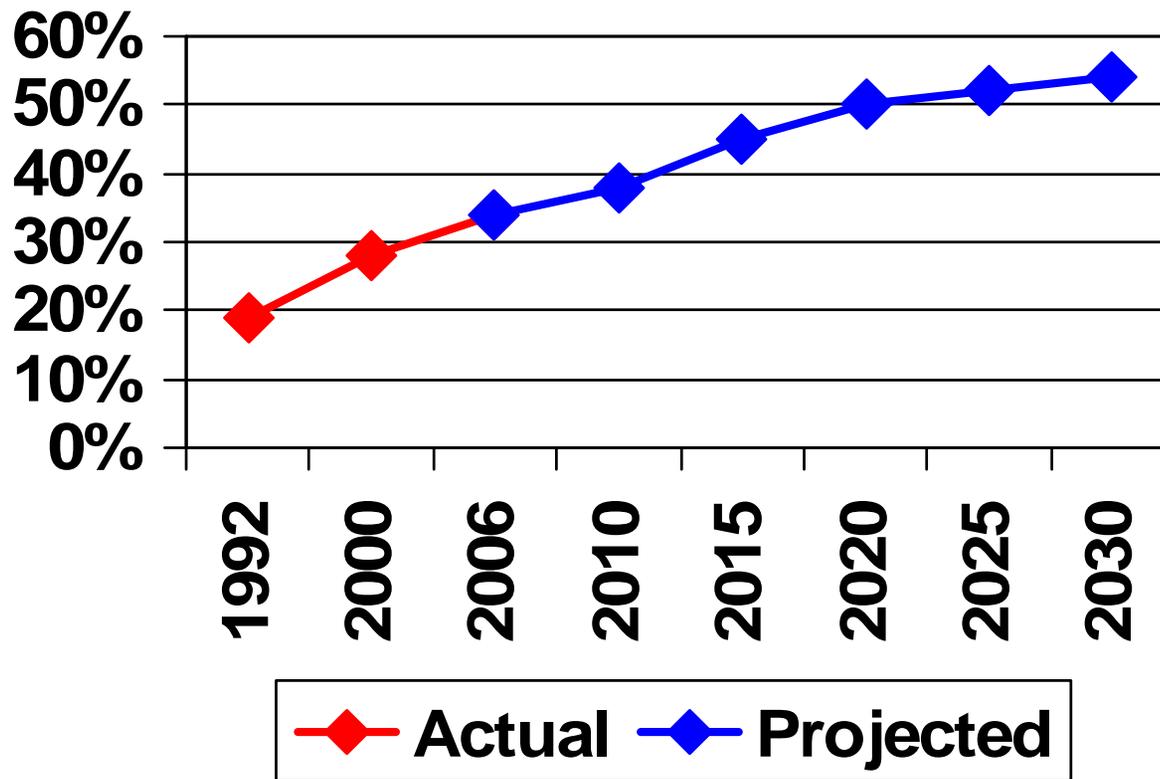
**CY 2006
Waste
Generated**

**5.75
million
tons**

**CY 2030
7.4
million
tons**

-Data from State Recycling Reports for the COG members
-Waste Generation is waste recycled + waste disposed

Recycling Rate for the COG Region: 1992 - 2030



**CY 2006
Regional
Rate**

@ 34%

CY 2030

@ 54%

- Data from State Recycling Reports for the COG members, 1992 data is MD region only
- Does not include source reduction credits awarded by the states

Solid Waste/Recycling Observations

- Per capita waste generation rates are increasing (1996: 5.5 lbs/day, 2006 6.7 lbs/day)
- Recycling rates are increasing too (1993 – 20%, 2006-34%)
- About 1/3 of region's waste is exported for disposal. This will almost certainly increase as region grows but could be offset by increases in recycling.

Solid Waste/Recycling and Scenarios

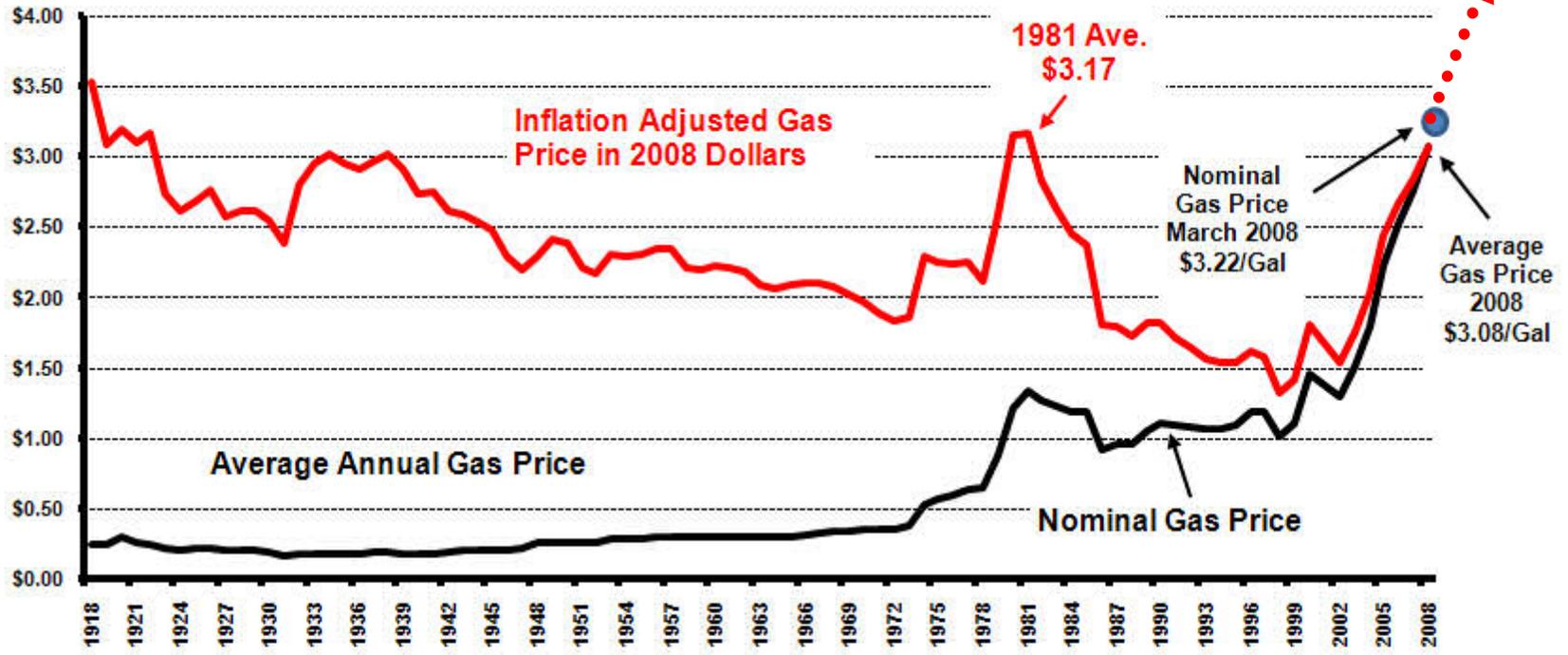
- Potential policy principles
 - Stabilize/reduce per capita waste generation
 - Set regional recycling goals

Energy



UNCHARTED TERRITORY

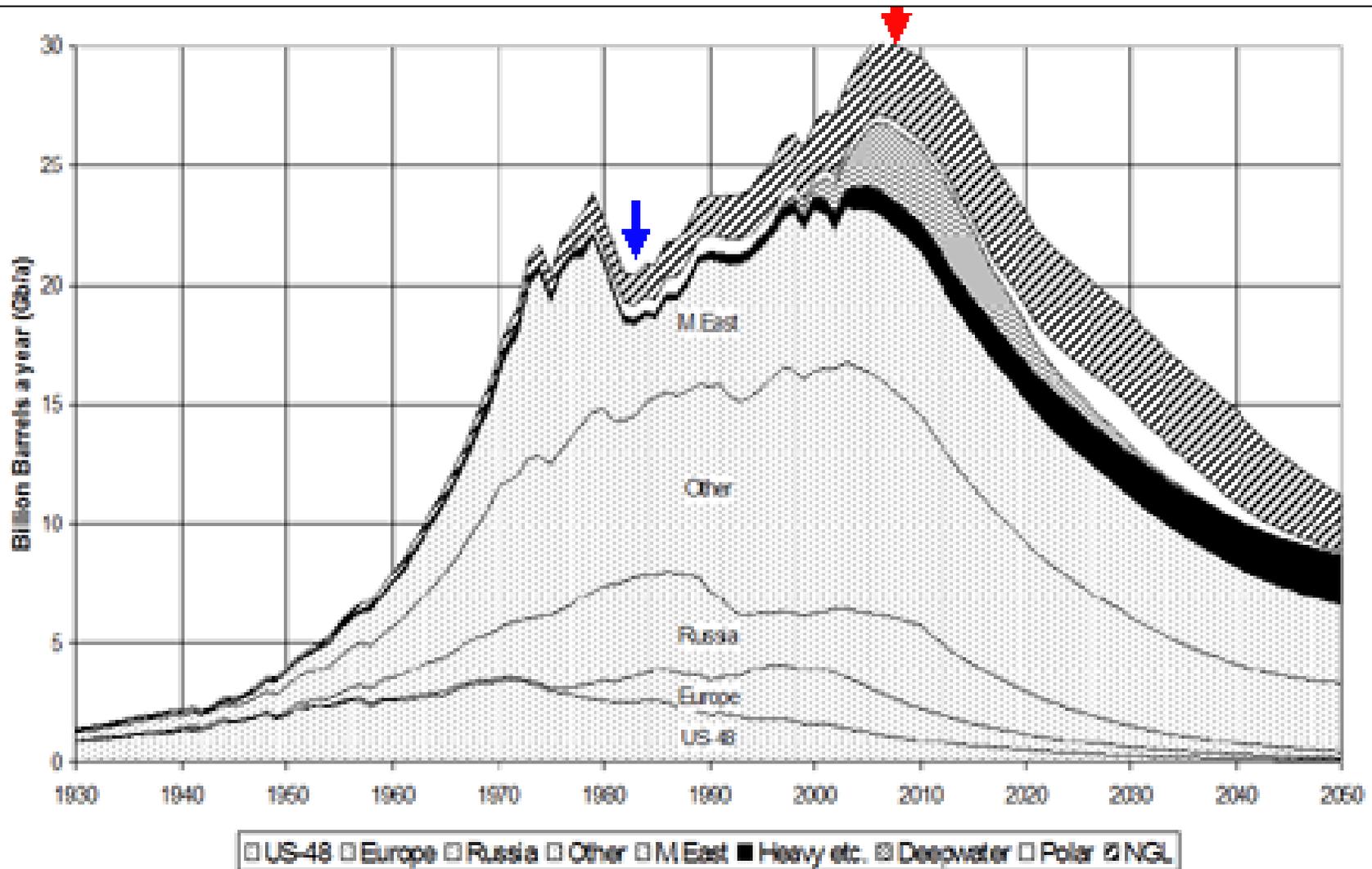
Gasoline Prices 1918-2008
Adjusted for Inflation
 © 2008 *Financial Trend Forecaster*
 www.InflationData.com
 Prepared By Timothy McMahon
 Updated 4/16/08



Note: Prices are Average Annual prices not Peak Prices so peaks are smoothed out considerably

Source of Data: US Energy Information Administration
 CPI-U Inflation index- www.bls.gov

Peak oil is the point in time when the maximum rate of global petroleum production is reached, after which the rate of production enters its terminal decline.



May 22, 2008

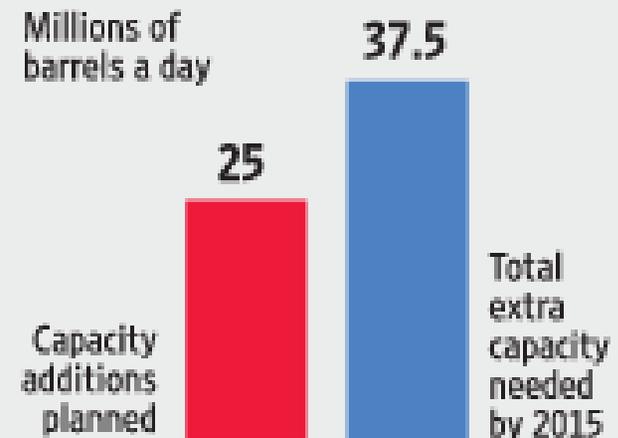
Energy Watchdog Warns Of Oil-Production Crunch

IEA Official Says Supplies
May Plateau Below
Expected Demand

For several years, the IEA has predicted that supplies of crude and other liquid fuels will arc gently upward to keep pace with rising demand, topping 116 million barrels a day by 2030, up from around 87 million barrels a day currently. Now, the agency is worried that aging oil fields and diminished investment mean that companies could struggle to surpass 100 million barrels a day over the next two decades.

Energy Gap

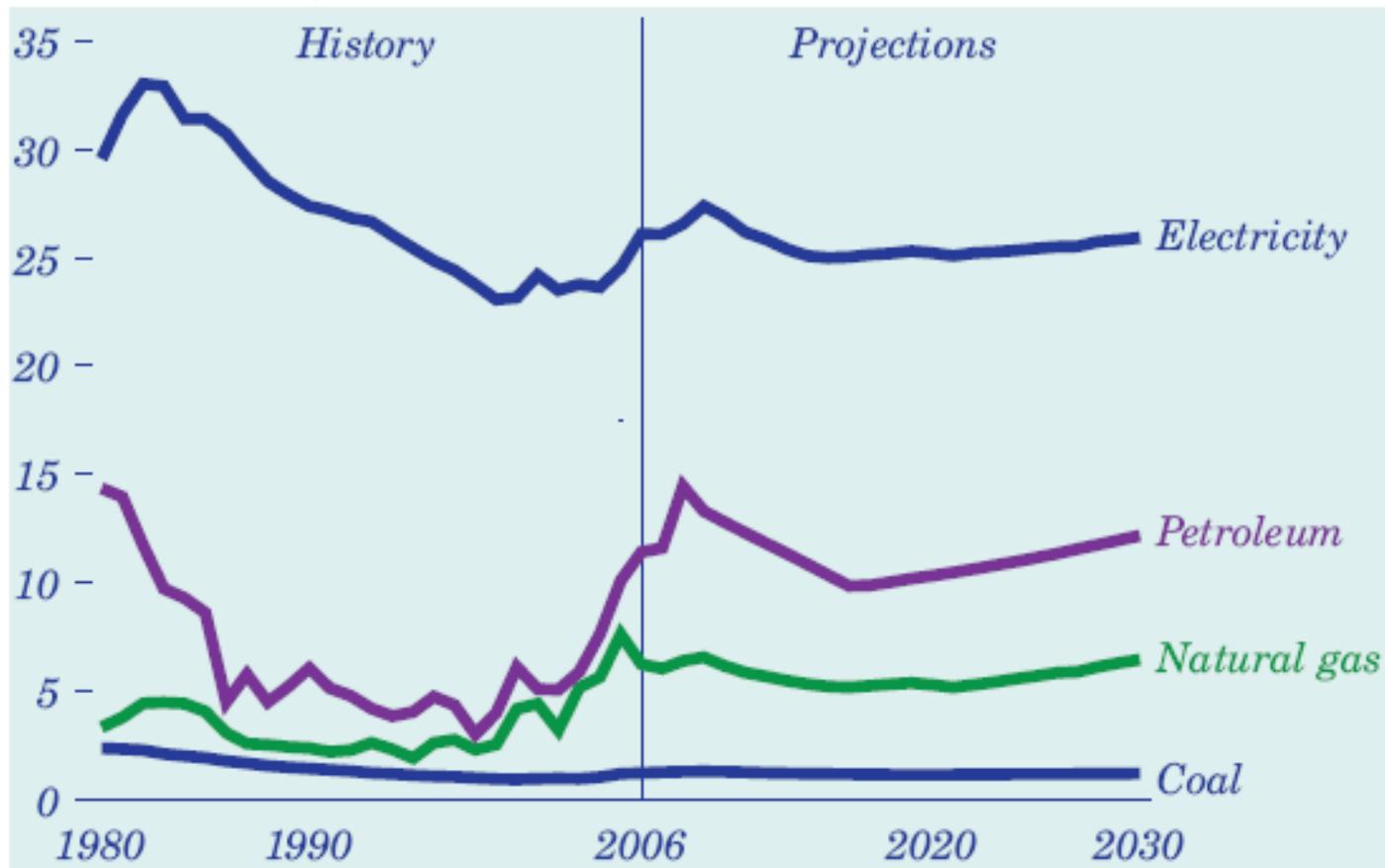
The IEA sees a supply crunch unless producers add 12.5 million barrels a day of capacity beyond current plans



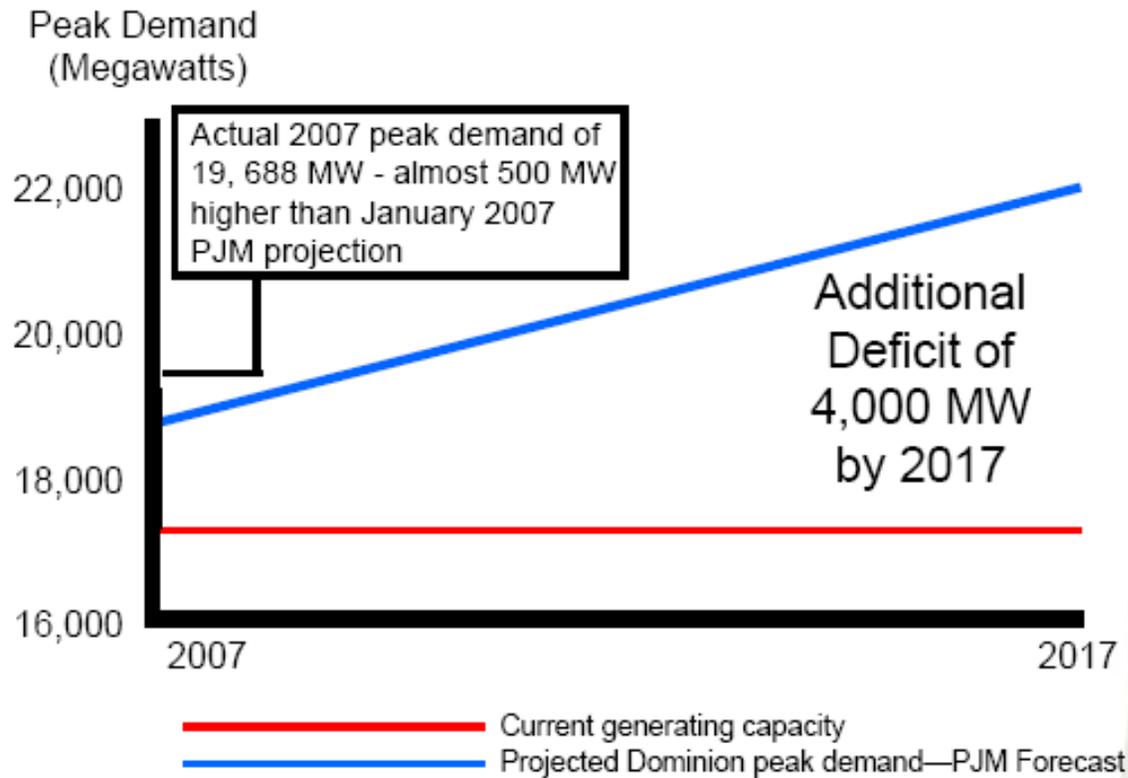
Source: IEA World Energy Outlook, November 2007

Forecast Energy Prices – 1980-2030

Figure 1. Energy prices, 1980-2030 (2006 dollars per million Btu)



Virginia's Mounting Electric Energy Gap



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Energy Observations

- We're in an era of rapidly rising energy prices and increasing uncertainty regarding long-term supply
- Alternative (non-carbon) energy sources, energy efficiency, and energy conservation are essential
- The effects of high energy costs on regional growth and development are uncertain but help support compact growth policies through market forces

Energy and Scenarios

- Energy supply and cost likely to be significant factors affecting/constraining pattern of regional growth and development
- Potential policy principles
 - Energy efficiency and conservation, including quantifiable targets
 - Alternative energy promotion including quantifiable targets

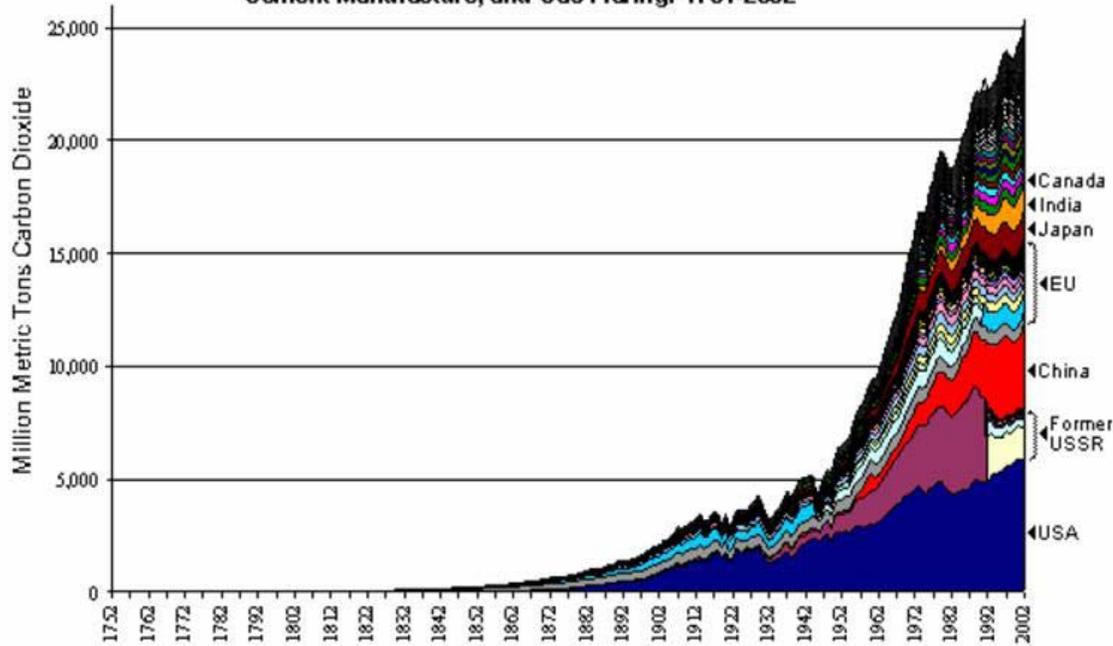
Climate Change



Global Anthropogenic CO₂ Emissions by Region



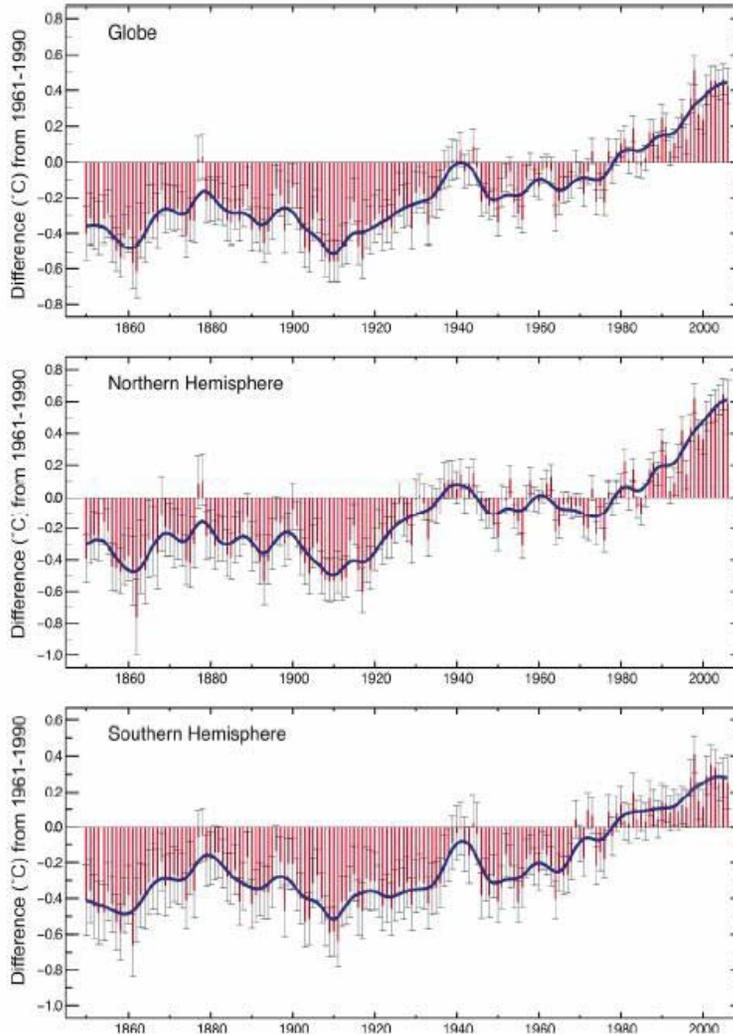
Figure 2: Global CO₂ Emissions from Fossil Fuel Burning, Cement Manufacture, and Gas Flaring: 1751-2002



Source: Carbon Dioxide Information Analysis Center, DOE

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

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

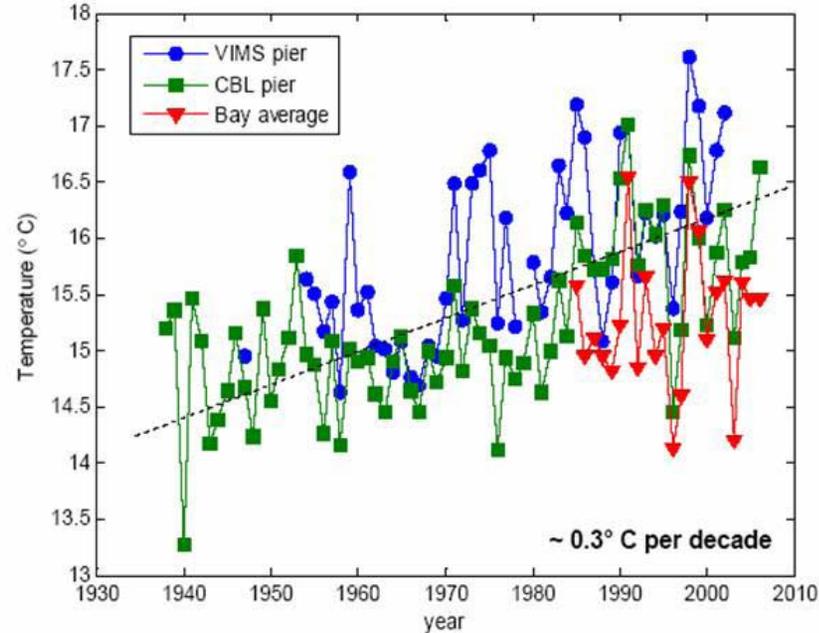
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Note: Slide obtained from presentation by Benjamin DeAngelo, U.S. EPA, to Virginia Climate Commission March 27, 2008

Water Temperature Increase in Chesapeake Bay: 1930 - 2007

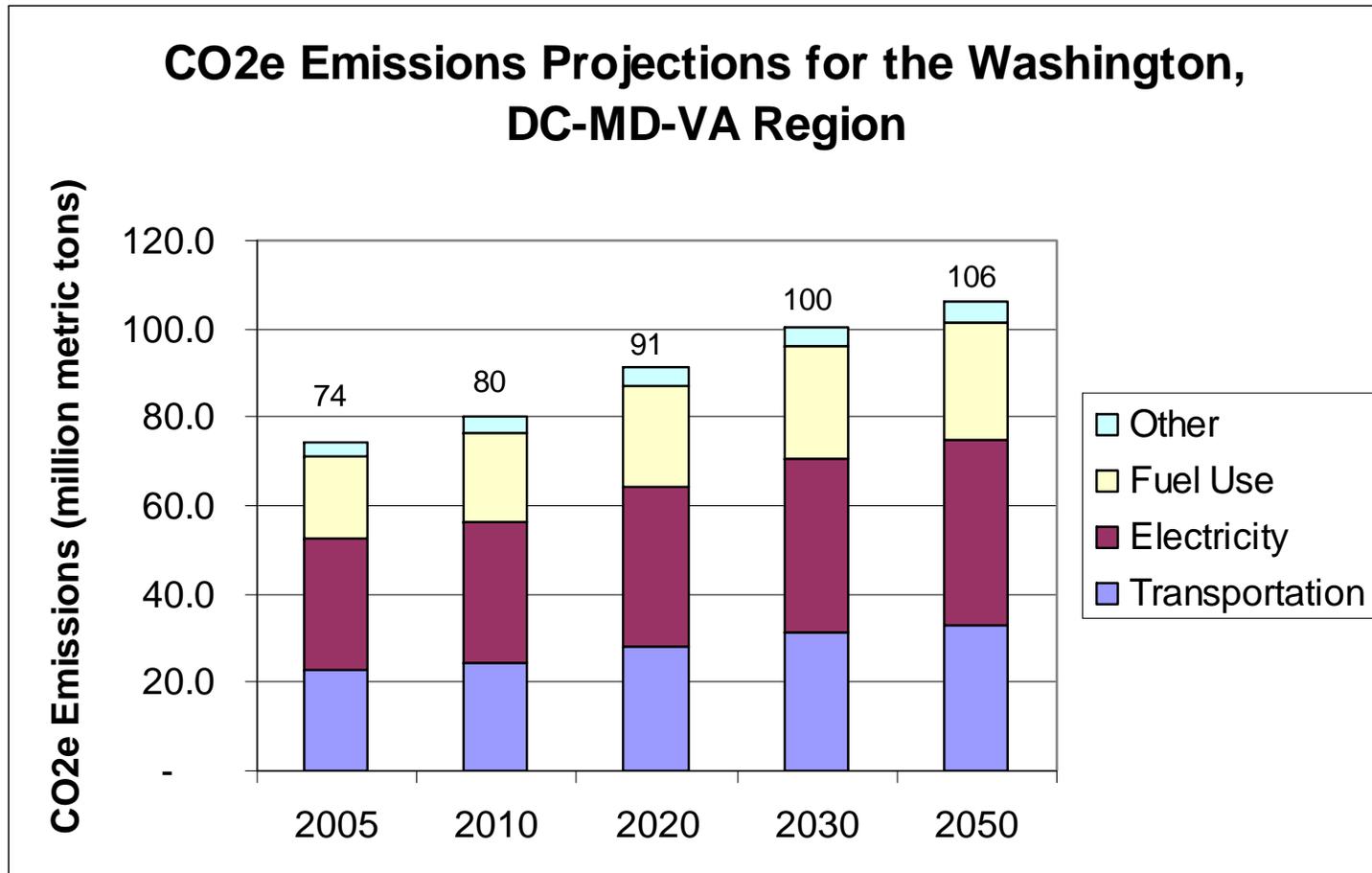


Measured Temperature Changes in Chesapeake Bay Surface Waters



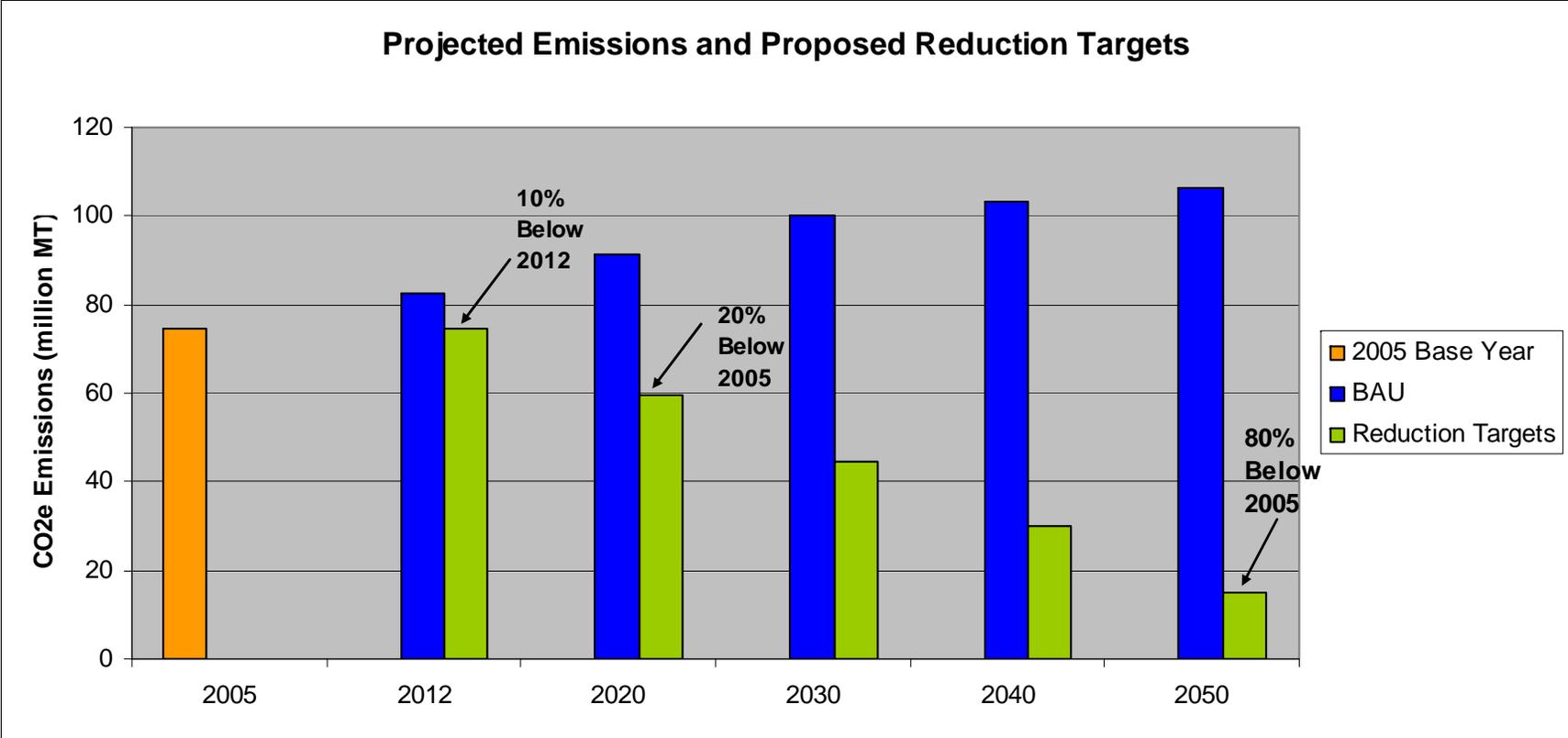
Source: *Predicted Impacts of Climate Change on Coastal Virginia and the Chesapeake Bay: Physical, Geological, and Biogeological Processes*. Presentation to Virginia Climate Commission, April 22, 2008

Business As Usual Projections 2005-2050 for Regional CO₂e emissions



Source: Metropolitan Washington Council of Governments

COG Climate Change Steering Committee: Proposed Regional Reduction Goals



NOTE – GOALS ARE PROPOSED AND HAVE NOT BEEN ADOPTED BY THE COG BOARD OF DIRECTORS.

Land Use Recommendations – In Draft CCSC Report

- Evaluate the benefits from achieving a range of possible goals (up to 95%) for directing new residential and commercial growth to regional activity centers.
 - Identify the percentage of auto trips under 3, 2, 1, ½ mile and develop strategy to shift half of these trips to bike or pedestrian modes.
 - Establish goal and develop program and plan to achieve a “no net loss” in the region’s tree canopy.
- Identify best practices enabling local governments to include greenhouse gas reduction and energy efficiency/conservation as elements in their local comprehensive planning.
 - Devise a consistent, standardized methodology for evaluating the greenhouse gas emission from proposed individual development projects
 - Promote local food production options, local vendors and suppliers

Climate Change - Observations

- Climate Change likely to have a profound effect on region by 2050
- Need to dramatically reduce regional greenhouse gas emissions will help region achieve many interrelated goals – transportation system performance, energy efficiency and conservation, land and watershed preservation, solid waste/recycling, and others.

Climate Change - Scenarios

- Metrics – CO₂/greenhouse gas emissions could be used as a metric for scenario analysis – methodology would need some development
- Policy principles –
 - Many recommendations from Climate Change Steering Committee report could be included in regional compact including regional greenhouse gas emission reduction goals

Growth Factors, Policy Principles and Metrics – Initial Ideas

- **Factors Potentially Constraining Growth or Location of Growth**
 - Water Supply
 - Wastewater capacity
 - Energy Supply
 - Solid waste disposal capacity
- **Potential Metrics**
 - Stream Health
 - Park area per capita
 - Air Pollution emissions (VOC, NOx, Particulates)
 - CO2 emissions
 - Examine metrics used in other regional growth initiatives

- **Potential Environmental Policy Principles in the Compact**
 - Conservation – water, energy, recycling with specific targets
 - Support energy efficiency and alternative/renewable energy policies
 - Meet all federal air quality standards
 - Support regional green building policies
 - Support stormwater management including redevelopment
 - Preserve contiguous forest parcels greater than 75 acres
 - No net loss of forest cover
 - Adopt regional greenhouse gas emission reduction goals

Environmental analysis should take account of more than COG region

