METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS

European Parliament Liaison Office

Jeff King, Chief, Energy and Climate
Department of Environmental Programs

November 14, 2019

Metropolitan Washington
Council of Governments

About COG

- The Metropolitan Washington Council of Governments (COG) is an independent, nonprofit association of governments

- Addresses regional issues
    - Transportation
    - Environment
    - Community Planning
    - Public Safety & Homeland Security

- 300+ elected officials from 24 local governments

- Region Forward Vision
    - Prosperous, Accessible, Livable, Sustainable

Technical Services Team | Esri, HERE, Garmin, NG...

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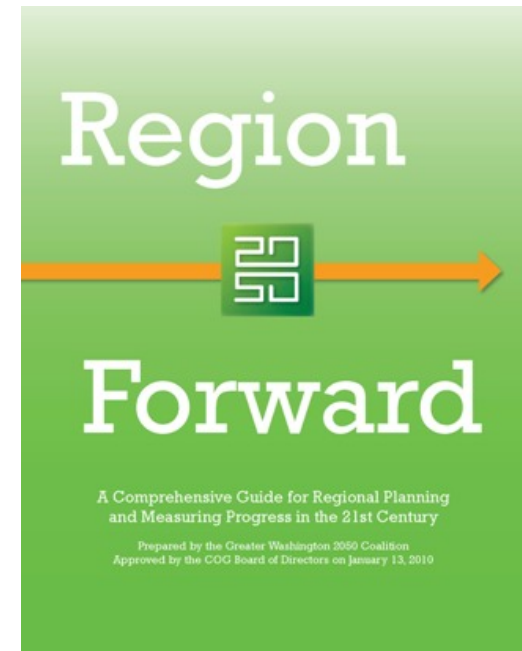**Council of Governments**
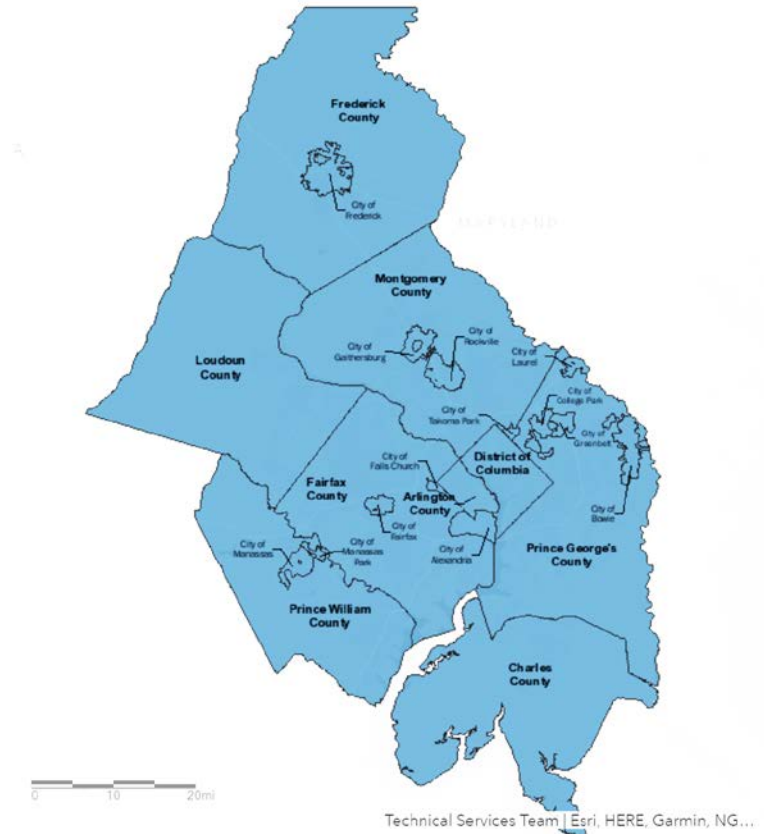
Transportation Planning

- The National Capital Region Transportation Planning Board (TPB) is the federally designated Metropolitan Planning Organization (MPO) for the region

- The TPB prepares plans and programs providing regional coordination in transportation planning and for federal transportation funds to flow to the region

- The long-range transportation for the region – Visualize 2045

- Planning areas include roads, transit, walking, biking, freight, airports, land use coordination, air quality conformity, management & operations safety, performance-based planning and fairness & accessibility

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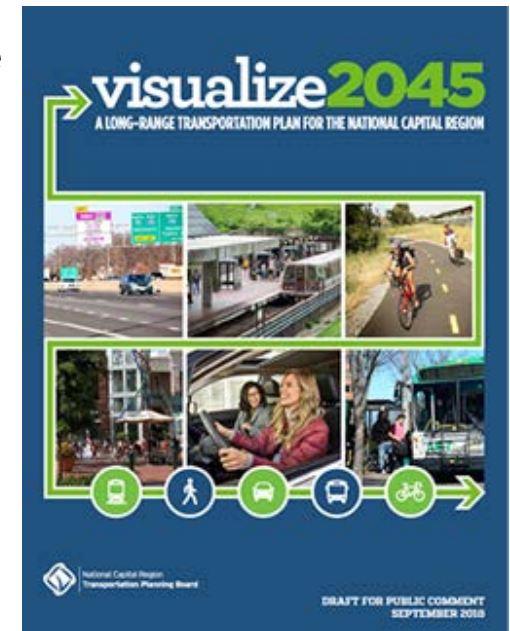
Community Planning

- Region Forward – the region's vision to shape more livable and prosperous communities

- Regional cooperation on planning, the economy, and housing for all residents; population, employment, and housing forecasts; shares best practices and data on affordable housing and homelessness

- COG proposes strategies to support sound land use and high-quality development in Activity Centers—the locations that can best accommodate the region's growth

- COG and its members also coordinate on public health and child welfare programs

Region 2050 Forward

A Comprehensive Guide for Regional Planning and Measuring Progress in the 21st Century

Prepared by the Greater Washington 2050 Coalition
Approved by the COG Board of Directors on January 13, 2010

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Homeland Security & Public Safety

- Increases the region's ability to detect, prepare, train for, and respond to man-made and natural threats

- Works with police chiefs, fire chiefs, and other first responders to address

  - Homeland Security – regional priority setting, mutual aid, supporting emergency communication and coordination, and emergency training, exercises & after action assessments

  - Public Safety Coordination – Planning for emergency response, information sharing and crime prevention, and addressing regional issues such as gangs, drunk driving & fire safety

  - Emergency Communication – Enhance emergency communication through the Regional Incident Communication and Coordination System (RICCS), regional calls for emergency management, and support for 911 & citizen warning systems

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Summary of Current Forecast (Round 9.1)

COG / TPB Planning Area
(Thousands)

	2015	2045	2015 to 2045 Number	Percent
Employment	3,160.8	4,273.8	1,113.0	35%
Population	5,390.6	6,925.7	1,535.1	28%
Households	2,011.7	2,659.9	648.2	32%

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Challenges from Economic Growth

- Land Use & Housing
  - Affordability
  - Proximity to jobs
  - Activity Centers

- Land Use & Transportation
  - Expansion and Maintenance - Funding
    - Roads
    - Transit
  - Congestion
  - Access to Jobs

- Environmental Sustainability
  - Water, Air, Energy, Climate
  - Agriculture, Forestry
  - Waste Management

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Uncertainties

- Federal Government
  - Spending
  - Relocation

- Mobility
  - Electric Vehicles
  - Autonomous Vehicles
  - Freight

- Energy
  - Grid Modernization/Microgrids
  - Solar with Storage
  - Fracking, Natural Gas
  - Greenhouse gas emission regulation

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Environmental Goals

- Air Quality
  - Ensure no unhealthy air quality days to protect the public health

- Water Quality
  - Ensure clean rivers & streams and a safe, resilient drinking water supply

- Energy & Climate
  - Conserve energy and increase use of clean energy sources to reduce greenhouse gas emissions

- Waste Management
  - Minimize waste generation and provide for safe, cost-effective collection, diversion or disposal

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Region Forward: *Measuring Progress*

Sustainability Targets — April 2018

TARGET						
By 2020, construct 5,000 **certified green buildings** (Target revised to show number of high-performance buildings. The data on square footage of LEED commercial construction is no longer available)	By 2020, **reduce regional greenhouse gas emissions** by 20% below 2005 levels	Beginning in 2014, the region's **air quality will be improving** and ambient concentrations will be reduced below federal standards (0.70)	The region will identify, conserve, and enhance a network of **protected open spaces, parks and green infrastructure** to provide ecological benefits, wildlife habitat, recreational opportunities, and scenic beauty	By 2050, 50% of **all sentinel watersheds will be in good or excellent condition**	By 2025, achieve 100% of **Chesapeake Bay Program's Water Quality Implementation Goals**	Beginning in 2012, the region will **maintain more than 497,500 acres of its area for agricultural uses**

LATEST ESTIMATE

3,553	10%	0.72	26%	Data not updated since 2010	100%	498,946

TREND

↑	↓	→	→	Not Determined	↓	↓

MEET / DO NOT MEET TARGET

✓	✗	✗ (Attaining 2008 Ozone standard, long-term trend down)	✗	Not Determined	✓ (Measures current attainment of TMDL wastewater nutrient limits)	✓ (Original 450,000 acre goal adjusted to include Charles County)

SOURCE/ LATEST DATA

COG's 2020 Regional Climate and Energy Action Plan, 2016	Draft COG Greenhouse Gas Inventories, 2005, 2012, 2015 (report and fact sheet will be published this summer)	EPA Design Value Reports - https://www.epa.gov/air-trends/air-quality-design-values, 2016	Chesapeake Bay Program GIS data - https://www.chesapeakebay.net/what/data, 2015-2016	Chesapeake Watershed stream health data - http://www.chesapeakeprogress.com/abundant-life/stream-health	Chesapeake Bay Total Maximum Daily Load (TMDL) Tracker, https://tmdl.chesapeakebay.net/	USDA Census of Agricultural - https://www.agcensus.usda.gov/, 2012

Long History of Delivering Clean Air

Air Pollution Control Act 1968

"They truly can be proud of the efforts they have made and the achievements that have resulted."
Remarks on signing the Clean Air Act,
President Lyndon Johnson, December 1963

No Code Red Days 2005

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Air Quality Program Framework

- Federal
  - National Ambient Air Quality Standards (NAAQS) for criteria pollutants
    - O_3, $PM_{2.5}$, CO, Pb, NO_2, SO_2
  - Non-attainment area designations
    - State Implementation Plan (SIP) and Maintenance Plan Requirements
  - Sector/source regulations
    - NO_x, VOC, SO_2, CO, CO_2 Pb, hazardous air pollutants

- State
  - Develop State Implementation Plans (SIPs)
  - State regulatory programs
    - Permit major & minor sources, vehicle inspection & maintenance (I/M)

- Super-Regional
  - Ozone Transport Commission (OTC)
  - National Association of Clean Air Agencies (NACAA)
  - Mid Atlantic Regional Air Management Association (MARAMA)
  - Northeast States for Coordinated Air Use Management (NESCAUM)

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Public Education

- Clean Air Partners
  - Public-private partnership
  - Educating individuals, businesses, and organizations in the greater metropolitan Baltimore-Washington region about health risks associated with poor air quality and the impacts on our environment
  - Actions individuals can take to reduce air pollution
  - Public notices
    - Daily air quality forecasts
    - Unhealthy air quality notices

- COG Environmental Quality Dashboard

- AirNow.gov

- State environmental agencies
  - District Department of Energy and Environment
  - Maryland Department of the Environment
  - Virginia Department of Environmental Quality

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Air Quality Monitoring

- Air Monitoring
  - Major Criteria Pollutants – ozone, fine particles ($PM_{2.5}$) - Regionwide
  - Other Pollutants – carbon monoxide, lead, nitrogen dioxide, PM_{10}, SO_2, air toxics
  - $PM_{2.5}$ speciation monitors
  - Hazardous Air Pollutants – Source specific (e.g., mercury)

- Emission Sources
  - Smokestack Continuous Emissions Monitoring (CEMS)
  - Roadside Monitoring
  - Tailpipe Vehicle Inspection/Maintenance (I&M)

- Federal Requirements
  - Number and location of monitors
  - State and local Air Monitoring Stations (SLAMS)
  - Clean Air Status and Trends Network (CASTNET)
  - Chemical Speciation Network
  - Federal Reference Method (FRM)
  - Federal Equivalent Method (FEM)
  - EPA Clean Air Markets Division (CAMD)

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Air Quality Monitoring

Metropolitan Washington's Air Monitors

Monitor Name		Pollutants Currently Monitored						
		O_3	$PM_{2.5}$	PM_{10}	CO	NO_2	SO_2	Pb
1.	Takoma Rec Center	•				•		
2.	McMillan NCore	•	•	•	•	•	•	•
3.	Verizon				•			
4.	Hains Point		•					
5.	Near Road		•		•	•		
6.	River Terrace	•	•		•	•	•	
7.	Frederick Airport	•						
8.	Rockville	•	•					
9.	Beltsville (Howard University site)	•	•	•	•	•	•	
10.	Beltsville	•					•	
11.	Prince George's Equestrian Center	•	•					
12.	Calvert	•						
13.	Southern Maryland	•						
14.	James S. Long Park	•				•		
15.	Ashburn	•	•			•		
16.	Springfield Near Road		•		•	•		
17.	Lee District Park	•	•	•			•	
18.	Tucker Elementary School			•				
19.	City of Alexandria				•	•		
20.	Aurora Hills	•	•		•	•		

Air Quality Monitoring

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Peak 8-Hour Average Ozone Levels (ppb)

March 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
24	25	26	27	28	01 **35**	02 **38**
03 **42**	04 **48**	05 **44**	06 **43**	07 **47**	08 **44**	09 **43**
10 **40**	11 **50**	12 **55**	13 **56**	14 **54**	15 **46**	16 **52**
17 **49**	18 **47**	19 **51**	20 **53**	21 **45**	22 **48**	23 **48**
24 **54**	25 **55**	26 **47**	27 **49**	28 **55**	29 **55**	30 **63**
31 **47**						

April 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	01 **48**	02 **48**	03 **57**	04 **58**	05 **45**	06 **54**
07 **56**	08 **47**	09 **55**	10 **56**	11 **45**	12 **47**	13 **49**
14 **42**	15 **45**	16 **51**	17 **54**	18 **58**	19 **37**	20 **47**
21 **43**	22 **45**	23 **58**	24 **56**	25 **55**	26 **48**	27 **56**
28 **46**	29 **45**	30 **62**				

May 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	01 **39**	02 **48**	03 **44**	04 **39**
05 **31**	06 **50**	07 **59**	08 **43**	09 **44**	10 **42**	11 **38**
12 **39**	13 **34**	14 **41**	15 **51**	16 **58**	17 **55**	18 **66**
19 **56**	20 **54**	21 **44**	22 **50**	23 **52**	24 **56**	25 **53**
26 **52**	27 **51**	28 **45**	29 **56**	30 **51**	31 **59**	

June 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	01 **71**
02 **58**	03 **47**	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Air Quality Index (AQI) Values — When the AQI is in this range:	Levels of Health Concern — ...air quality conditions are:
0 to 50	Good
51 to 100	Moderate
101 to 150	Unhealthy for Sensitive Groups
151 to 200	Unhealthy
201 to 300	Very Unhealthy
301 to 500	Hazardous

1 Code Orange Day, 26 Code Yellow Days, 68 Code Green Days

Analysis is based on draft and incomplete data as of June 4, 2019.

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Ozone Exceedance Days

Number of Exceedance Days Under the 2015 Ozone Standard (70 ppb)
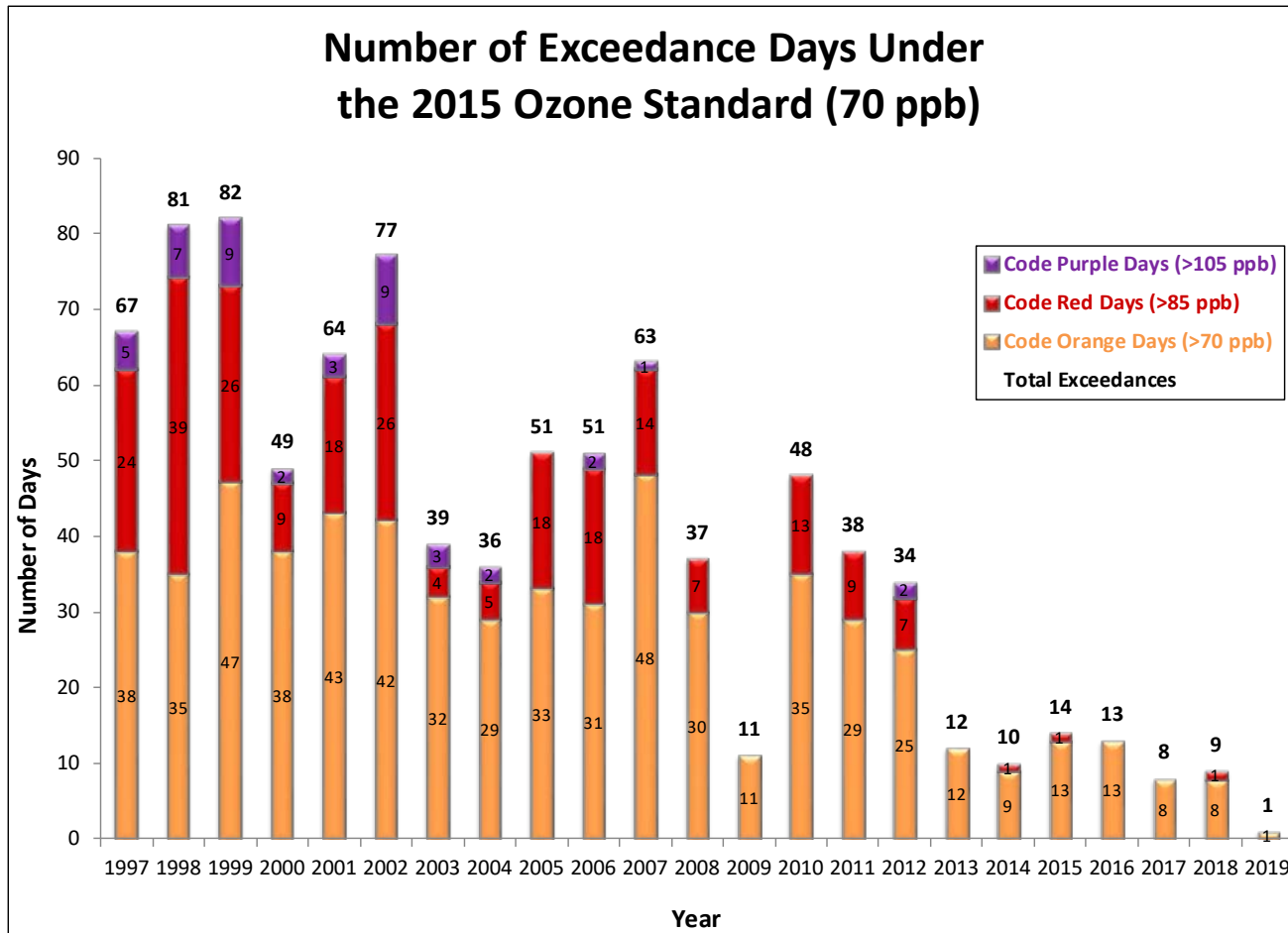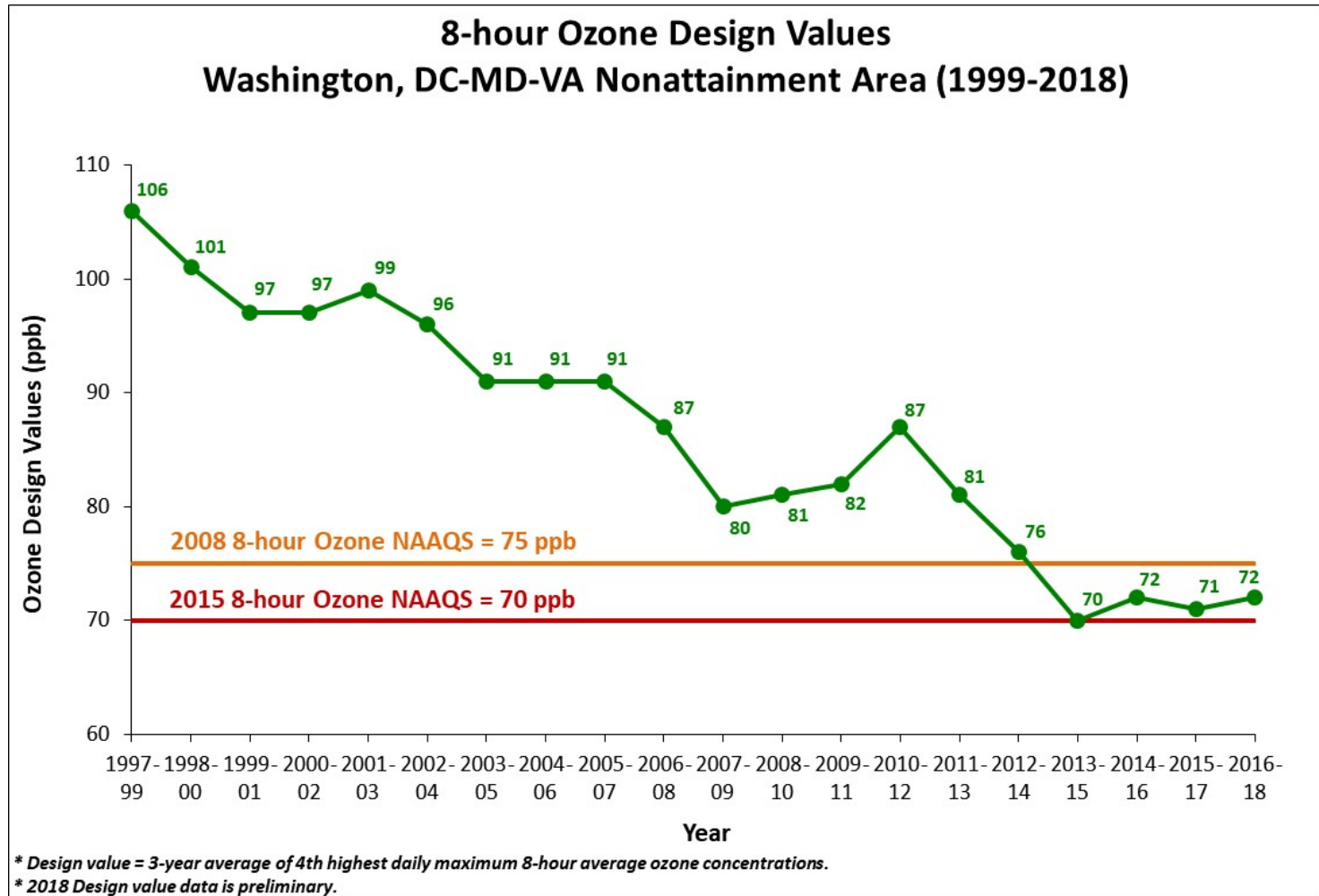
Air Quality Design Value

Calculation

- Record hourly readings from all monitors in the region

- Each monitor records a maximum 8-hour average for each day

- Average the 4th highest reading for each monitor for each year for the most recent 3 year period

- Design Value is the highest 3-year average 4th highest concentration from any single monitor in the region

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Ozone Design Value Trend

8-hour Ozone Design Values
Washington, DC-MD-VA Nonattainment Area (1999-2018)

Design value = 3-year average of 4th highest daily maximum 8-hour average ozone concentrations.
2018 Design value data is preliminary.

Why Fewer Exceedance Days Now ?

Emission Control Programs

Federal	State	Local
Acid Rain Program (1996/2000)	Vehicle Inspection & Maintenance Programs	Renewable Energy Programs Regional Wind Power Purchase Program Clean Energy Rewards Program Renewable Portfolio Standards
Tier 2 (LD Vehicle) Rule (2004)	Maryland Healthy Air Act (2009/2012)	Energy Efficiency Programs LED Traffic Signal Retrofit program Building Energy Efficiency Programs
HD Diesel vehicle Rule (2004/2007)	Virginia CSAPR Rule	VRE Idling Reduction
NOX SIP Call (2004)	Ozone Transport Commission Rules	LOW VOC Paint
CAIR/CSAPR/CSAPR Update (2009/2015/2017)		Gas Can Replacement

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24-Hour Average PM2.5 Levels (µg/m³)

March 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
24	25	26	27	28	01 **11.3**	02 **12.2**
03 **12.9**	04 **9.5**	05 **7.4**	06 **9.4**	07 **10.2**	08 **15.6**	09 **16.1**
10 **9.9**	11 **4.3**	12 **8.0**	13 **12.4**	14 **9.0**	15 **8.9**	16 **4.4**
17 **5.2**	18 **9.0**	19 **9.0**	20 **12.6**	21 **4.7**	22 **5.0**	23 **4.6**
24 **6.0**	25 **11.0**	26 **4.2**	27 **6.3**	28 **9.0**	29 **10.9**	30 **15.0**
31 **10.2**						

April 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	01 **5.7**	02 **8.9**	03 **8.8**	04 **12.1**	05 **9.4**	06 **12.8**
07 **11.5**	08 **9.4**	09 **7.0**	10 **7.9**	11 **5.0**	12 **8.1**	13 **7.3**
14 **7.1**	15 **3.5**	16 **4.8**	17 **6.2**	18 **10.0**	19 **9.5**	20 **4.6**
21 **3.7**	22 **5.4**	23 **9.2**	24 **7.0**	25 **10.3**	26 **8.4**	27 **4.8**
28 **5.7**	29 **5.2**	30 **13.0**				

May 2019

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	01 **10.6**	02 **14.2**	03 **13.7**	04 **23.0**
05 **8.7**	06 **3.8**	07 **7.6**	08 **10.5**	09 **6.7**	10 **6.6**	11 **7.0**
12 **2.4**	13 **3.0**	14 **3.8**	15 **6.9**	16 **16.1**	17 **13.0**	18 **15.8**
19 **15.1**	20 **10.8**	21 **4.9**	22 **6.5**	23 **12.0**	24 **19.1**	25 **9.5**
26 **15.8**	27 **13.0**	28 **13.3**	29 **13.5**	30 **8.1**	31 **7.6**	

June 2019

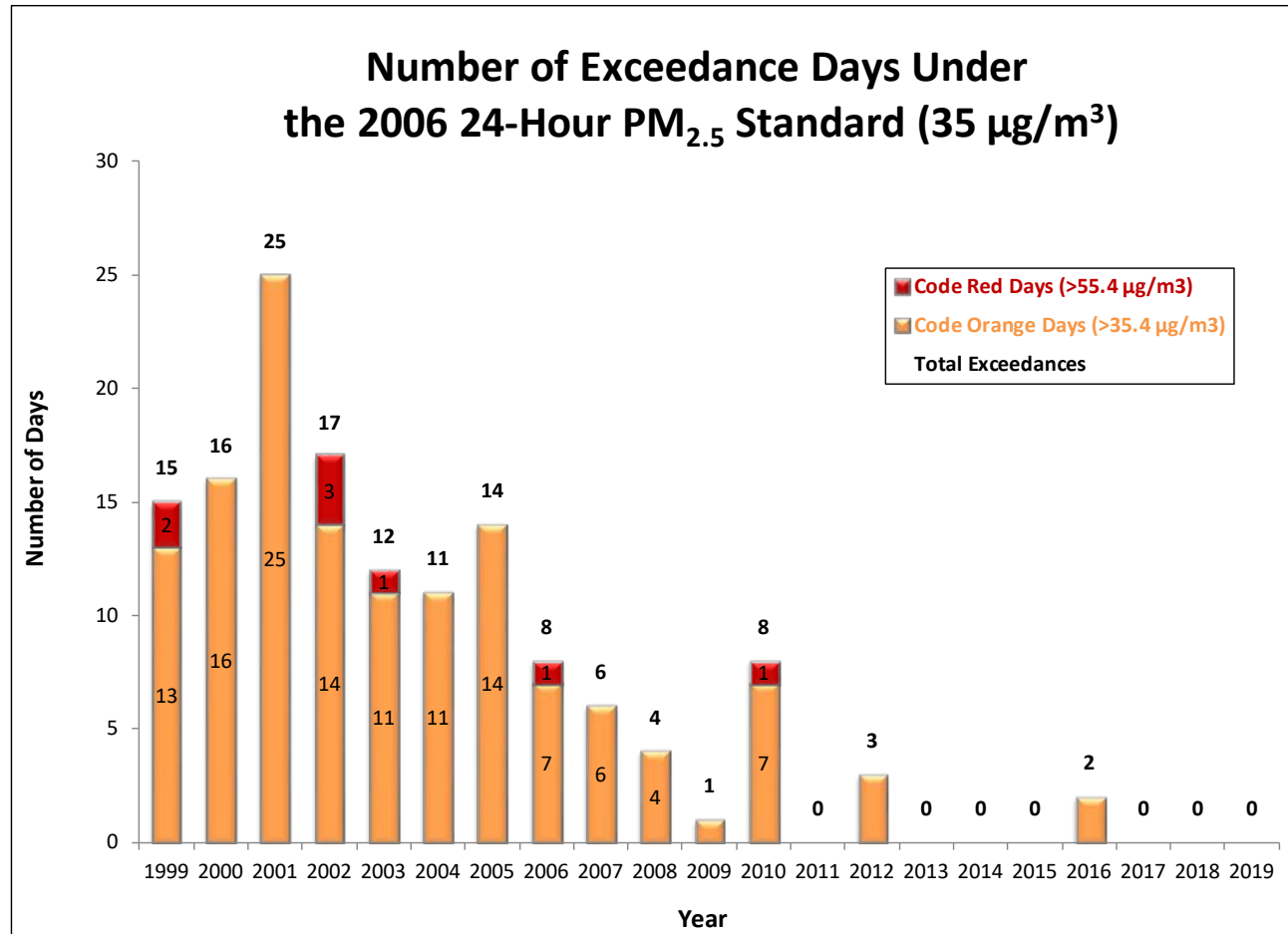| Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	01 **12.0**
02 **15.1**	03 **5.8**	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

23 Code Yellow Days, 72 Code Green Days

Analysis is based on draft and incomplete data as of June 4, 2019.

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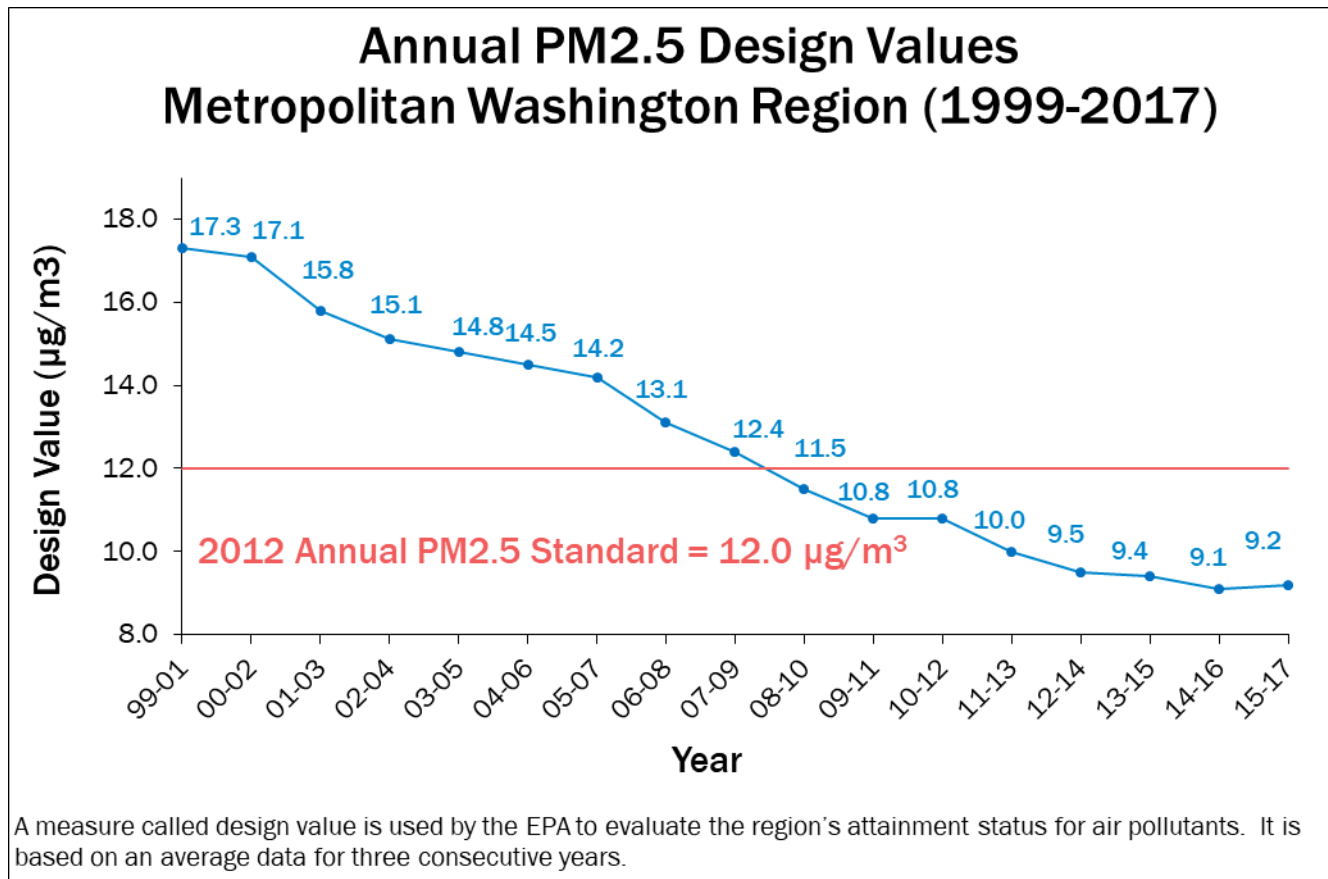
24-Hour PM2.5 Design Value Trend

PM2.5 Exceedance Trend

Number of Exceedance Days Under the 2006 24-Hour PM$_{2.5}$ Standard (35 µg/m³)

Legend:
- Code Red Days (>55.4 µg/m3)
- Code Orange Days (>35.4 µg/m3)
- Total Exceedances

Year	Code Orange	Code Red	Total
1999	13	2	15
2000	16		16
2001	25		25
2002	14	3	17
2003	11	1	12
2004	11		11
2005	14		14
2006	7	1	8
2007	6		6
2008	4		4
2009	1		1
2010	7	1	8
2011			0
2012	3		3
2013			0
2014			0
2015			0
2016	2		2
2017			0
2018			0
2019			0

Analysis is based on draft and incomplete data as of June 4, 2019.

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Annual PM2.5 Design Value Trend

Annual PM2.5 Design Values
Metropolitan Washington Region (1999-2017)

2012 Annual PM2.5 Standard = 12.0 µg/m^3

A measure called design value is used by the EPA to evaluate the region's attainment status for air pollutants. It is based on an average data for three consecutive years.

Water Monitoring

WATER
- Focus
    - Comply with federal water quality standards
    - Assess effectiveness of best management practices (BMPs)
    - Determine trend in stream/river health

- Drinking Water
    - Test for giardia, cryptosporidium, lead
    - Chlorine/Chloramine to disinfect
    - Orthophosphate for corrosion

- Stormwater - State MS4 Permit Requirements
    - Urban streams
    - Watershed

- Wastewater – Total Maximum Daily Load (TMDL)
    - Pretreatment
    - Continuous monitoring
    - Process, outfalls
    - Combined sewer overflows

- Pollutants and Other Areas of Interest
    - Chemical, biological, flow
    - Total Kjeldahl Nitrogen, Total Phosphorous, Ammonia-Nitrogen, Sediment
    - Stream erosion, temperature, dissolved oxygen
    - Biological oxygen demand (BOD)
    - Bacteria, Benthic organisms

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Water Quality

Total Nitrogen Loads From Regional WWTPs

Potomac River at Chain Bridge - Total Nitrogen Load Trend

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Water Quality

Total Phosphorus Loads From Regional WWTPs

Potomac River at Chain Bridge - Total Phosphorus Load Trend

Water Quality

Potomac River at Chain Bridge - Total Sediment Load Trend

10-Year Trend 7% Degrading

33-Year Trend 33% Improving

- - - Upper 90% CI   —— FN Load   - - - Lower 90% CI

Potomac River Shad

■ Percent of Goal Achieved

Water Quality

Potomac River Segments and Stations

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Water Quality
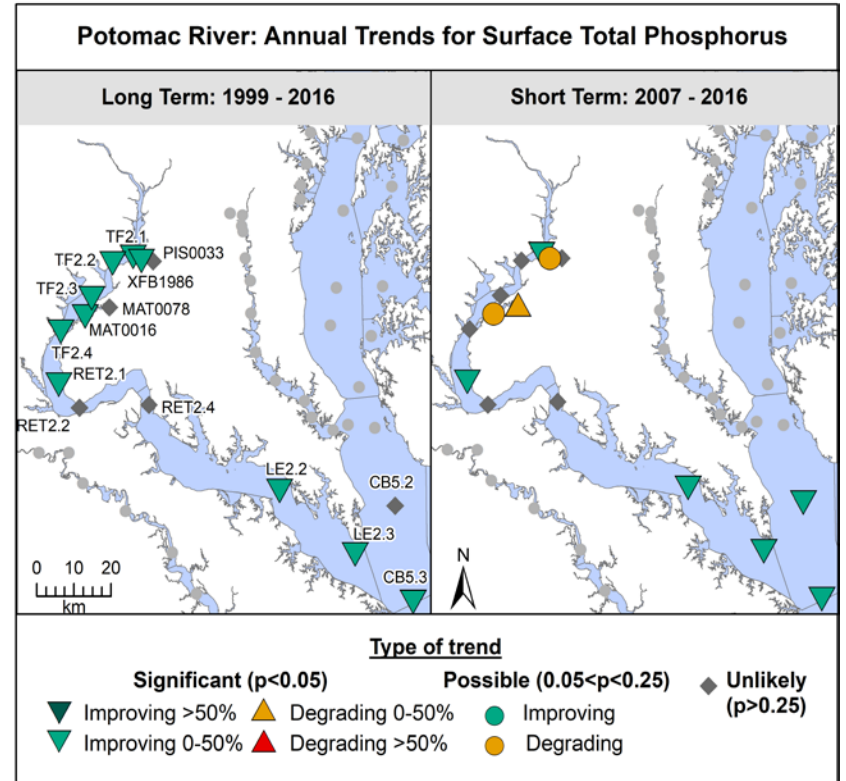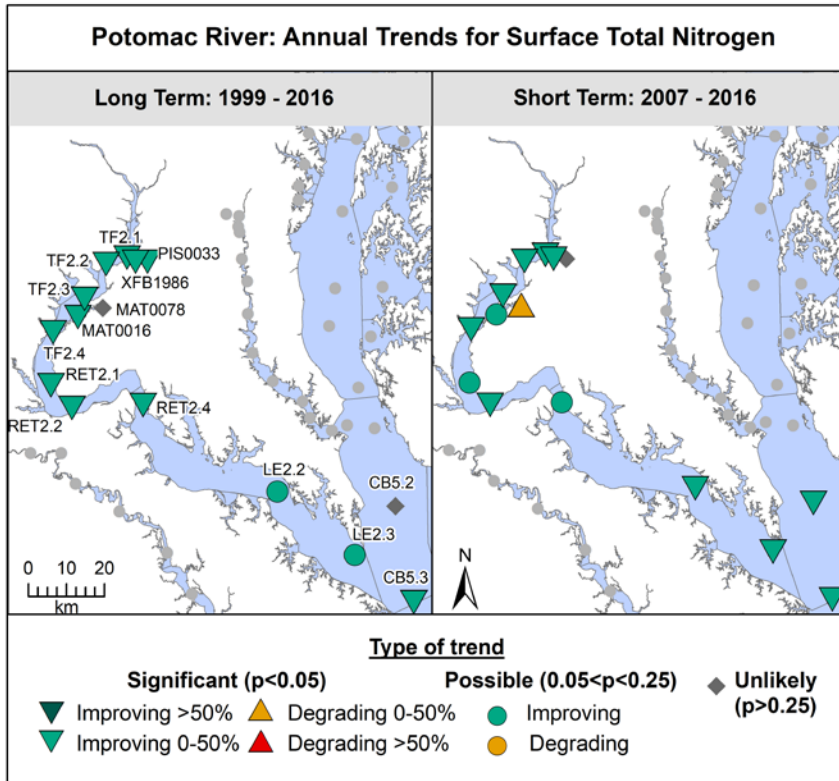
Water Quality
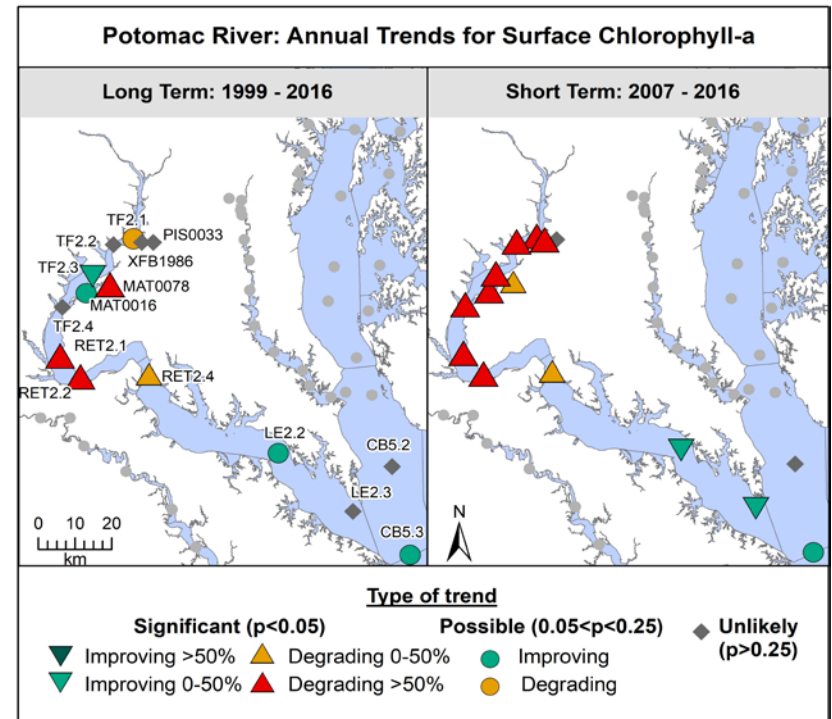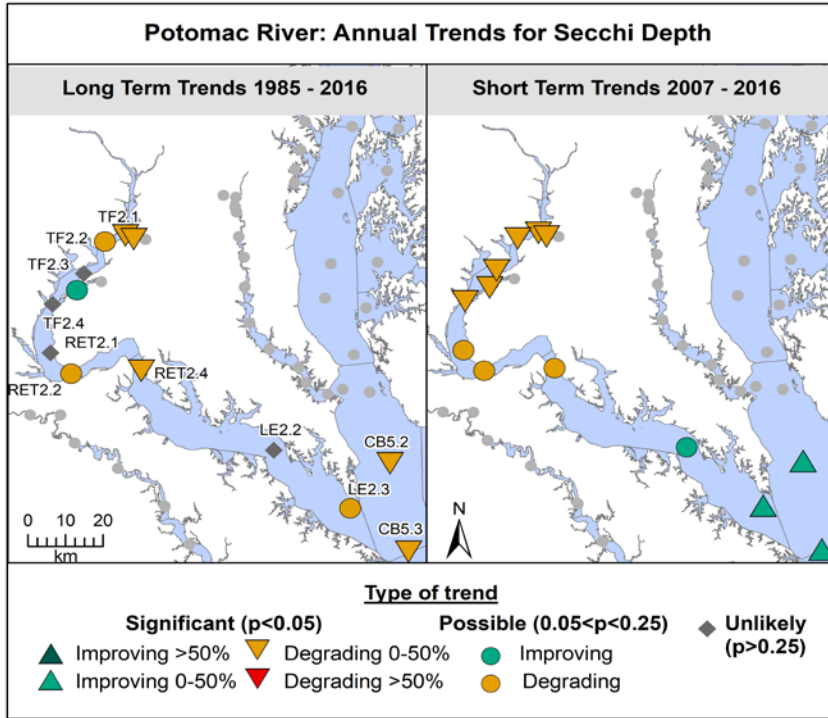
Energy and Climate Planning

- Mid-2000s Recognize Problem

- 2008 Regional Climate Report
  - Regional Goals
  - Policy Committee
  - Regional Environmental Fund

- Climate & Energy Action Plans

- Learning, Networking & Coordinating
  - Climate, Energy & Environment Policy Committee
  - Technical & Citizen Advisory Committees
  - Partnerships
- Leveraging Co-Benefits
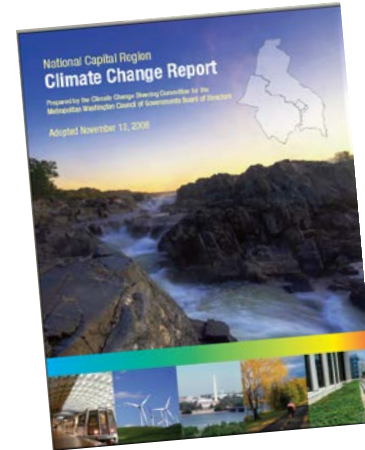
Greenhouse Gas Emissions Inventory
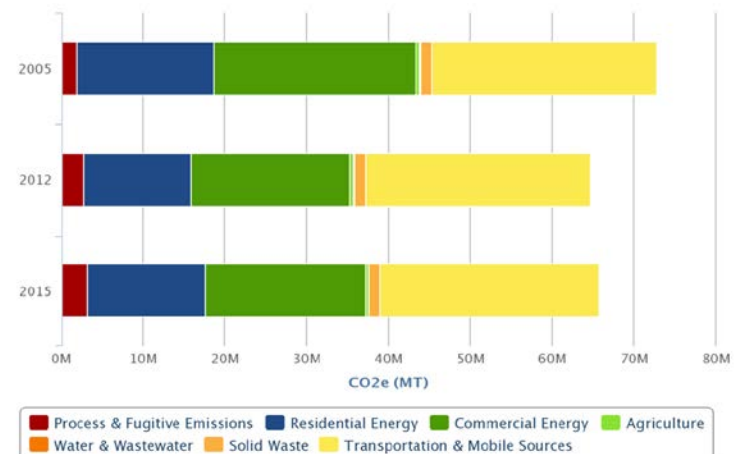
Energy and Climate Planning

- 2017-2020 Climate & Energy Action Plan
    1. Reduce Energy Consumption
    2. Increase Share of Renewables
    3. Advance Sustainable Regional Mobility
    4. Increase Sustainable Urban Development
    5. Move Towards Zero Waste
    6. Build Regional Resilience
    7. Protect Equity and Health
    8. Grow the Regional Economy

Increase Number of High Performance Buildings		
1-q	Incorporate high performance building goals and strategies in master plans, comprehensive land use plans, and small area plans.	50%
1-r	Enhance green building policies to require or encourage higher level of green construction standards (e.g., LEED Gold instead of LEED Silver).	50%
1-s	Offer incentives for commercial and residential buildings certified by a high efficiency building/green rating system (e.g., LEED, ENERGY STAR, Passive House, EarthCraft, Living Building Challenge, Net Zero, Well Standard, etc.).	50%
1-t	Provide education and training on new and advanced green construction standards (e.g., Living Building, Net Zero, WELL Standard, Designed to ENERGY STAR, etc.).	50%

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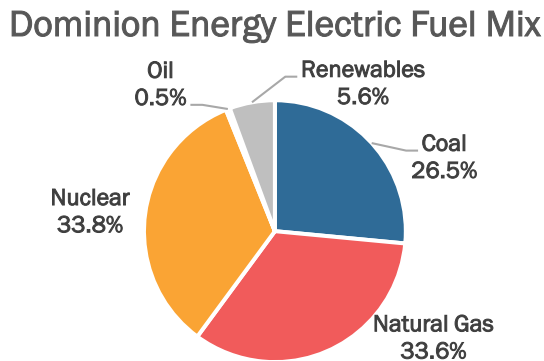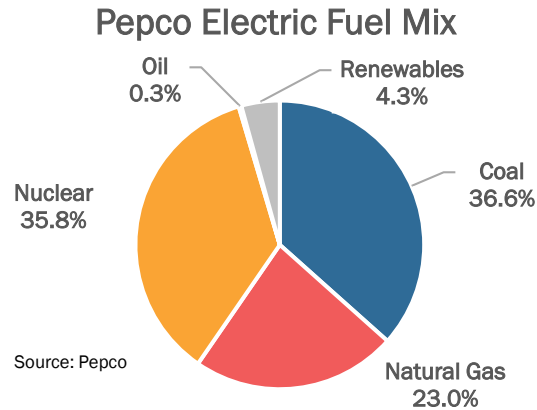**Council of Governments**

Energy and Climate Action

- Greenhouse Gas Inventory
  - Drivers of Change
- Utility Energy Data
- Solar
  - Policy & Regional Goals
  - Coops & Solarize
- Alternate Fuel Vehicles
  - Clean Cities Coalitions
  - EV Infrastructure
- Microgrids
- Diesel efficiencies
  - Switcher Locomotives
  - Riverboats
  - Backup Generators
- Energy Codes

- Cooperative Procurement
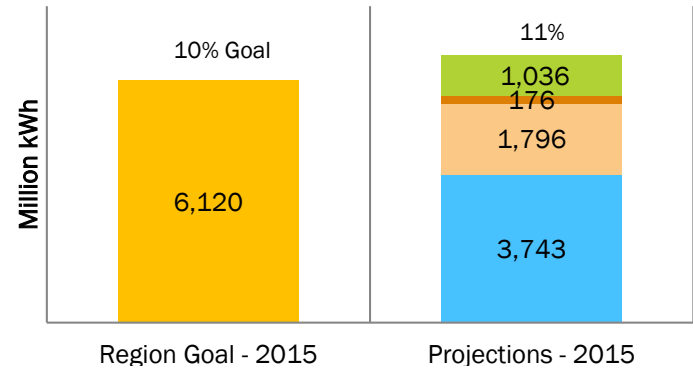- NESCAUM Northeast Corridor

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Energy and Climate

Pepco Electric Fuel Mix

- Oil 0.3%
- Renewables 4.3%
- Coal 36.6%
- Natural Gas 23.0%
- Nuclear 35.8%

Source: Pepco

Dominion Energy Electric Fuel Mix

- Oil 0.5%
- Renewables 5.6%
- Coal 26.5%
- Natural Gas 33.6%
- Nuclear 33.8%

Source: Dominion energy

Source: EPA

Metro Washington Renewable Electricity

- ■ COG 10% Target
- ■ Utility RE
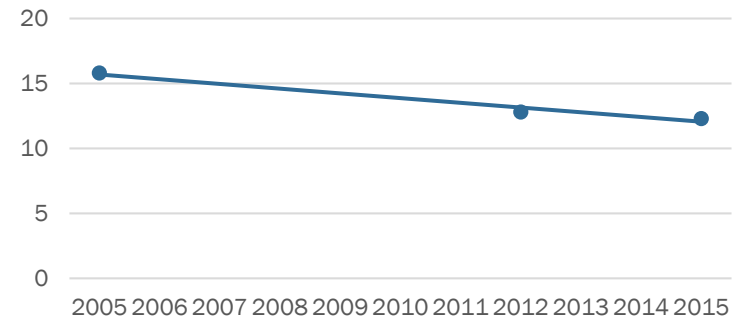- ■ Additional GP Purchases
- ■ DG Deployment
- ■ Large Hydro

Million kWh

Region Goal - 2015
- 10% Goal: 6,120

Projections - 2015
- 11%
- Large Hydro: 1,036
- DG Deployment: 176
- Additional GP Purchases: 1,796
- Utility RE: 3,743

Source: COG

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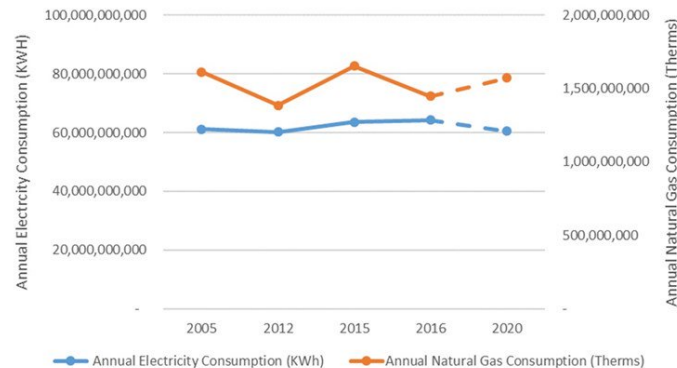
Metropolitan Washington Dashboard

Greenhouse Gas Emissions
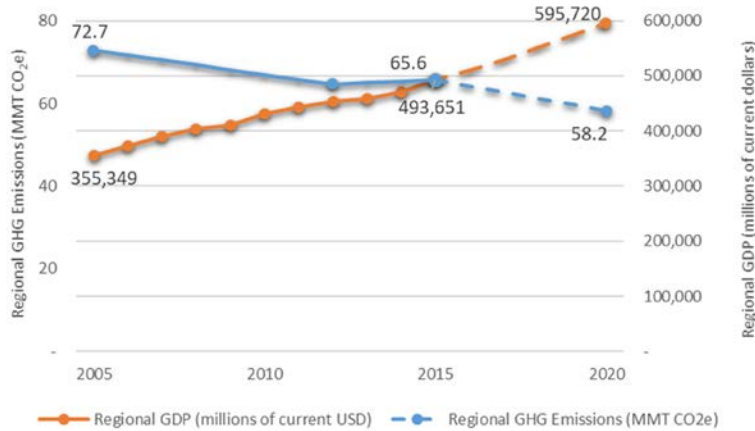
Per Capita Greenhouse Gas Emissions

Energy Consumption

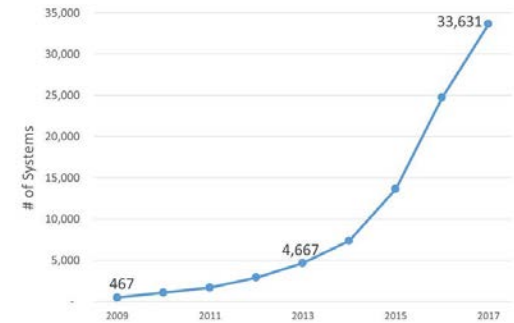Metropolitan Washington
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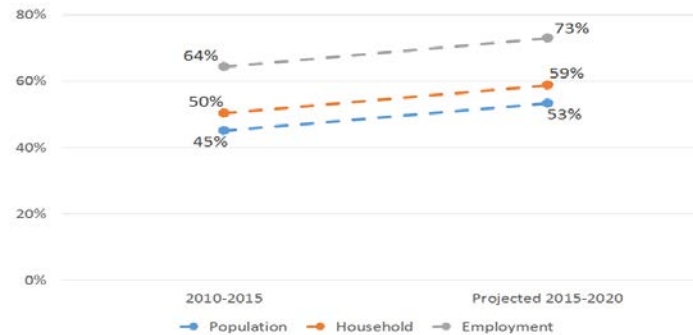# Metropolitan Washington Dashboard
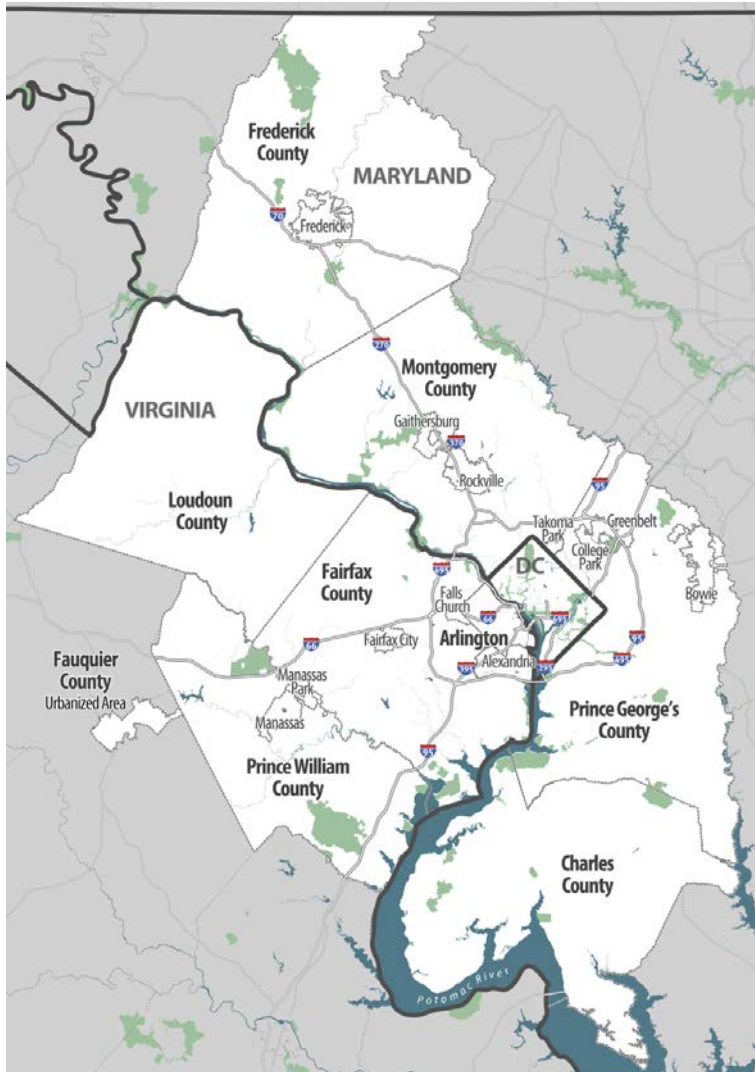
High Performance Buildings
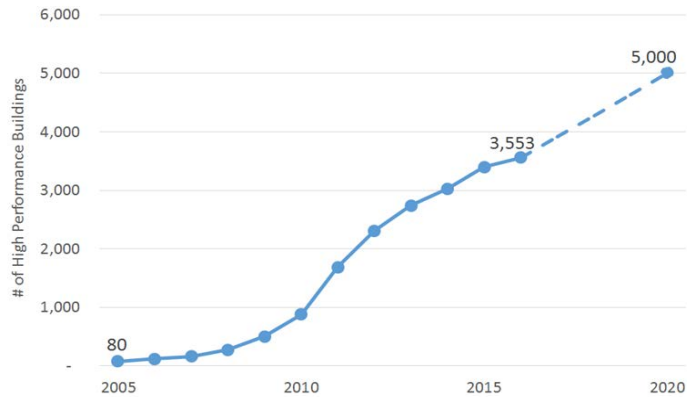
Grid Connected Renewables

Smart Land Use Planning
Growth in Activity Centers

Transportation Planning - Region

- Federal planning body - TPB
- About - 9,100 sq. km. ;
  5.5M people; 3 million jobs
- Multiple stakeholders / decision makers
  - State (3), County (9), City (13), Federal City (1)
  - Legislatures (26), Highway agencies (26), Transit Agencies (19), Federal Entities (4)
  - Varied legal authority – Transportation responsibility, Funding, Land-use and Environment
  - Geographic diversity- Urban core, Suburban, Exurban/Rural

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Comprehensive Collaborative Cooperative

Think Regionally, Act Locally:

Consider regional needs when developing local projects and programs for funding and implementation

- Provide a Comprehensive Range of Transportation Options
- Promote Dynamic Activity Centers
- Ensure System Maintenance, Preservation, and Safety
- Maximize Operational Effectiveness and Safety
- Protect and Enhance the Natural Environment
- Support Interregional and International Travel and Commerce

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Transportation Planning - Requirements

- *All federally funded* projects and **other regionally significan**t

- **Funding reasonably expected** for O&M and Capital

- *Air Quality impacts* — Emissions of criteria pollutants from all projects / programs must adhere to emissions limits in the region's air quality improvement plan.

- Public Involvement – Local and regional level

- **Performance Targets** on selected aspects

  o Asset management, Safety, Congestion, Air Quality

- Monitor / report on regional transportation system performance

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Transportation Emissions Reductions

- System wide – Federal / State
  - Vehicle
  - Vehicle Fuel
- Regional – Travel
- Local – Travel

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Transportation Emission Reductions

Land Use

Travel Demand Management
- Ride matching for Carpool, Vanpool; Bus, Bike
  - Work / Non Work; Via Telephone, Online, Mobile Apps
- Guaranteed Ride Home
- Teleworking

Employer Assistance / Outreach

Incentive Programs
- New Car / van pools
- Rideshare Flextime during construction and/or congestion

Other Local Programs
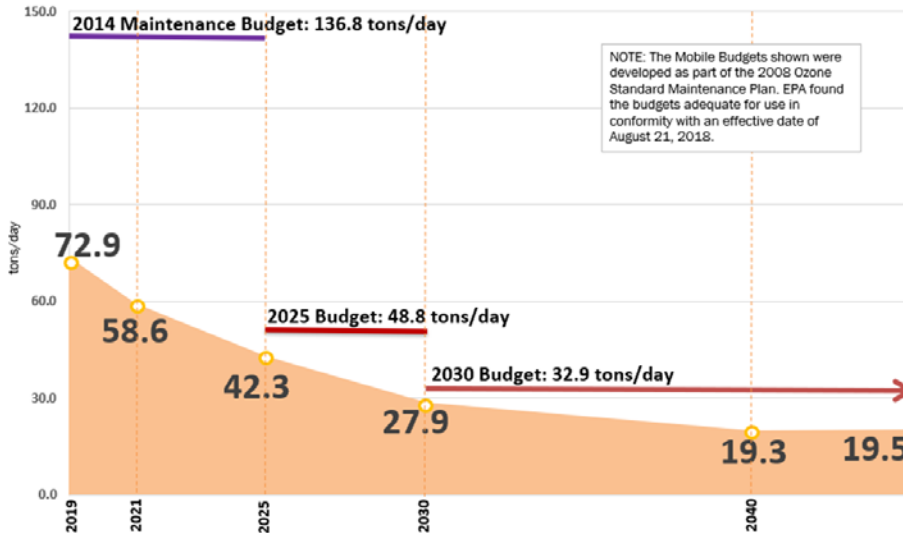- Anti-idling; Traffic Signal optimization; Alternative Fuel Vehicles, Park and Ride Lots; Etc.

Estimated Daily Program Impacts (Reductions)
- Vehicle Trips   156,000/Day
- Vehicle Kilometers Travelled   7,793,274/Day
- Nitrogen Oxides   0.7 Tons/Day
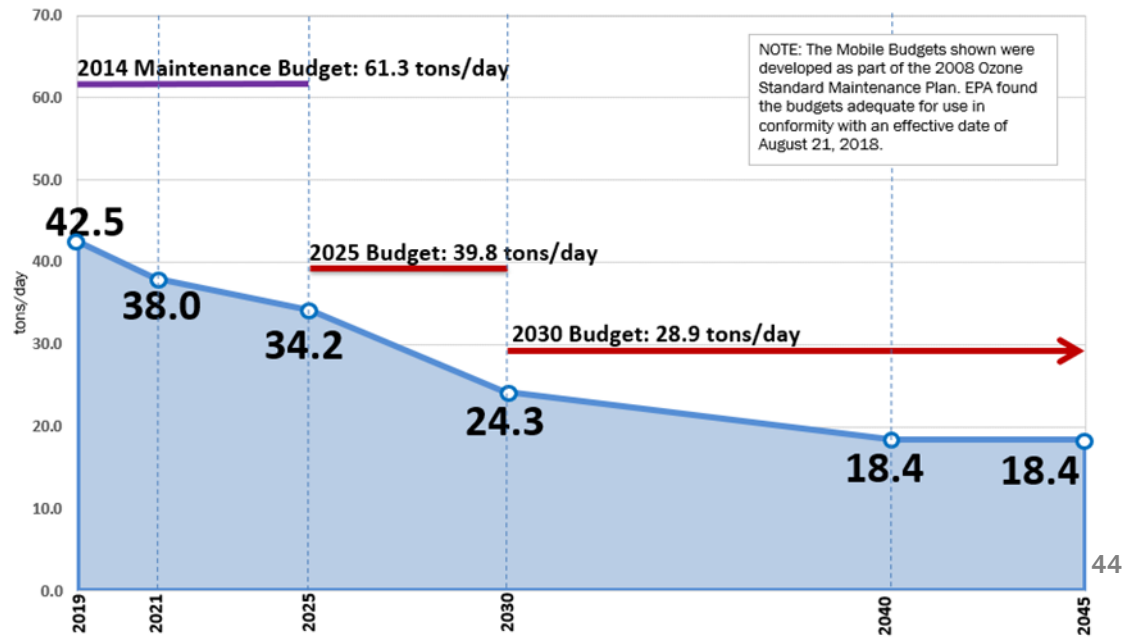- Volatile Organic Compounds   0.5 Tons/Day

Latest Transportation Emissions Estimates (Ozone)

Air Quality Conformity
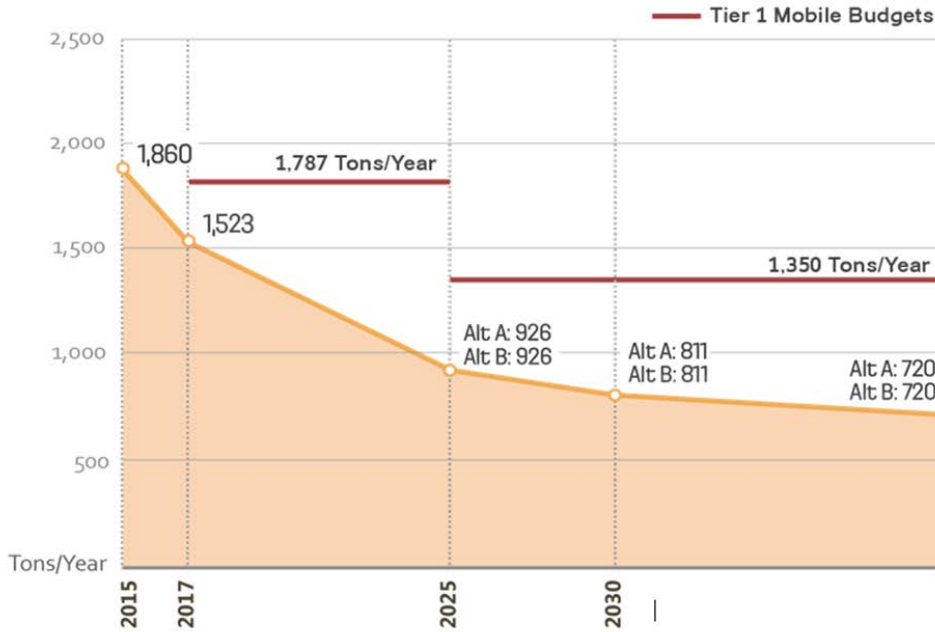## Mobile Source Emissions and Mobile Budgets
Ozone Season NOx

2014 Maintenance Budget: 136.8 tons/day

NOTE: The Mobile Budgets shown were developed as part of the 2008 Ozone Standard Maintenance Plan. EPA found the budgets adequate for use in conformity with an effective date of August 21, 2018.

2025 Budget: 48.8 tons/day

2030 Budget: 32.9 tons/day

- 72.9
- 58.6
- 42.3
- 27.9
- 19.3
- 19.5

(tons/day; years 2019, 2021, 2025, 2030, 2040, 2045)

Air Quality Conformity
Mobile Source Emissions and Mobile Budgets
Ozone Season VOC

2014 Maintenance Budget: 61.3 tons/day

NOTE: The Mobile Budgets shown were developed as part of the 2008 Ozone Standard Maintenance Plan. EPA found the budgets adequate for use in conformity with an effective date of August 21, 2018.

2025 Budget: 39.8 tons/day

2030 Budget: 28.9 tons/day

- 42.5
- 38.0
- 34.2
- 24.3
- 18.4
- 18.4

(tons/day; years 2019, 2021, 2025, 2030, 2040, 2045)

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Mobile Source Emissions PM₂.₅ Direct — Tons/Year chart (2015–2030)

Mobile Source Emissions PM₂.₅ Precursor NOx — Tons/Year chart (2015–2040)

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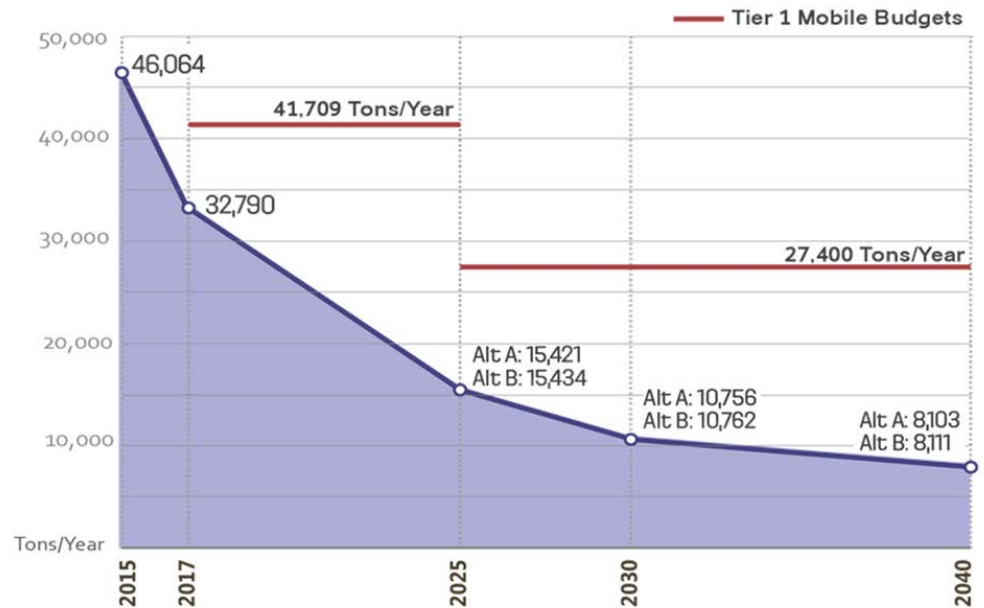
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