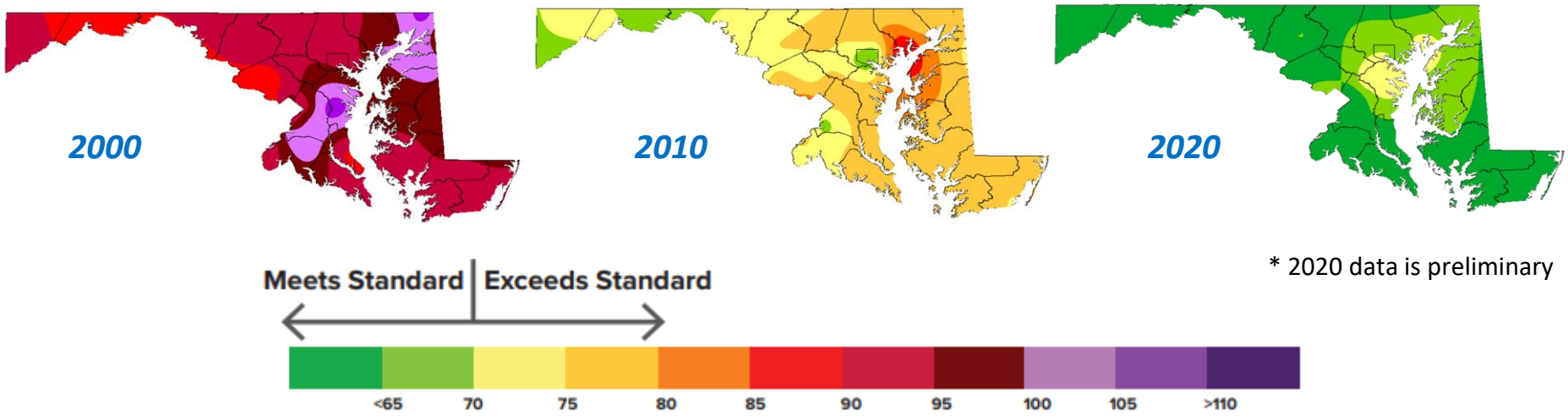
Maryland
Department of the Environment

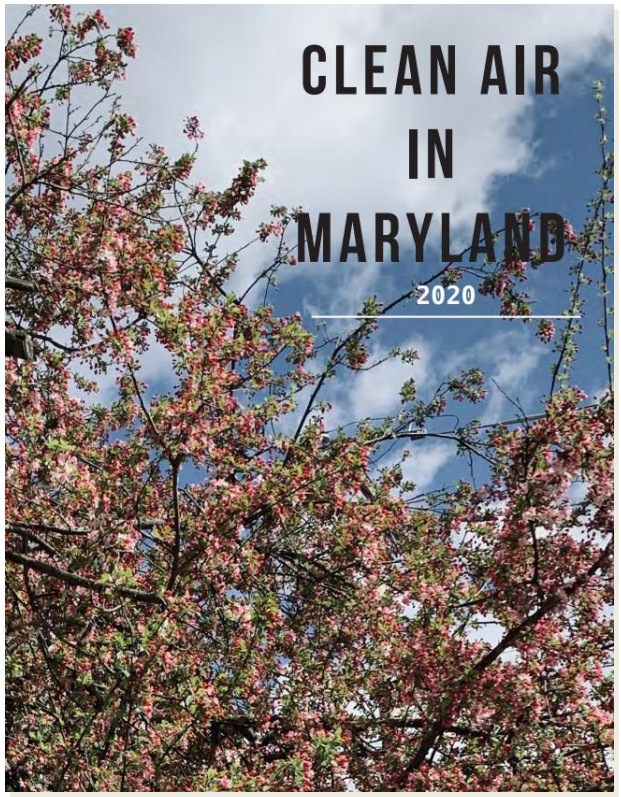
An Air Quality and Climate Change Update



* 2020 data is preliminary

Overview of Presentation

- Air Quality Basics Refresher
- Clean Air and Climate Change Progress
- State and Federal Programs Addressing Air Pollution
- Questions/Discussion

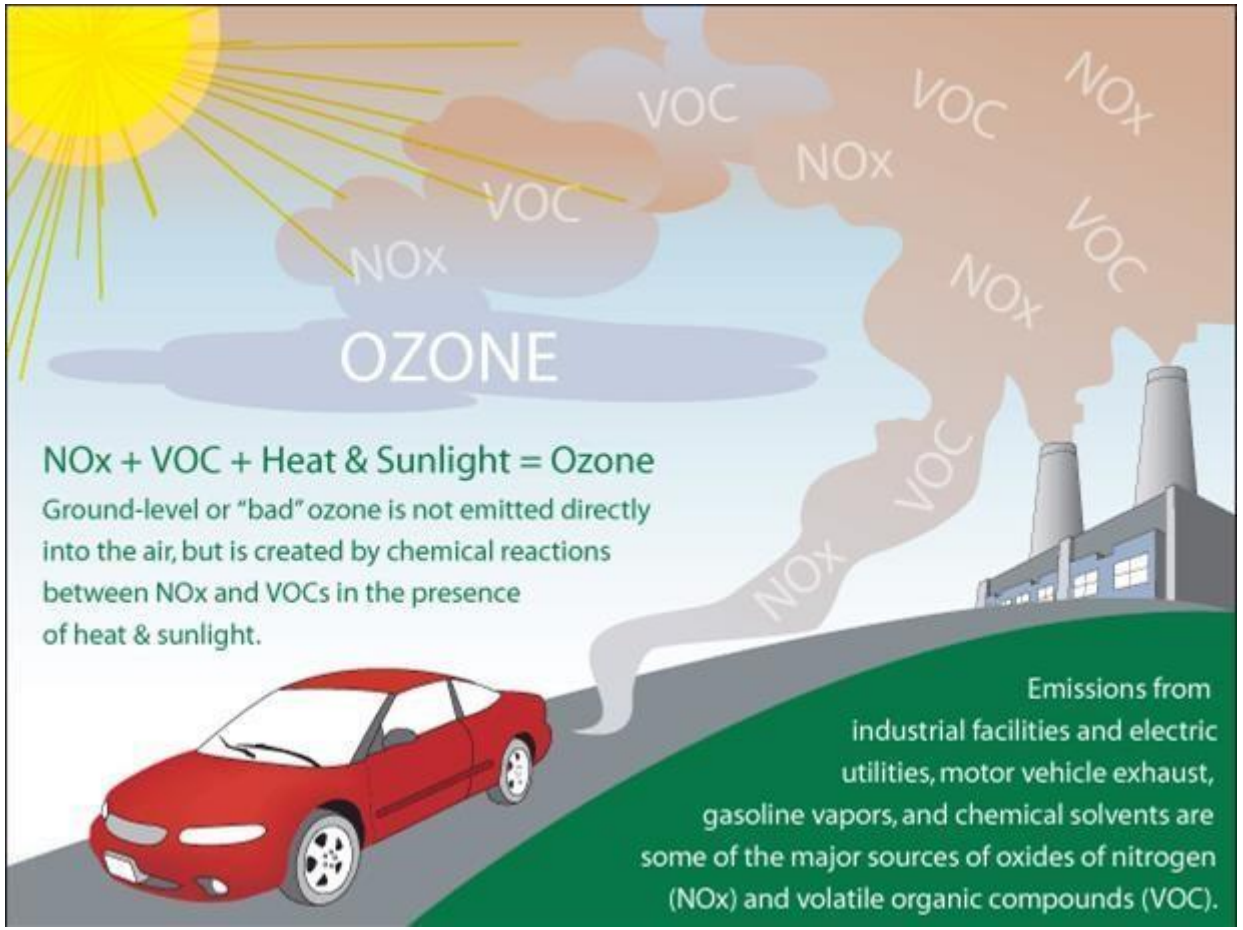


https://mde.maryland.gov/programs/Air/Pages/index.aspx


AIR QUALITY BASICS
A REFRESHER

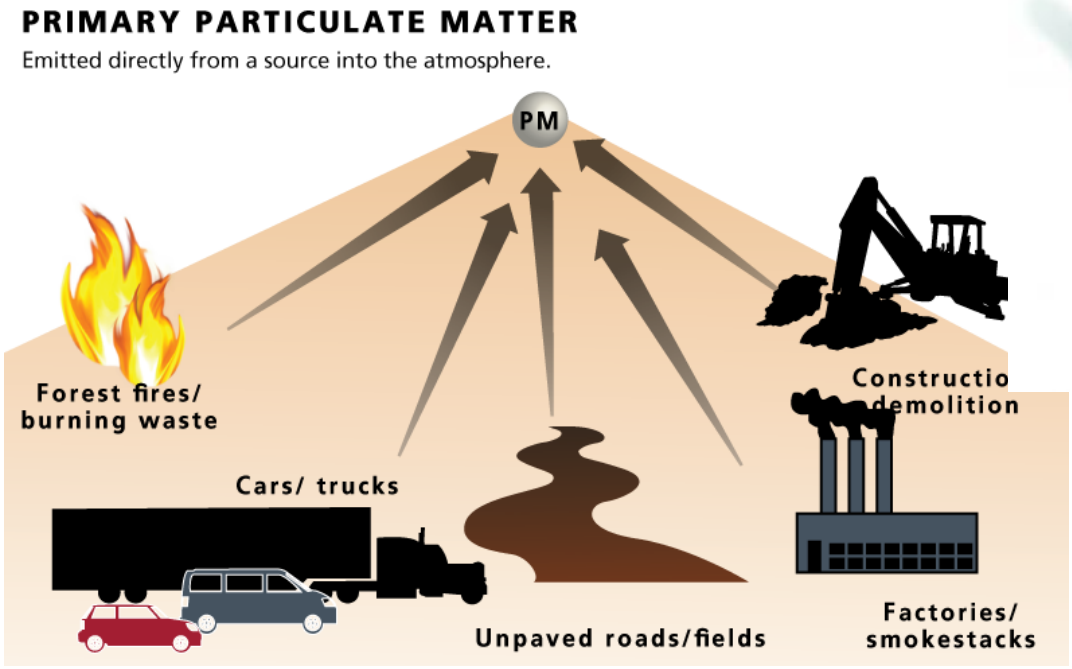
Ground-Level Ozone

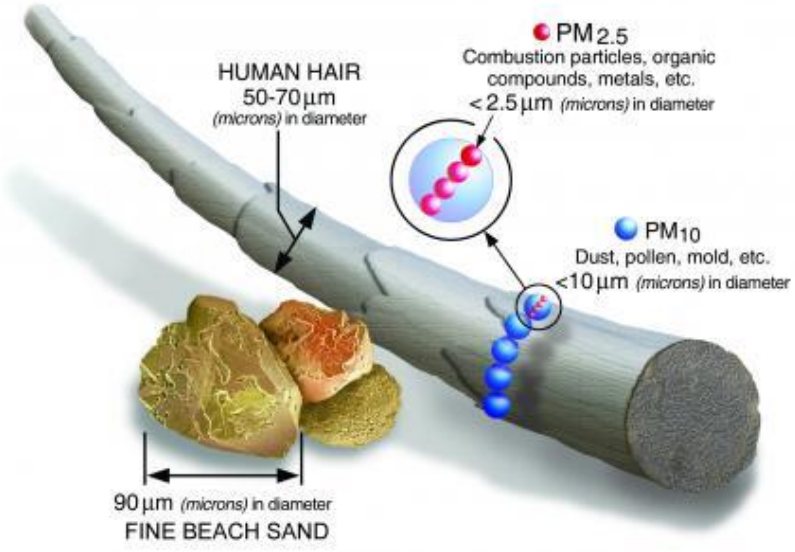
- The most pervasive air pollutant in Maryland and many other parts of the country…



Particulate Matter

- The highest risk air pollutant. For the past 10 years, fine particle levels have met the federal air quality standards. Typically, particle levels are slightly higher in urban areas.



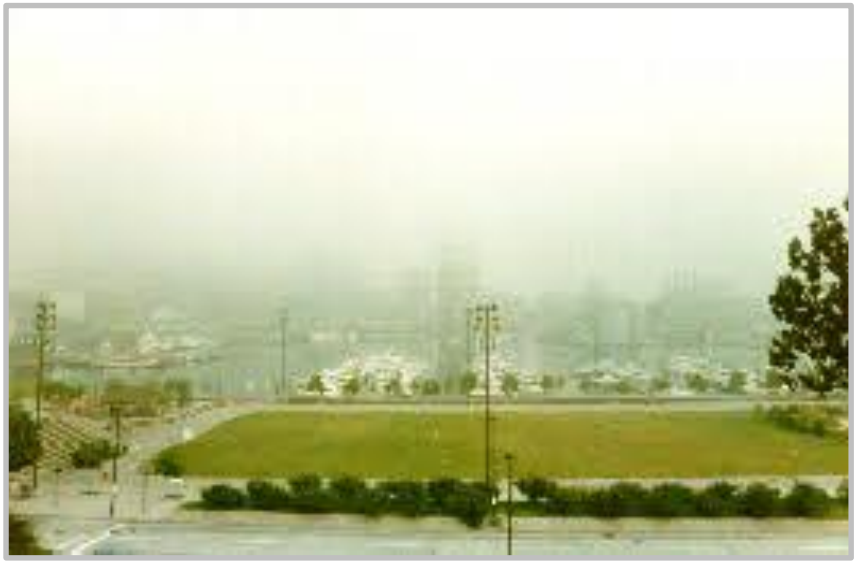


The Ugly…

- Significant air quality events, such as those occurring in Denora, PA in 1948, New York City in 1953, 1963 and 1966 as well as many others throughout the nation, prompted the federal government to enact the Clean Air Act (CAA).

The Bad…

- Up until 2010, Maryland continued to experience numerous bad air quality events with ground-level ozone and particulate matter levels in the unhealthy range:
  - 2005 MIT PM Study - Maryland identified as the riskiest place to breathe the air east of the Mississippi.
  - 2008 - EPA designates the Baltimore area as the worst ozone area outside of California and Texas.



The Good…

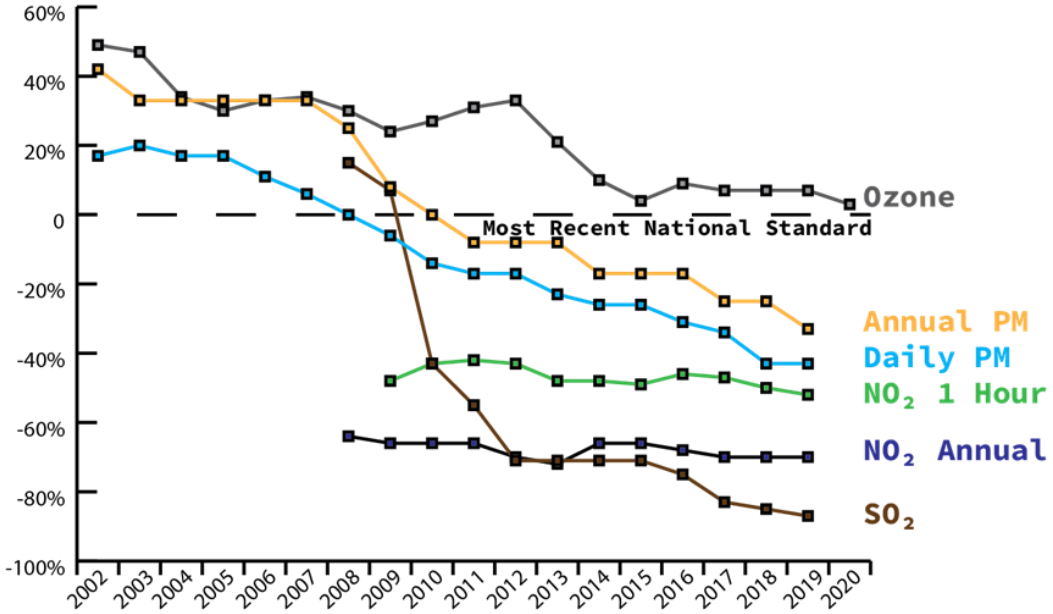
- In recent years, Maryland has achieved the federal fine particle standard, as well as the 2008 ozone standard, and is moving towards achieving the more stringent 2015 ozone standard. In 2020, Maryland recorded the fewest number of bad ozone days ever.

2021 - CLEAN AIR HIGHLIGHTS

PROGRESS CONTINUES

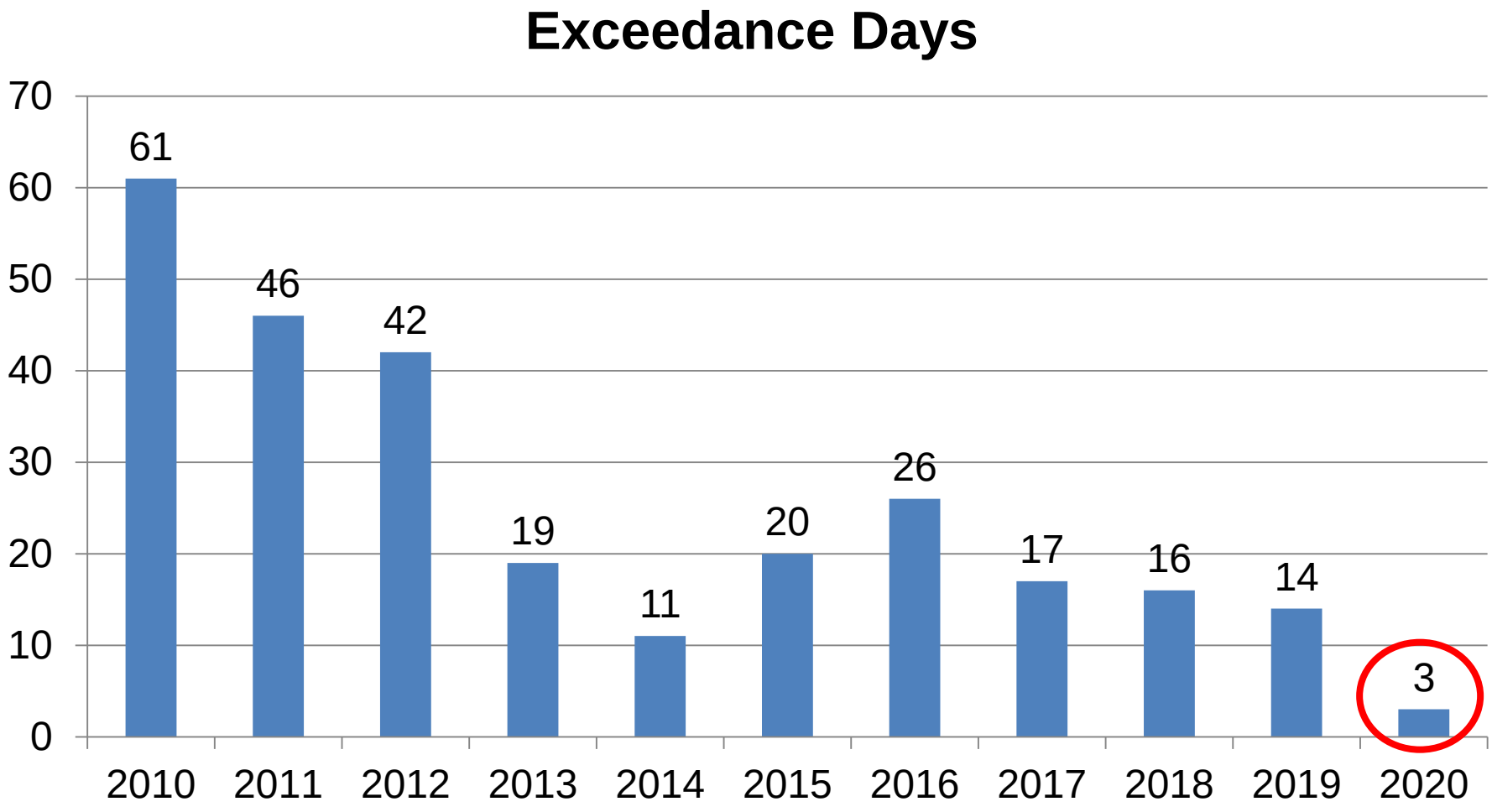
Clean Air Highlights

- For nearly 30 years, Maryland's air quality has dramatically improved.
- Air quality policies and regulations have lowered levels of six common pollutants — particles, ozone, lead, carbon monoxide, nitrogen dioxide, and sulfur dioxide .



- ↓Nitrogen Dioxide (NO_2) Annual 16% (2008-2019)
- ↓Nitrogen Dioxide (NO_2) 1-Hour 8% (2009-2019
- ↓Ozone (O_3) 28% (2002-2020)
- ↓Particles ($PM_{2.5}$) Annual 53% (2002-2019)
- ↓Particles ($PM_{2.5}$) 24-Hour 51% (2002-2019)
- ↓Sulfur Dioxide (SO_2) 1-Hour 88% (2008-2019)

Maryland Bad Ozone Days



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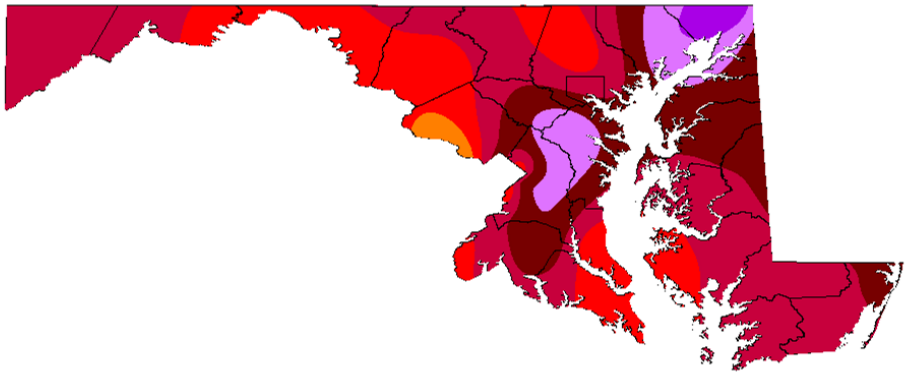
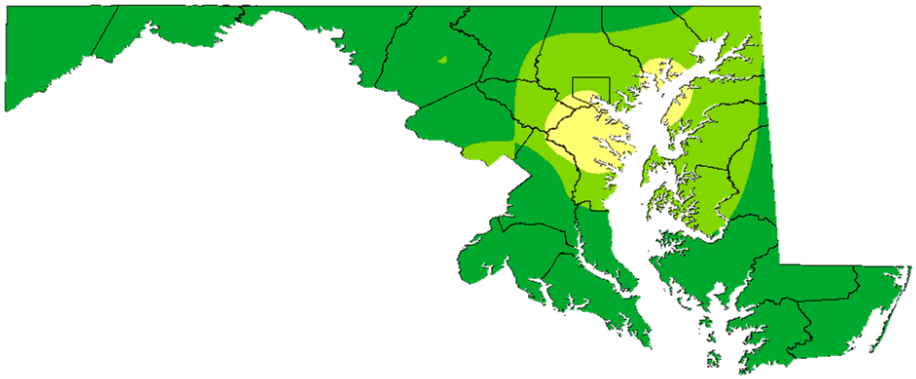
The Shrinking Ozone Problem

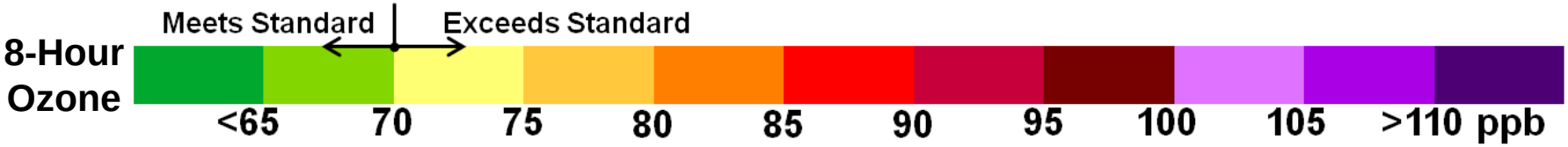
1998



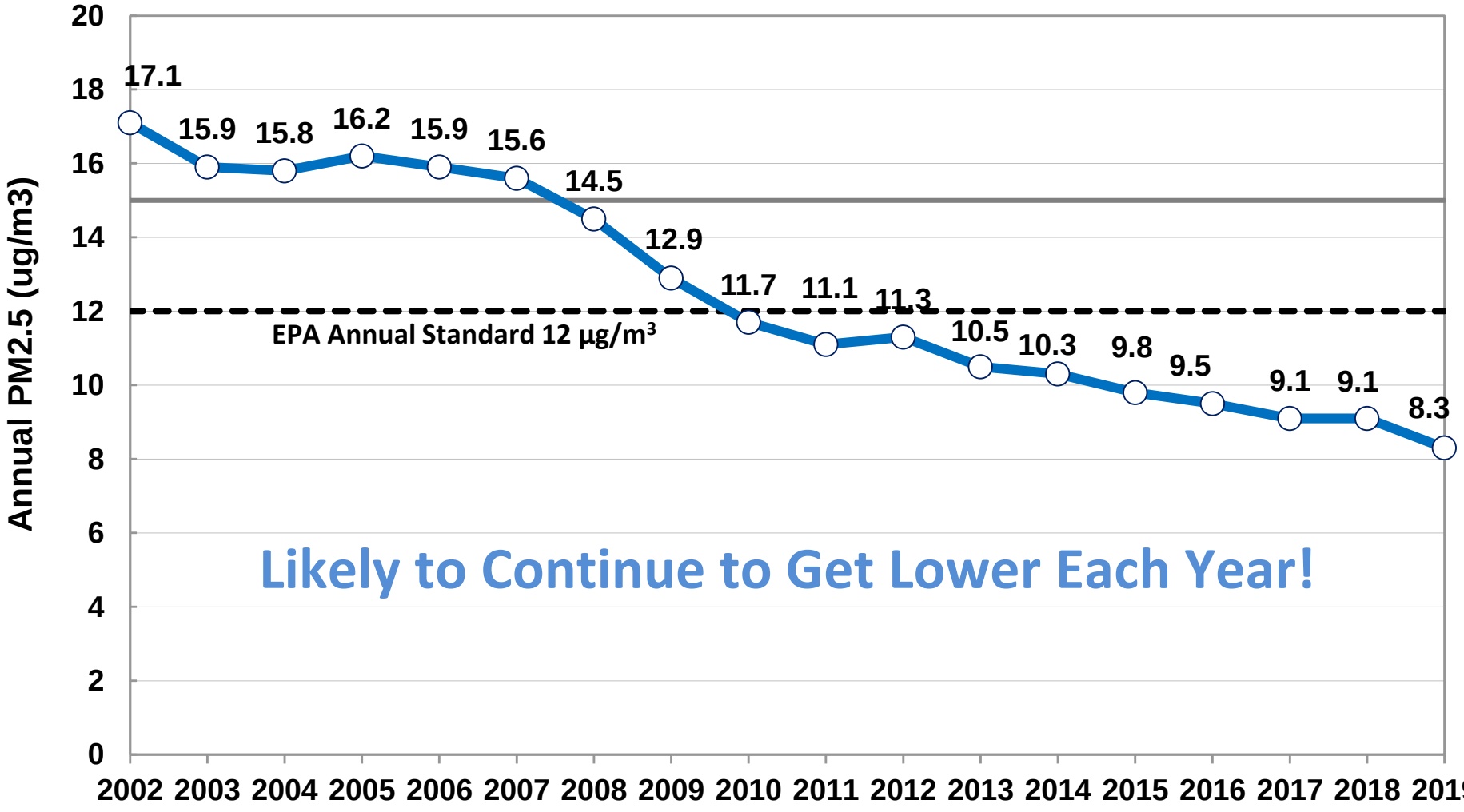
2020



Lower Ozone Levels and Significant Spatial Risk Reduction

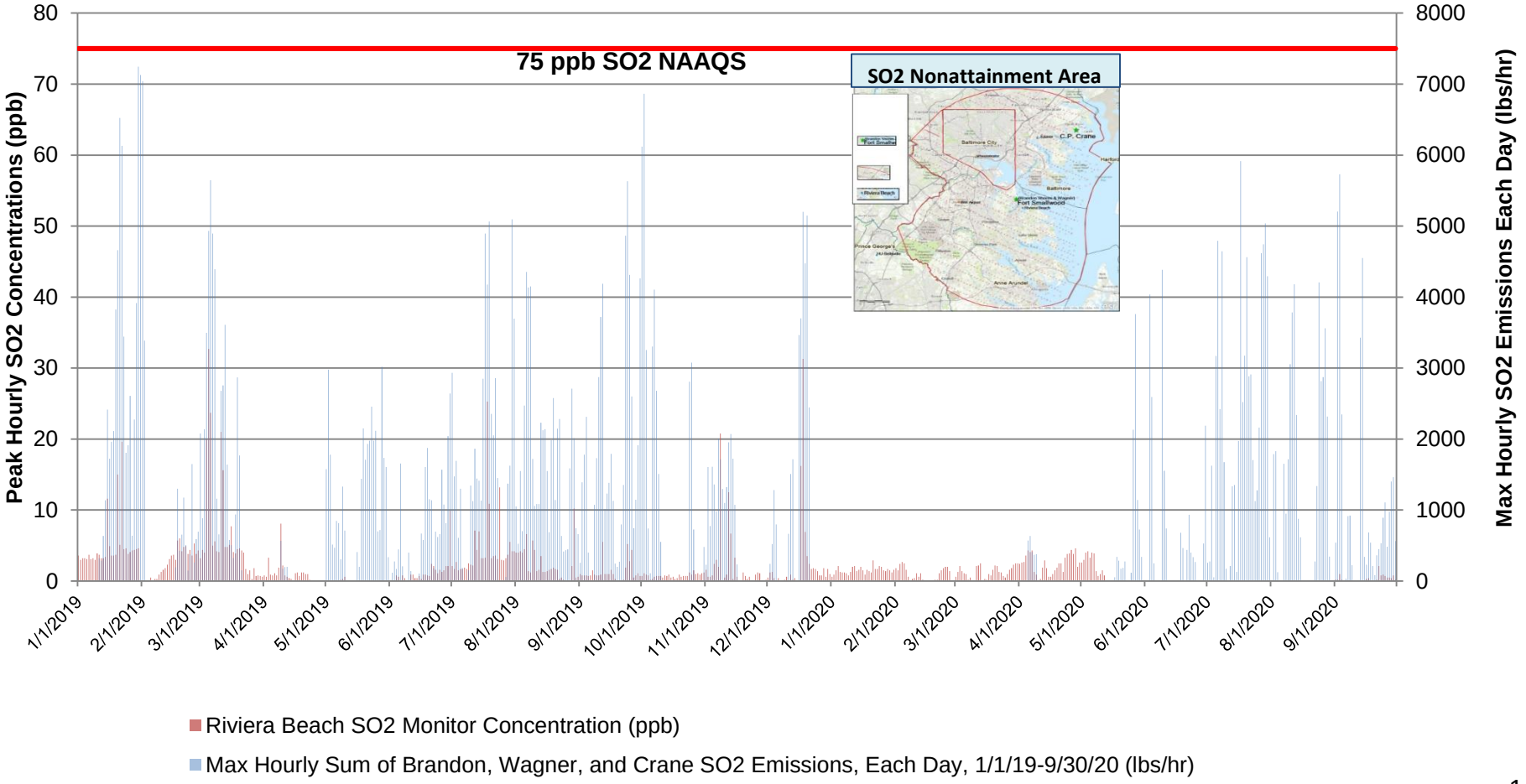


Fine Particle Air Pollution
Lower Levels Across the State

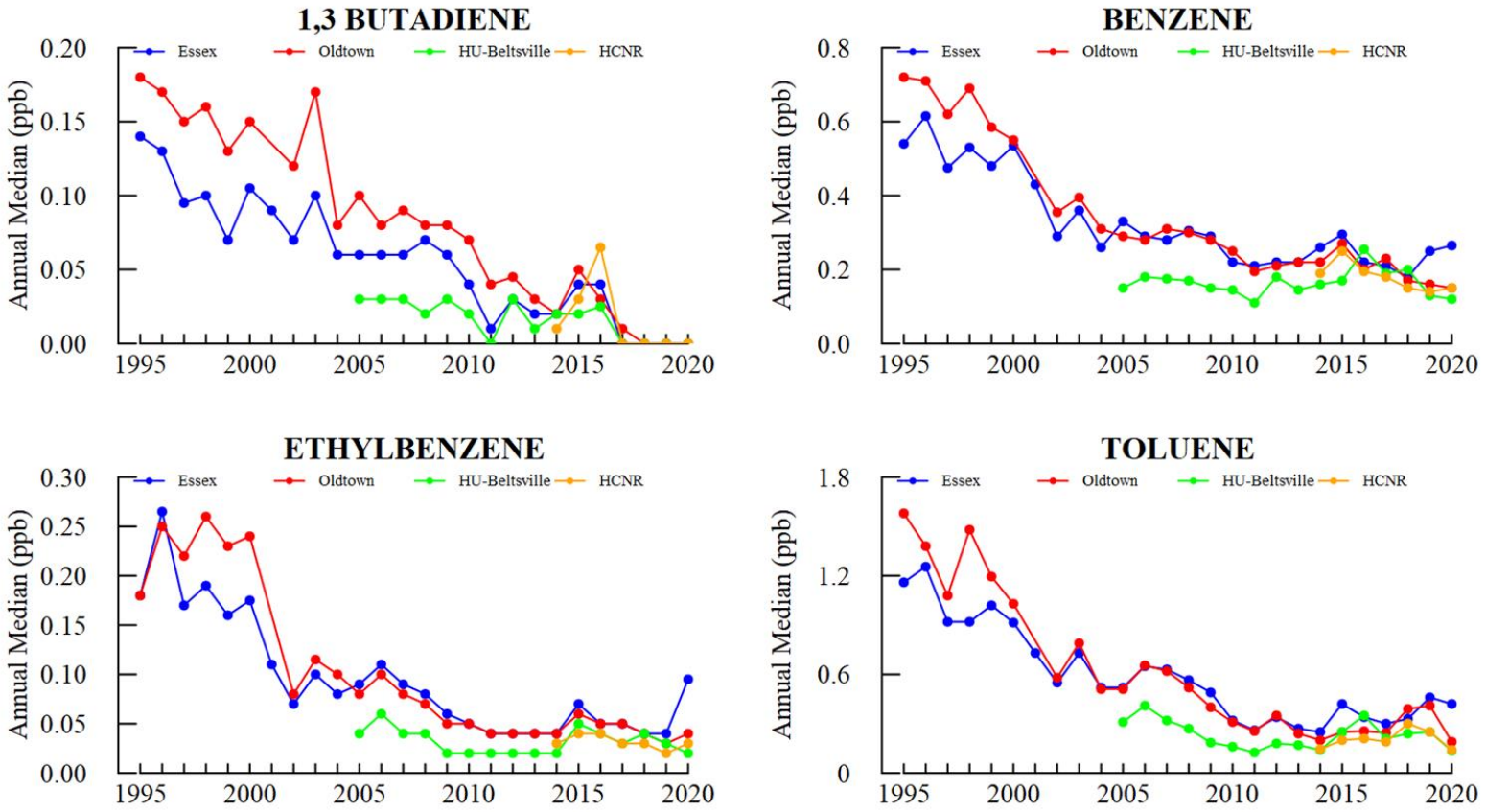


SO2 Air Pollution Levels Well Below Standards

Peak Daily Riviera Beach Monitor SO2 Concentrations &
Maximum Hourly Sum of Brandon, Wagner, & Crane SO2 Emissions
Each Day, 1/1/19 – 9/30/20



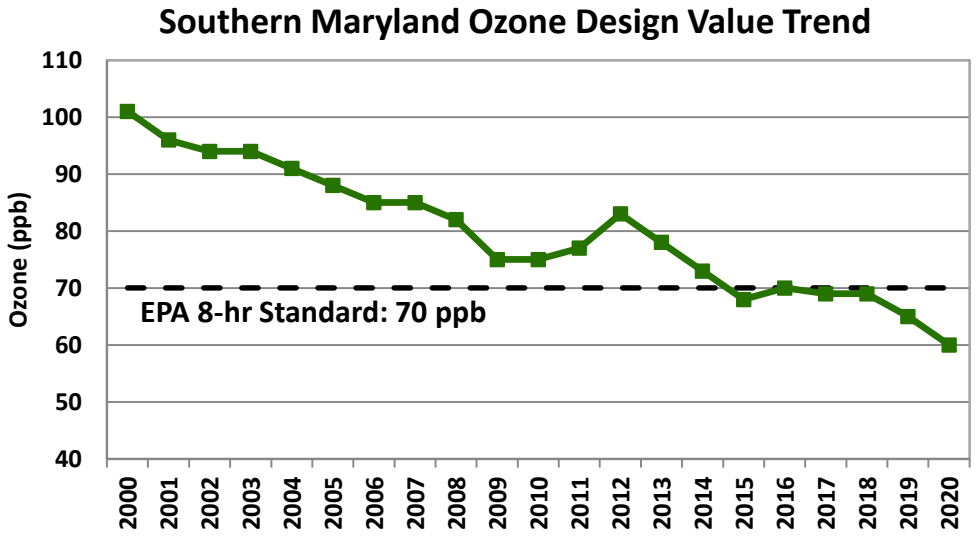
Air Toxics Have Been Reduced Significantly

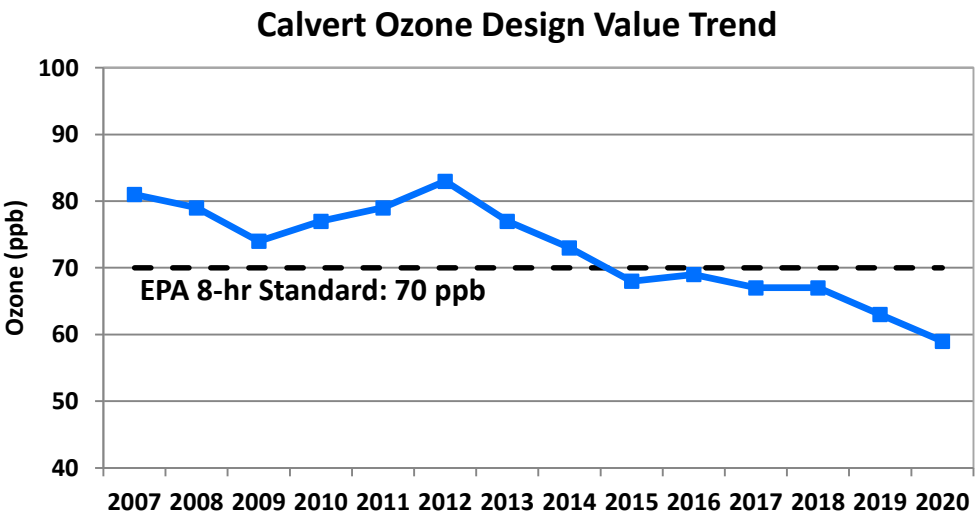


- Air toxics are those known to cause cancer and other serious health impacts.
- Over the last 25 years, Maryland has generally cut concentrations of air toxics by about 50%.


CALVERT COUNTY TRENDS

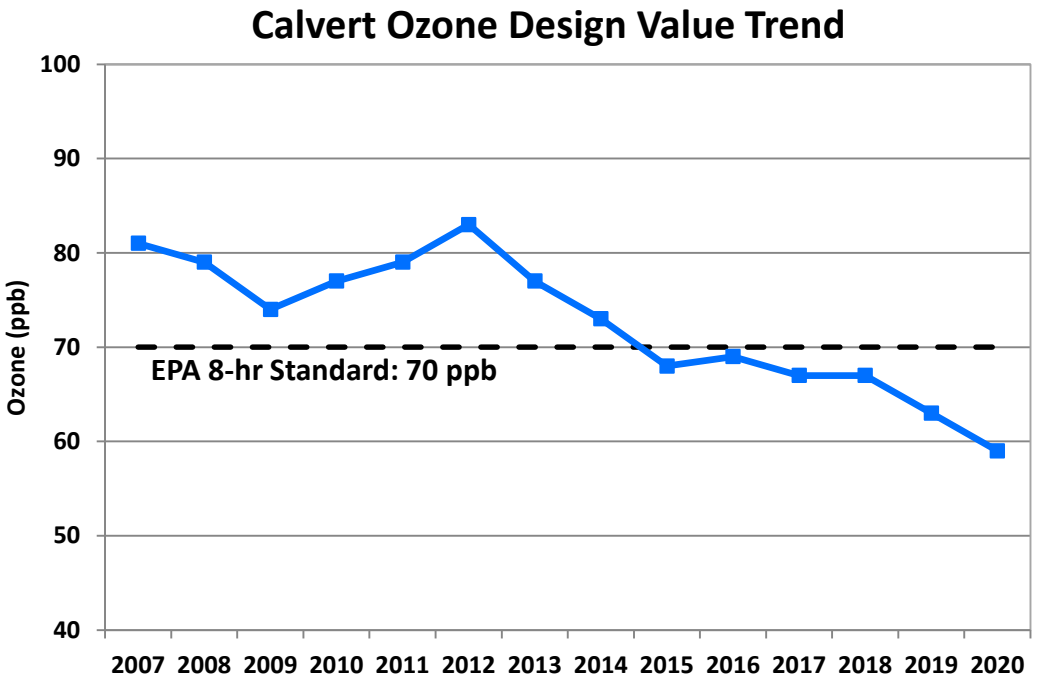
Ozone Trends: Charles and Calvert Counties

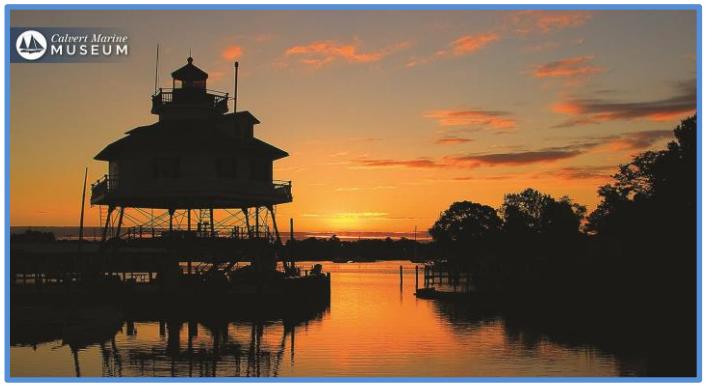




**2020 Data is Preliminary*

Calvert County Ozone Trend





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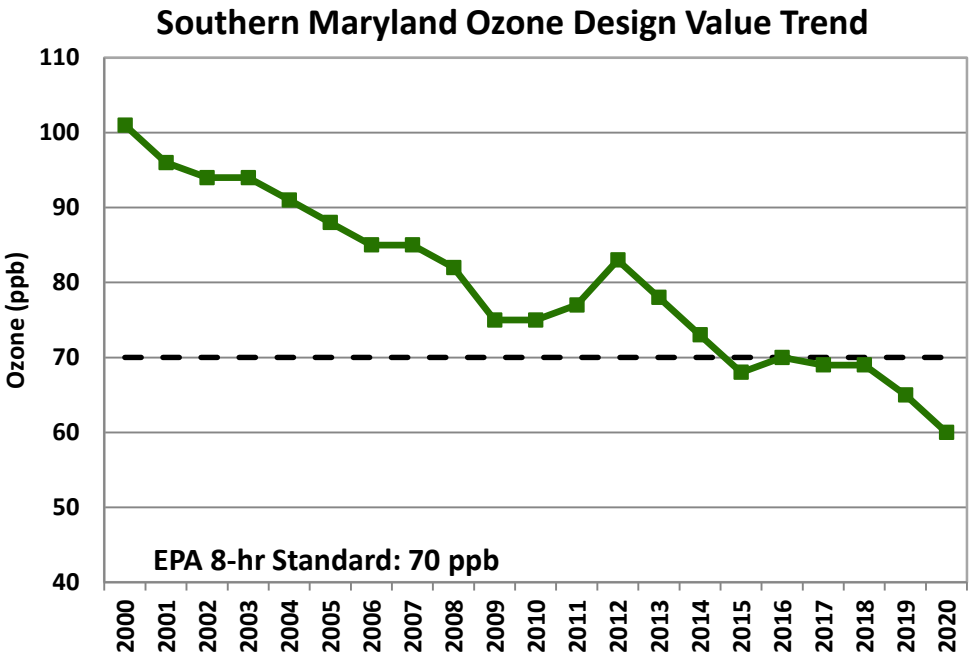
Charles County Ozone Trend



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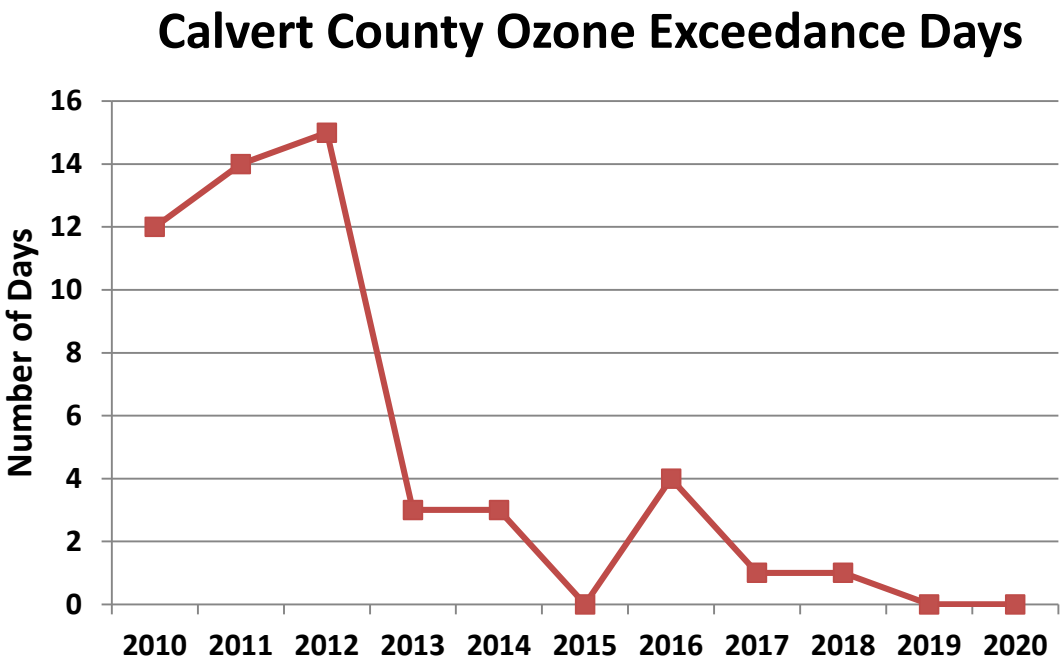
Calvert County: Ozone Exceedance Days



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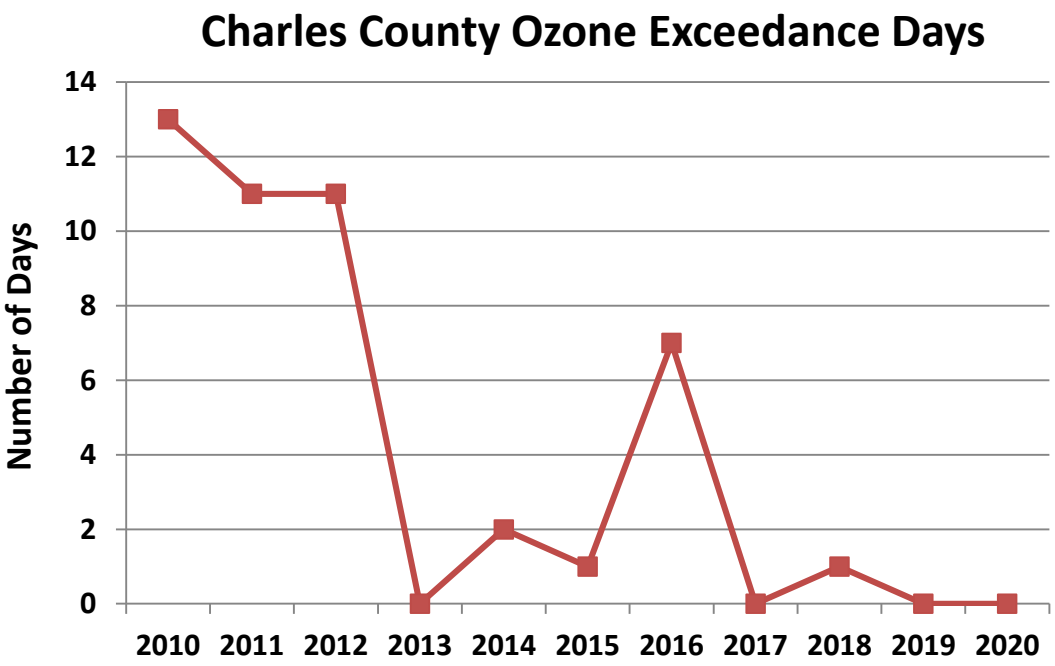
Charles County: Ozone Exceedance Days



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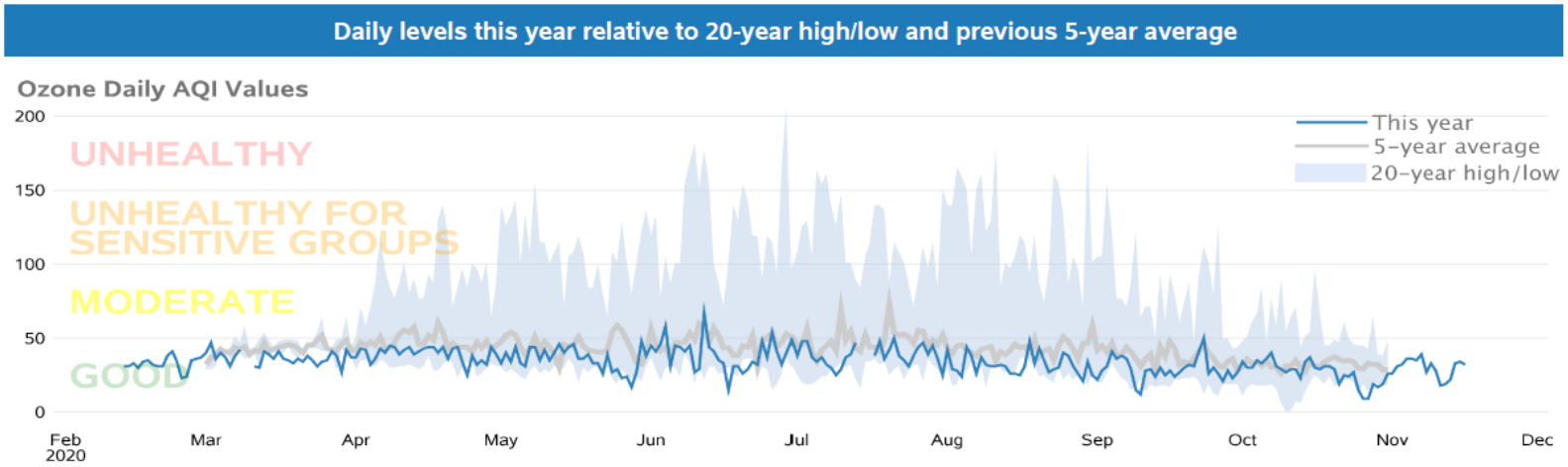
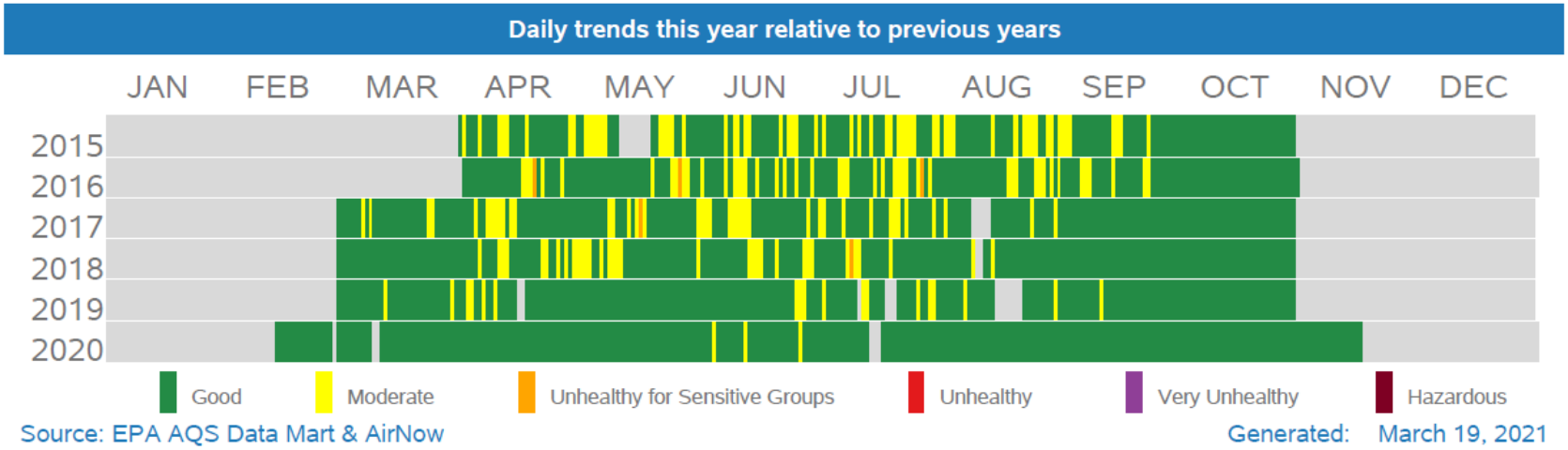
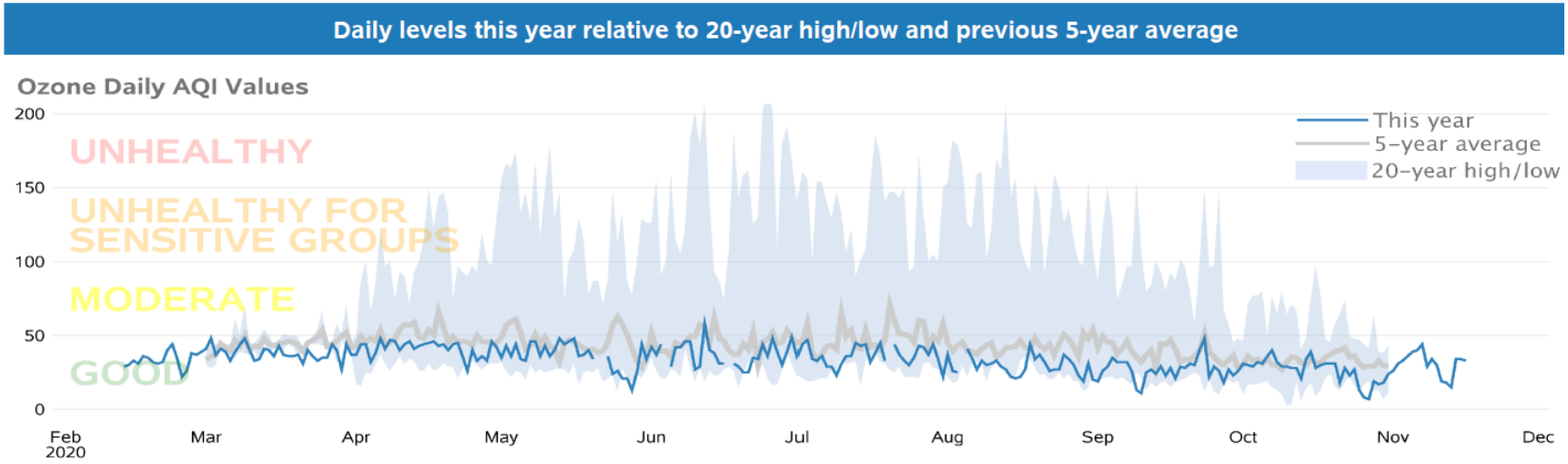
Calvert County Ozone



Source: U.S. EPA AirData <https://.epa.gov/air-data>



Charles County Ozone



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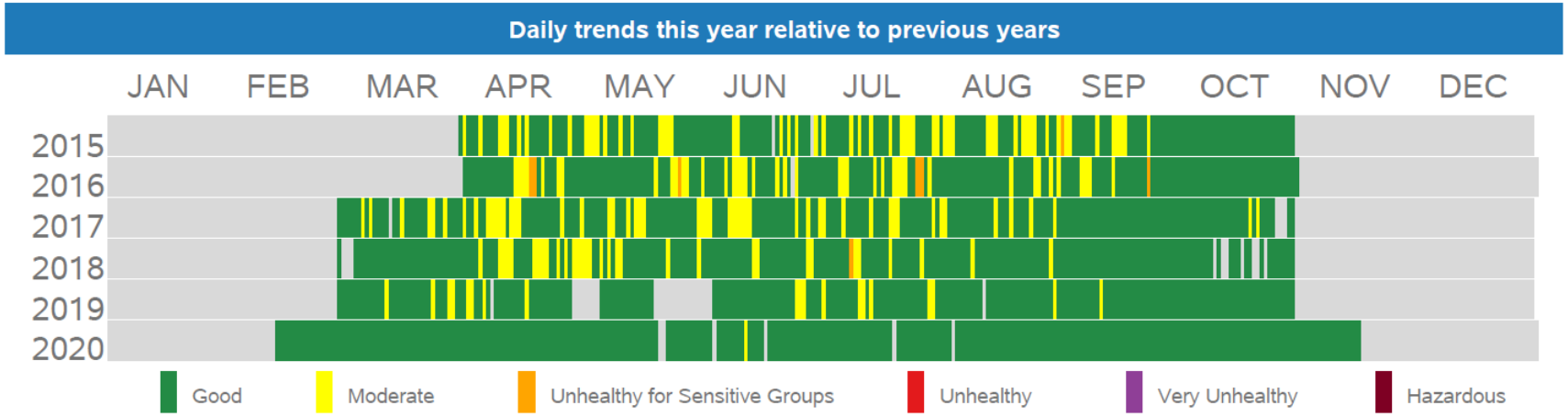
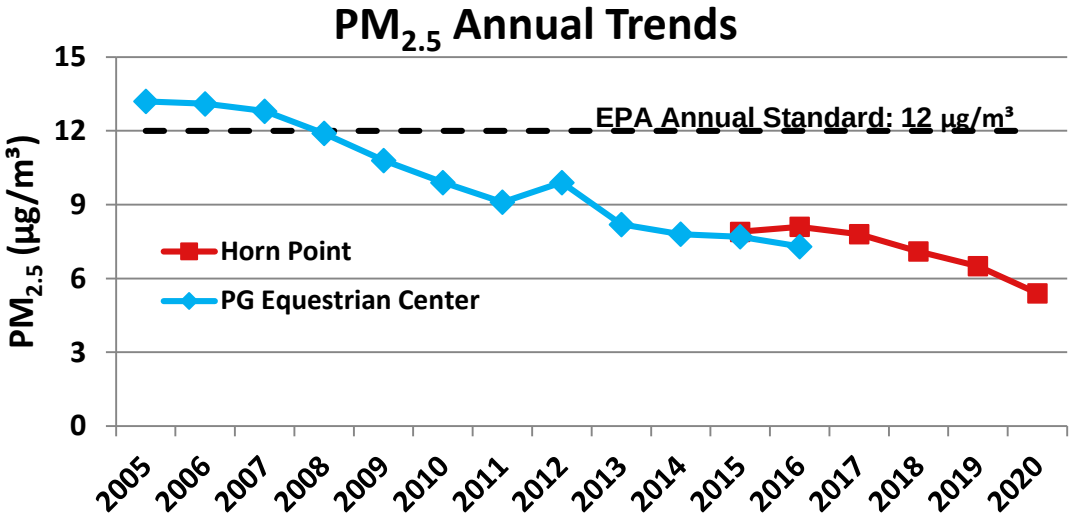
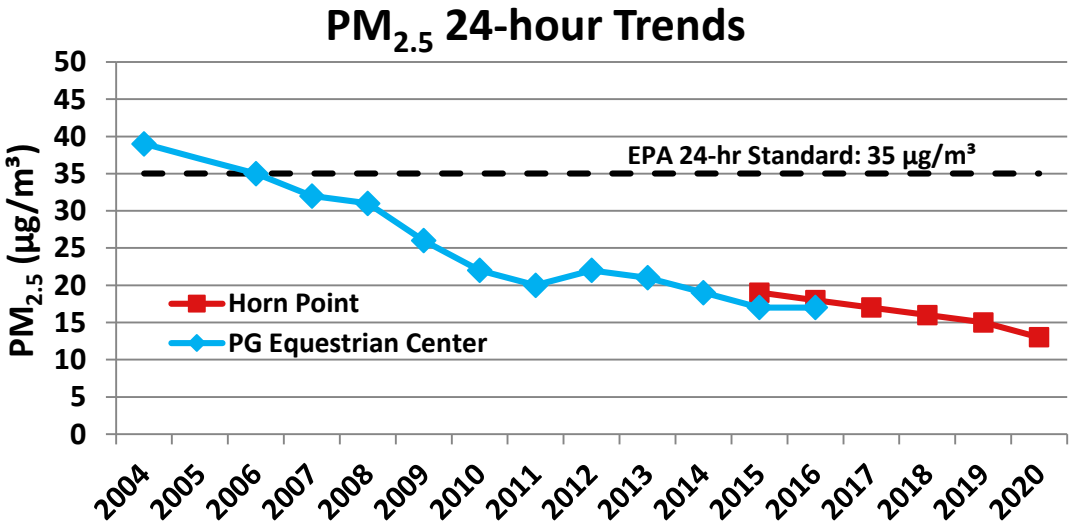


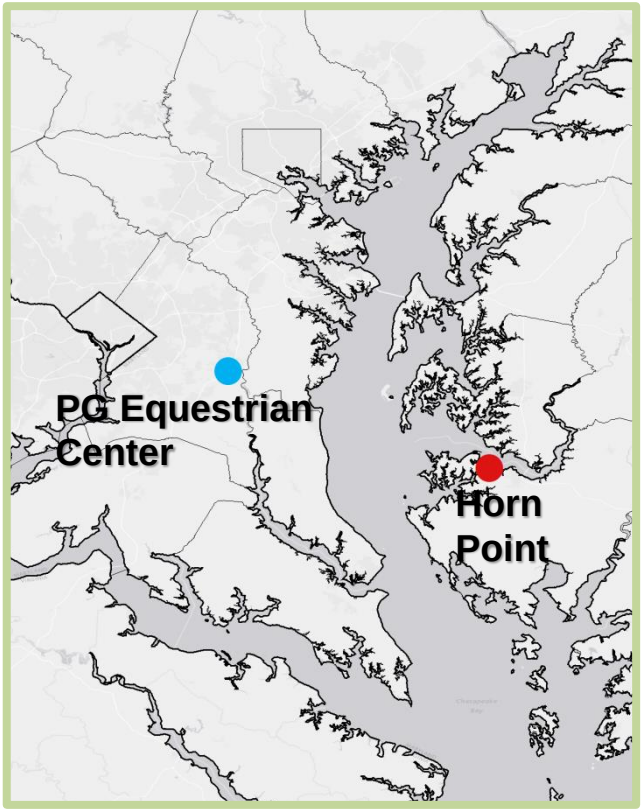
Source: EPA AQS Data Mart & AirNow

Generated: March 19, 2021

Fine Particle Trends:
Horn Point and PG Equestrian Center







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WHY HAS AIR POLLUTION
IMPROVED SO DRAMATICALLY?

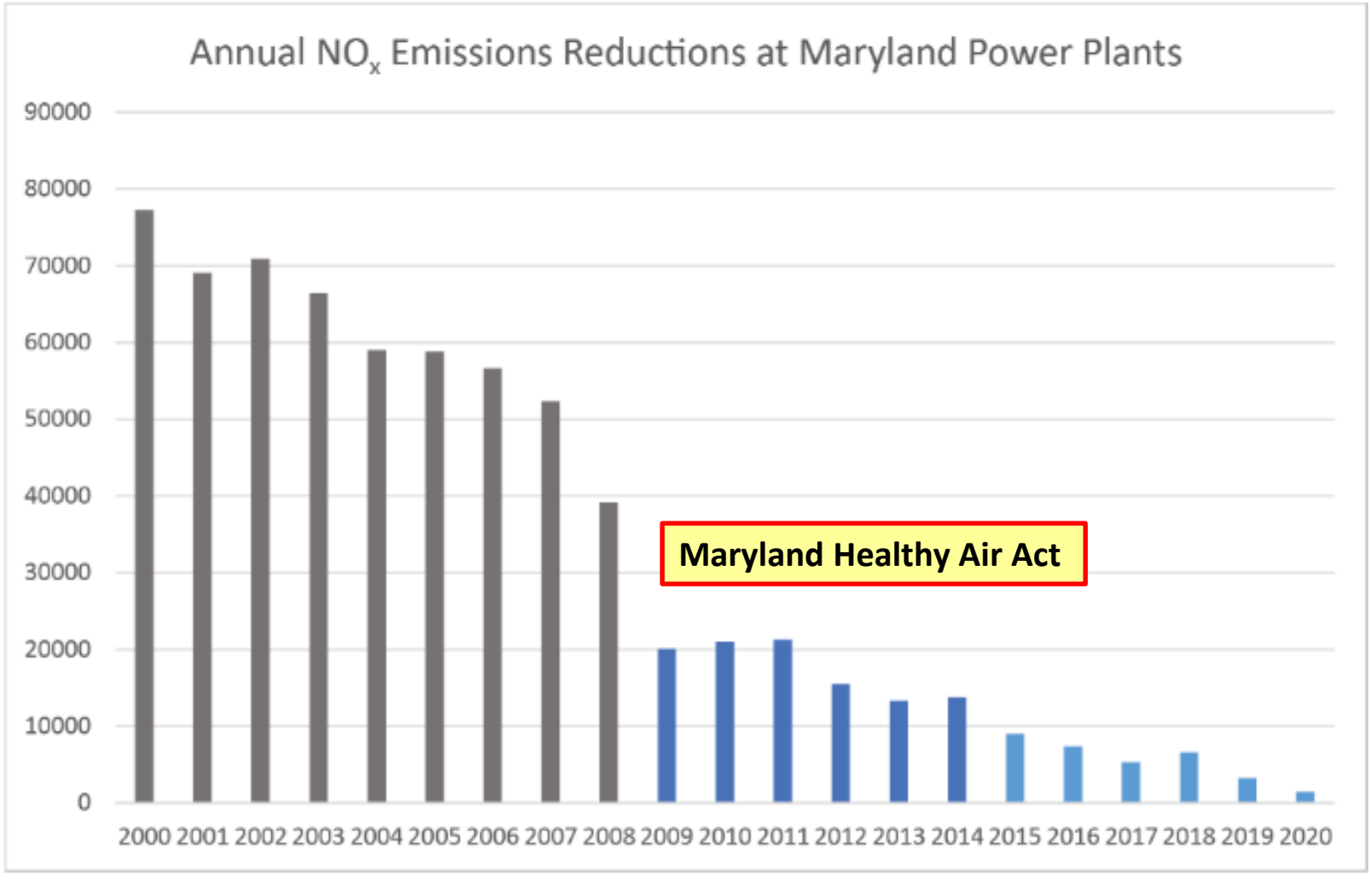
What Has Driven the Progress?

- Maryland has adopted hundreds of emission control programs to reduce air pollution
  - A few of the higher profile efforts are listed below
- Stationary (smokestack sources):
  - The Maryland Healthy Air Act, The Regional Greenhouse Gas Initiative (RGGI), Maryland's 2015 NOx Regulations … many more
- Mobile sources:
  - The 2007 Clean Cars Program, Federal Tier 2 and 3 tailpipe standards, numerous diesel emission reduction efforts … many more
- Potential future emission reduction efforts:
  - The Transportation and Climate Initiative (TCI), Zero Emission Medium and Heavy Duty Trucks … many more

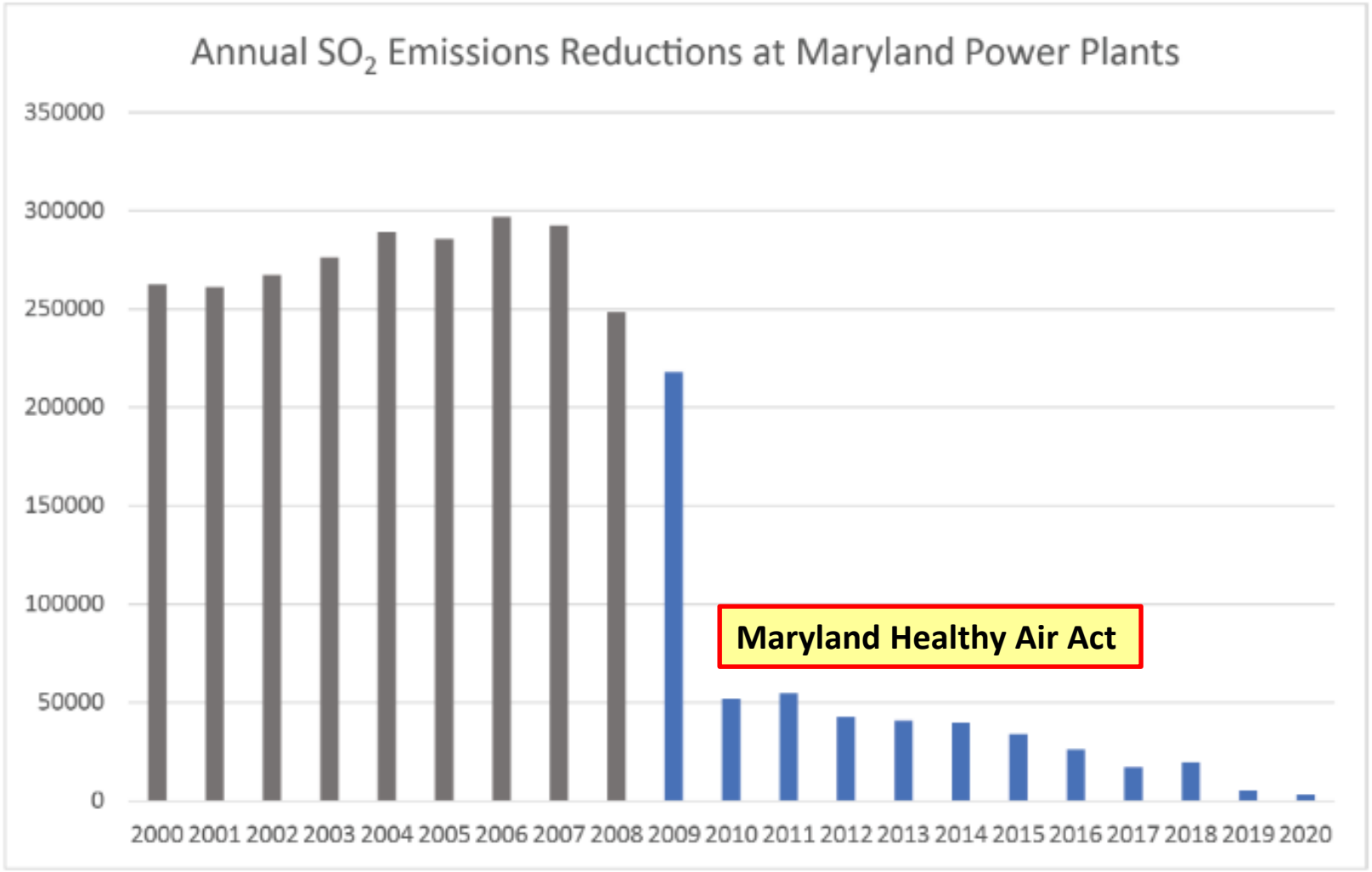
Driving Progress with Research

- MDE works in partnership with the other states, local universities (UMD at College Park, UMBC, and Howard University) and federal agencies (NASA, NOAA,NIST) to study ozone and fine particulate air pollution problems.
- Major focus … Transport
  - Airplanes … Balloons … Lidar
  - Profilers … Satellites … Special monitors … Modeling
  - Much, much more
- Major driver of the last 15 years of progress. Key lessons learned:
  - About 70% of Maryland's ozone problem originates in upwind states.
  - Reducing nitrogen oxide from power plants and vehicles and SO2 from power plants in MD and upwind states will dramatically reduce ozone and fine particulate in Maryland.

NOx Reductions from Coal-fired Power Plants



SO2 Reductions from Coal-fired Power Plants

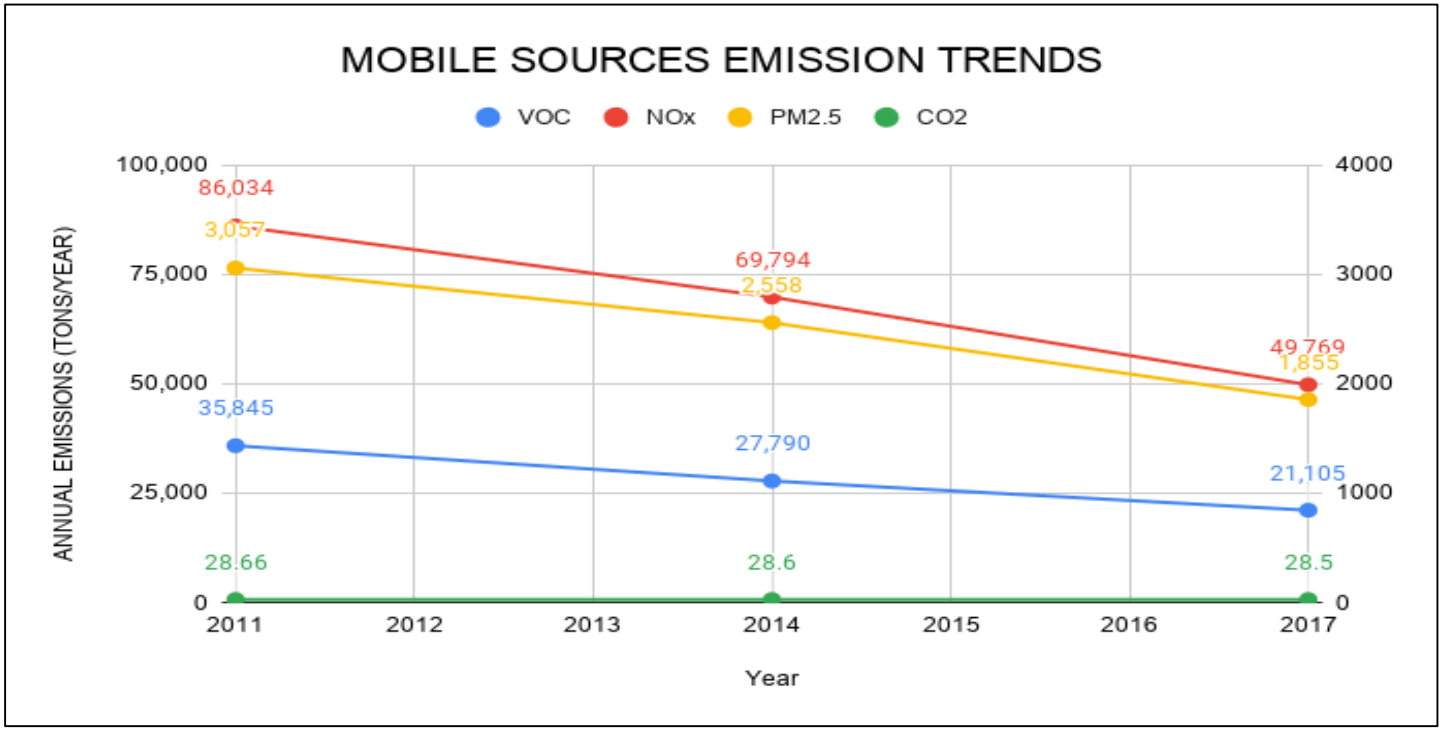


Deactivation of Coal-fired Power Plants

- All of Maryland's coal-fired power plants to close by 2030:
  - HA Wagner 2 – June 1, 2020
  - Dickerson – July 30, 2020
  - Chalk Point – June 1, 2021
  - Brandon Shores – October 1, 2025
  - HA Wagner – October 1, 2025
  - Morgantown – 2027
  - AES Warrior Run – 2030
- Gas and oil-fired units within facilities may continue operation.
- Renewable energy and battery storage projects being planned as on-site replacement.

Mobile Source Emission Reductions

- State and federal requirements have also driven significant reductions in emissions from mobile sources



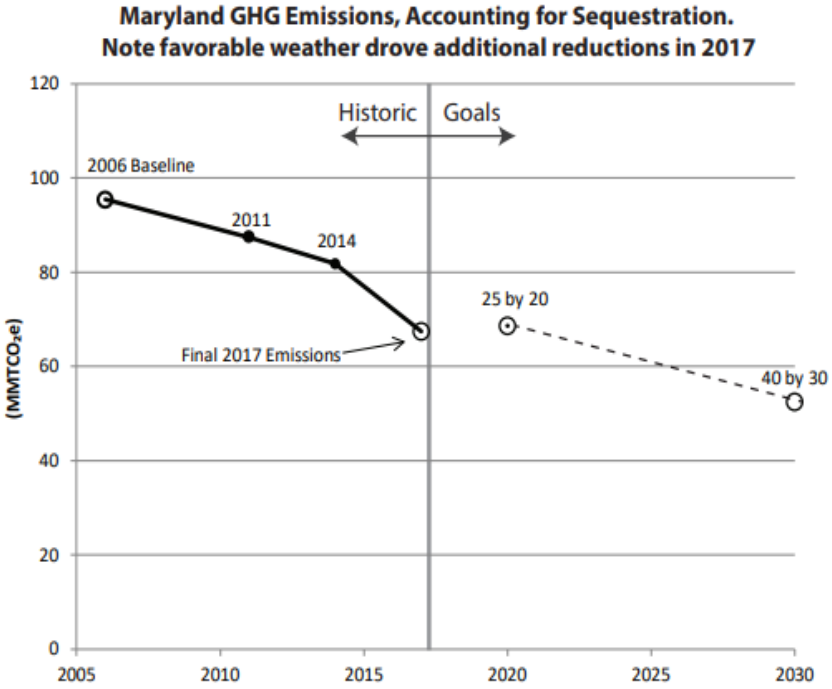
ADDRESSING CLIMATE CHANGE

MARYLAND'S EFFORTS

Greenhouse Gas Reduction Efforts

- Through the 2009 and 2016 Greenhouse Gas Emission Reduction Acts (GGRA), MDE has just released a bold, comprehensive plan to reduce our greenhouse gas (GHG) emissions by a minimum of 40% from 2006 levels by 2030 while positively impacting the State's economy and creating jobs.

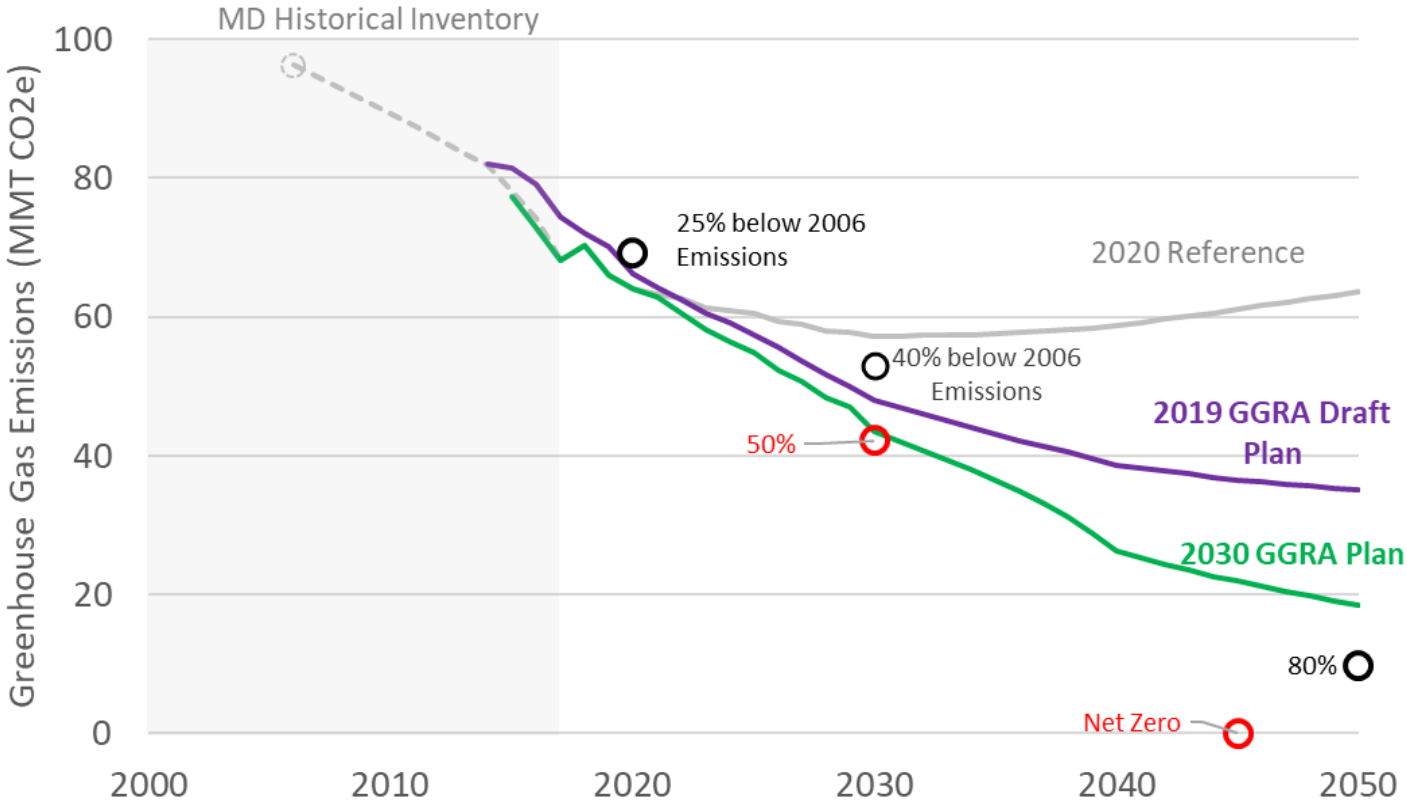
- The final plan incorporates a comprehensive set of more than 100 measures designed to reduce GHG emissions.



https://news.maryland.gov/mde/

The 2030 GGRA Plan

The Plan reduces GHGs substantially more than the 40-by-30 requirement, and nearly achieves 50-by-30. Additional Federal action would make up the difference.



Maryland greenhouse gas emissions, accounting for sequestration. Projections from Draft Plan and 2030 GGRA Plan.

GGRA Plan - Economic Impacts

The GGRA Plan achieves the 2030 goal with significant benefit to the State's economy.

MD impact relative to Reference Case	Through 2030	Through 2050
Average job impact*	+ 6,186	+ 6,823
GDP Impact**	+ $ 5.3 billion	+ $ 14.7 billion
Personal Income Impact**	+ $ 4.5 billion	+ $ 16.1 billion
Public Health Benefit (Avoided Mortality)**	+ $ 0.9 to $ 2.1 billion	+ $ 7.5 to $ 17 billion
Climate Change Benefit**	+ $ 3.12 billion	+ $ 27.9 billion

* Average number of job-years created or sustained each year.
** 2018 Dollars, Cumulative, Net Present Value using 3% discount rate.
Climate benefit evaluated using Federal Social Cost of Carbon (2015 Update)


DEISEL REDUCTION
PARTNERSHIPS

Reducing Diesel Exhaust Emissions

- This is an area where we have made considerable progress over the past few years.
- Over the last 10 years, more than $16 M invested into diesel clean-up efforts by government and private sources.
- An additional $166 M being invested over the next few years.
- Funding from federal grants, State funds and a large pot of mobile source clean-up money that came to Maryland when Volkswagen (VW) broke the law.
- An opportunity to partner with Calvert County.

Diesel Emission Reduction Efforts
The Past

- The Port Partnership (since 12/2015)
  - Dray truck replacement, cargo handling equipment repower and replacement
  - NOx reduced by 1,250 tons, $9.2 M investment in clean air
- Others Around Baltimore
  - Retrofit locomotives, trucks, gantries, harbor ships and locomotives, tugboat engine replacement, locomotive idle reduction equipment
  - NOx reduced by 1,260 tons, $7.2 M investment
- Other Projects
  - Retrofit school buses, long haul trucks, ambulances and fire trucks
  - NOx reduced by 670 tons, $3.3 M investment

Diesel Emission Reduction Efforts The Future

- Community Projects funded with VW funds
  - Turners Station
    - Marshall's Trash Truck
  - Curtis Bay
    - Diesel yard truck
- VW Projects in and around the Port
  - Port projects
    - Repower tugs and purchase trucks and handling equipment
    - NOx reduced by 406 tons, $2.97 M investment
  - Private Sector projects
    - Repower tugs and purchase diesel buses, locomotive switchers, electric cranes
    - NOx reduced by 1,876 tons, $22.3 M investment
- Other VW Projects
    - Purchase new electric and alternative fuel school buses, trash trucks, transit buses
    - NOx reduced by 1,307 tons, $133.7 M investment

The Port Partnership

- A great example of a partnership between government and communities
- Government partners: the Port, the MD Department of the Environment, the MD Department of Transportation and the MD Energy Administration.
- Community partners: Turners Station, St. Helena, Greater Baybrook, North Point, Fort Howard and maybe 10 other communities.
- Diesel reduction has been a major focus but the partnership includes other media and other issues.
- Through 2020, about $10 Million investment into clean air and climate change … about 1250 tons of NOx emissions eliminated … significant reductions in GHG and toxic emissions … continued collaboration with communities.


QUESTIONS ... DISCUSSION