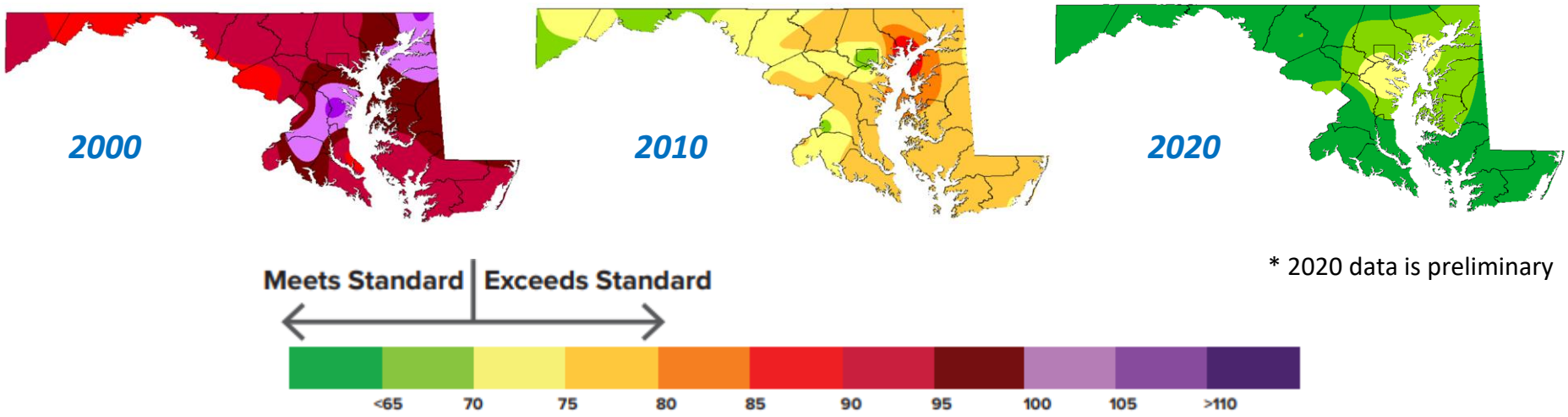
Maryland
Department of the Environment

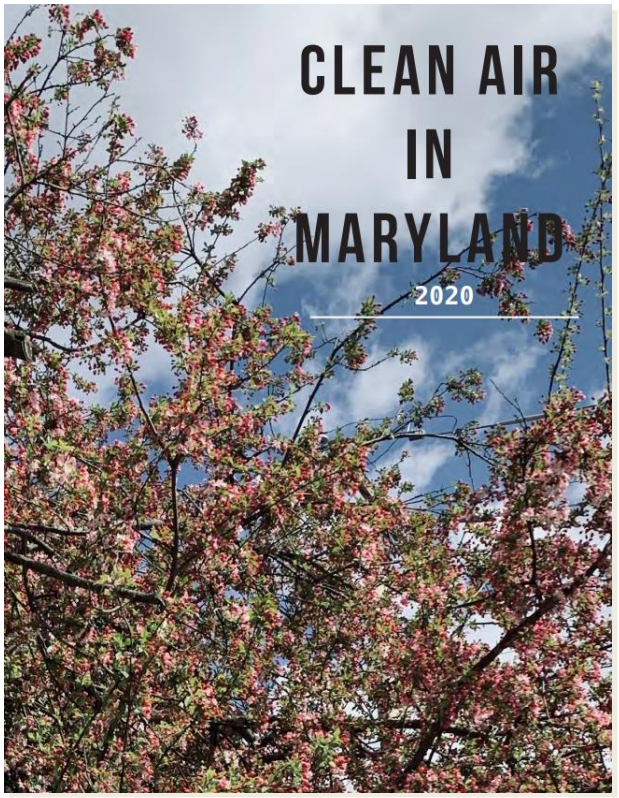
An Air Quality and Climate Change Update



* 2020 data is preliminary

Overview of Presentation

- Air Quality Basics Refresher
- Clean Air and Climate Change Progress
- State and Federal Programs Addressing Air Pollution
- Moving Forward - AQCAC Priorities 2021 and 2022

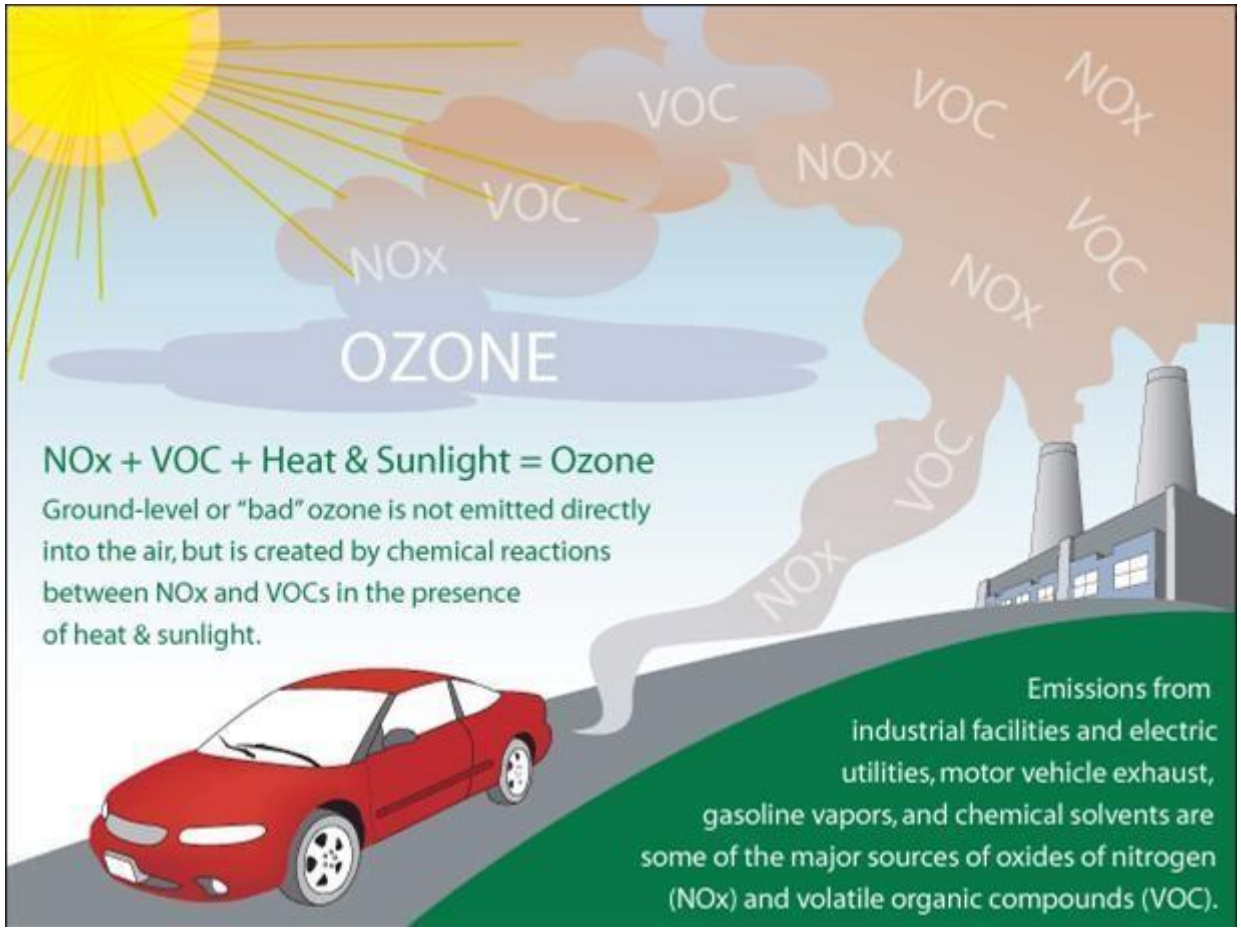


https://mde.maryland.gov/programs/Air/Pages/index.aspx


AIR QUALITY BASICS
A REFRESHER

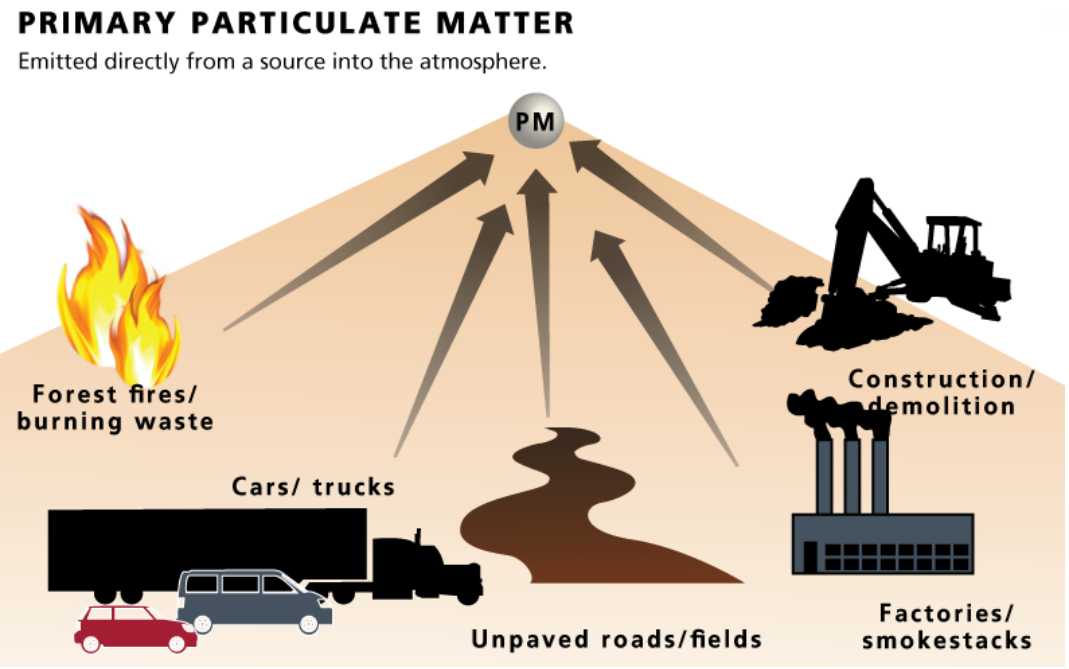
Ground-Level Ozone

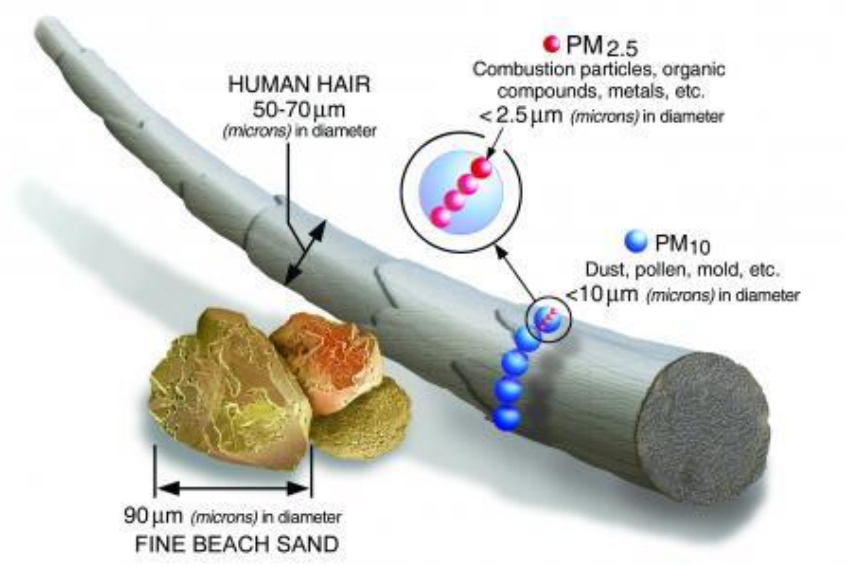
- The most pervasive air pollutant in Maryland and many other parts of the country…



Particulate Matter

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



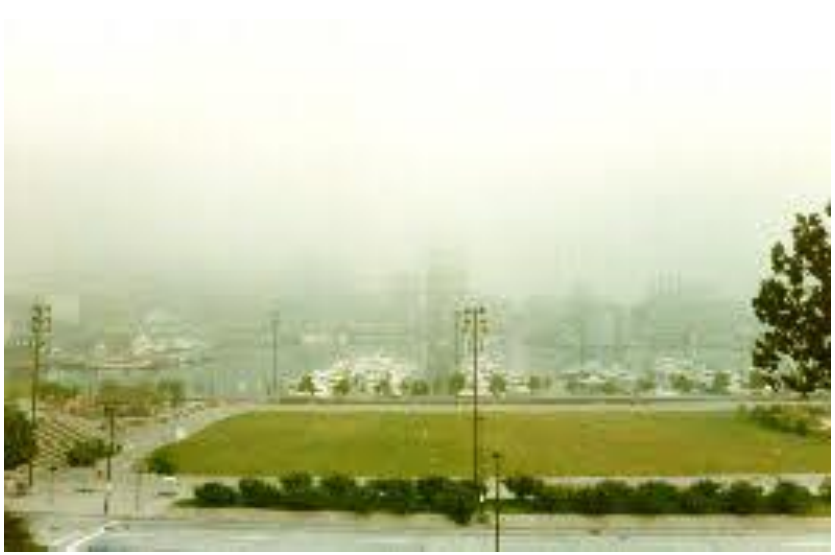


The Ugly…

- 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

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 west 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 recorded in a year.

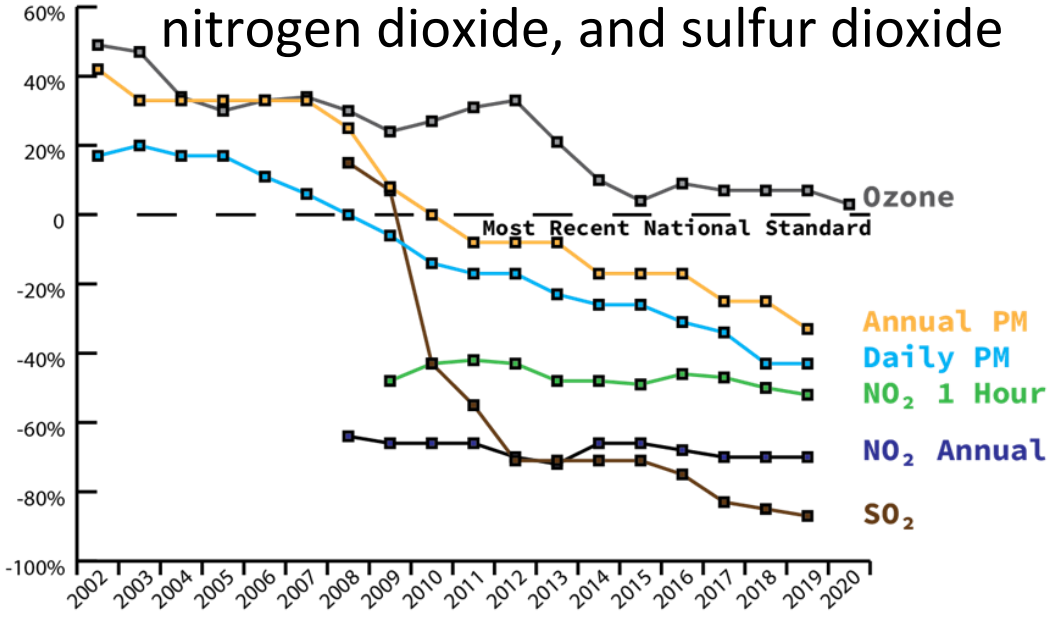
2021 - CLEAN AIR HIGHLIGHTS

PROGRESS CONTINUES

Clean Air Highlights

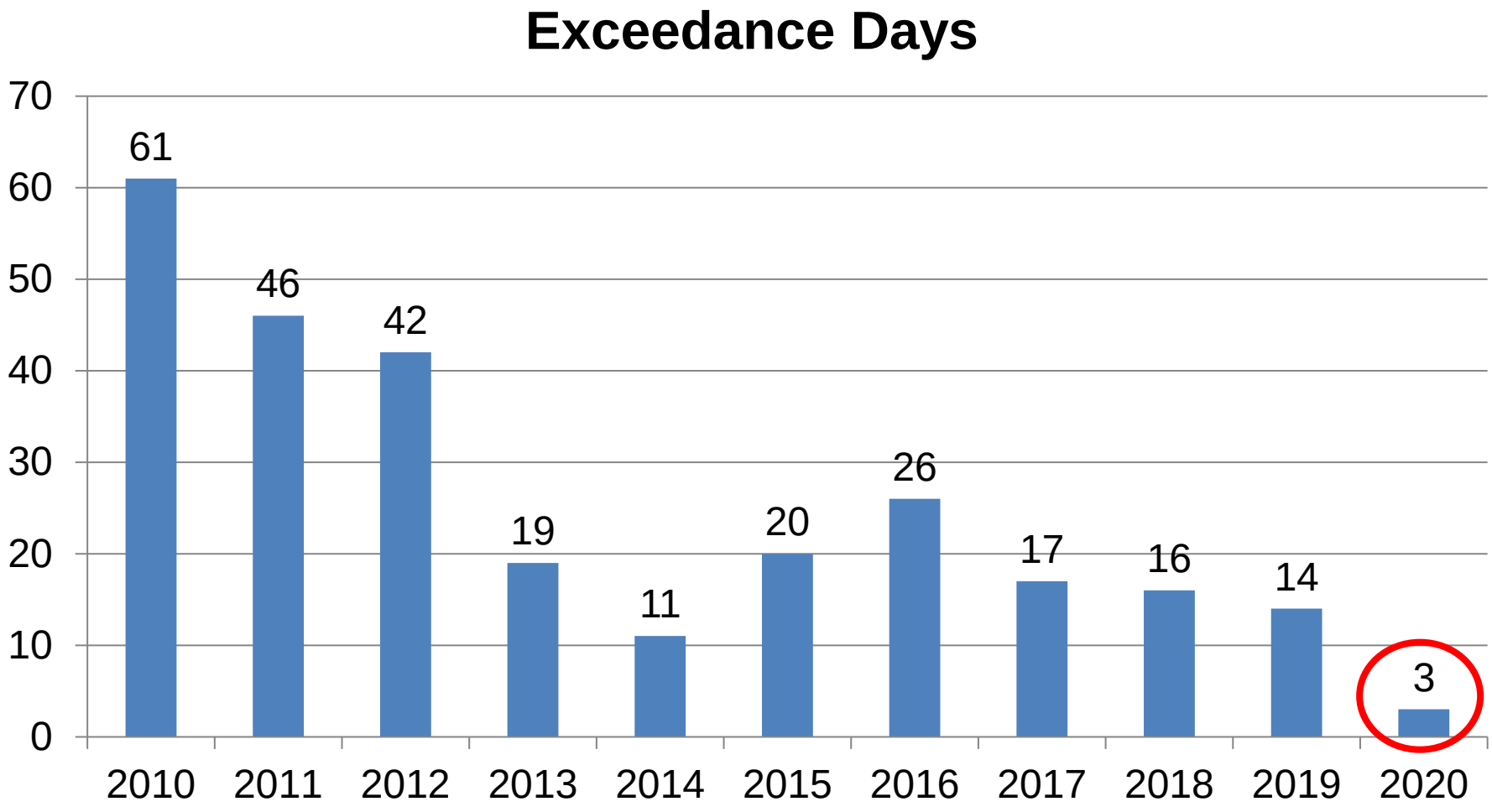
- For nearly 30 years, Maryland's air quality has dramatically improved

- 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)

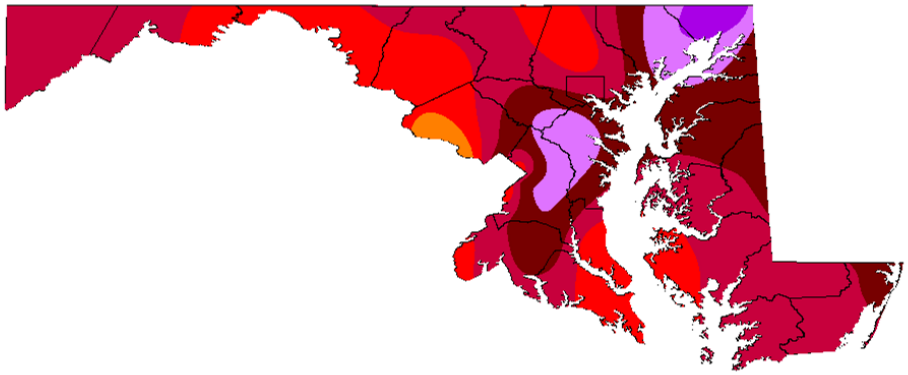
Maryland Bad Ozone Days



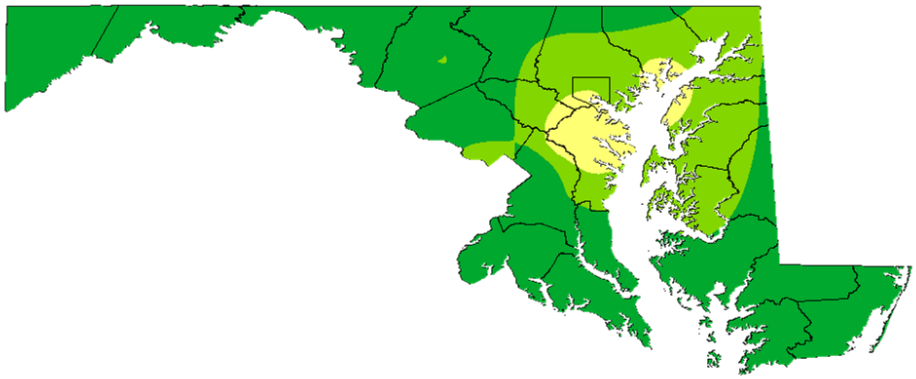
* 2020 data is preliminary

The Shrinking Ozone Problem

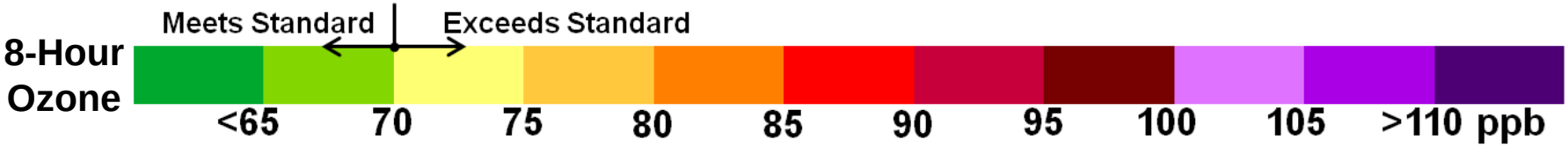
1998



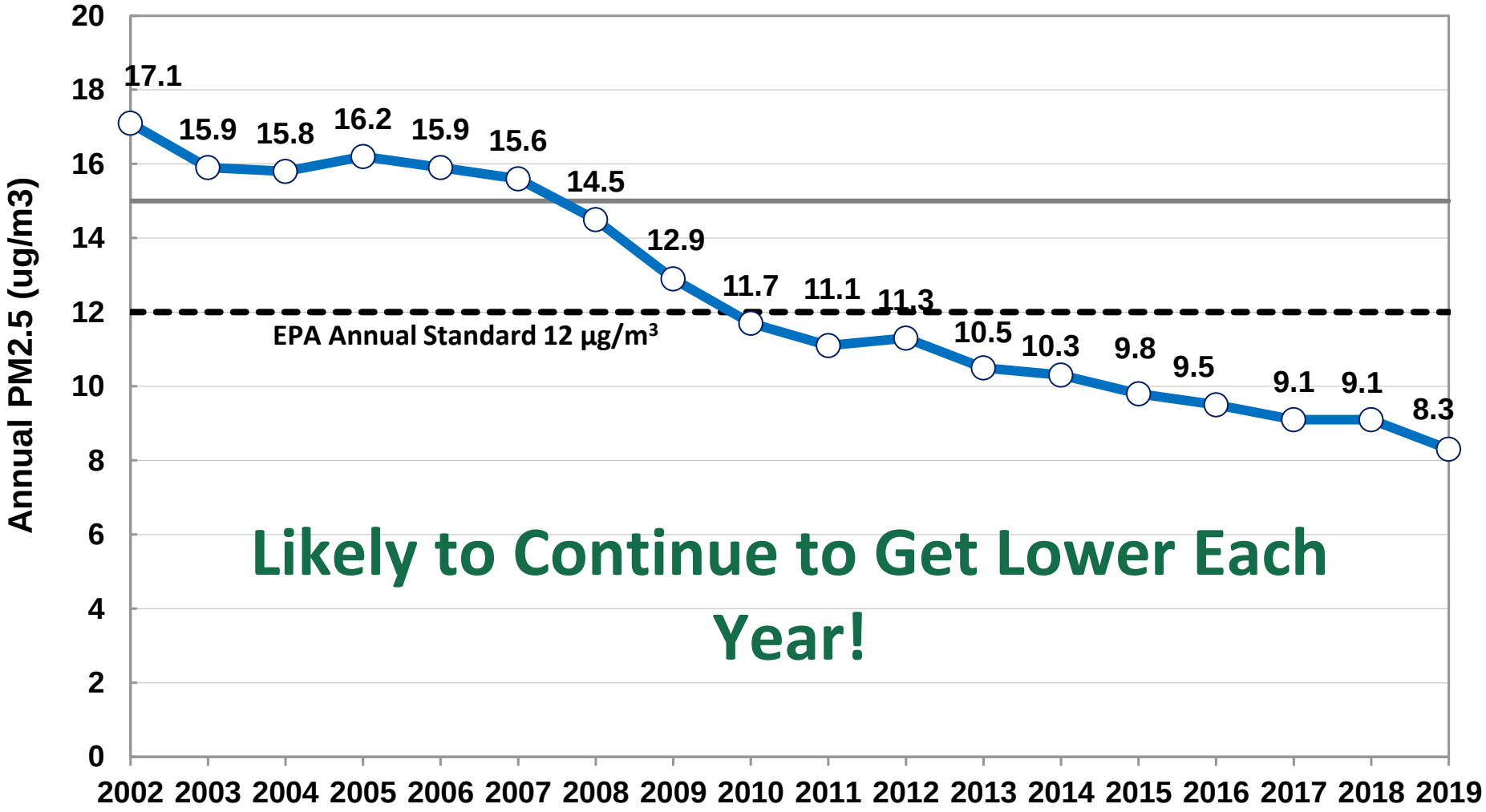
2020*



Lower Ozone Levels and Significant Spatial Risk Reduction

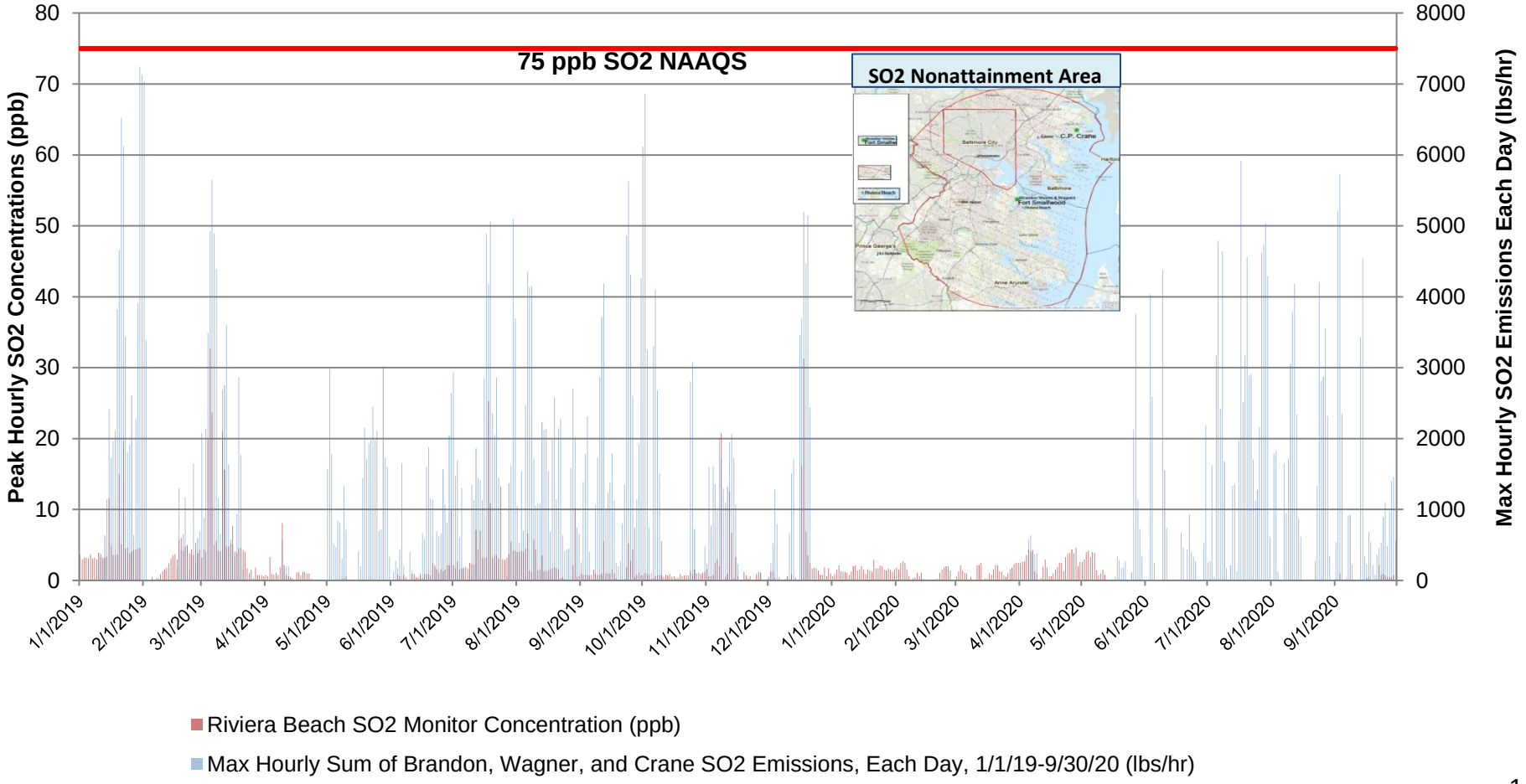


Fine Particle Air Pollution
Lower Levels Across the State

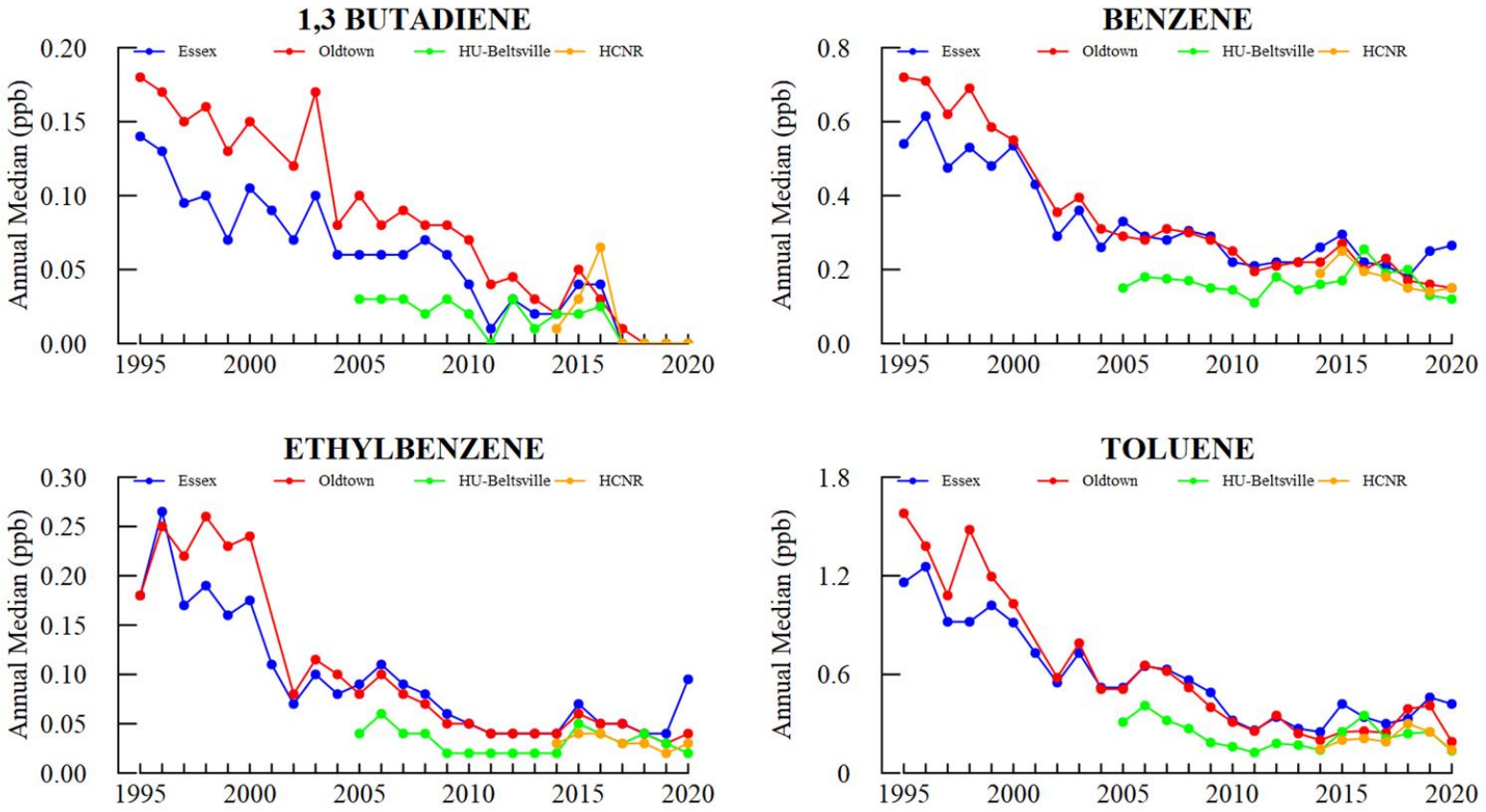


SO2 Air Pollution Levels Well Below Standards

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 50%

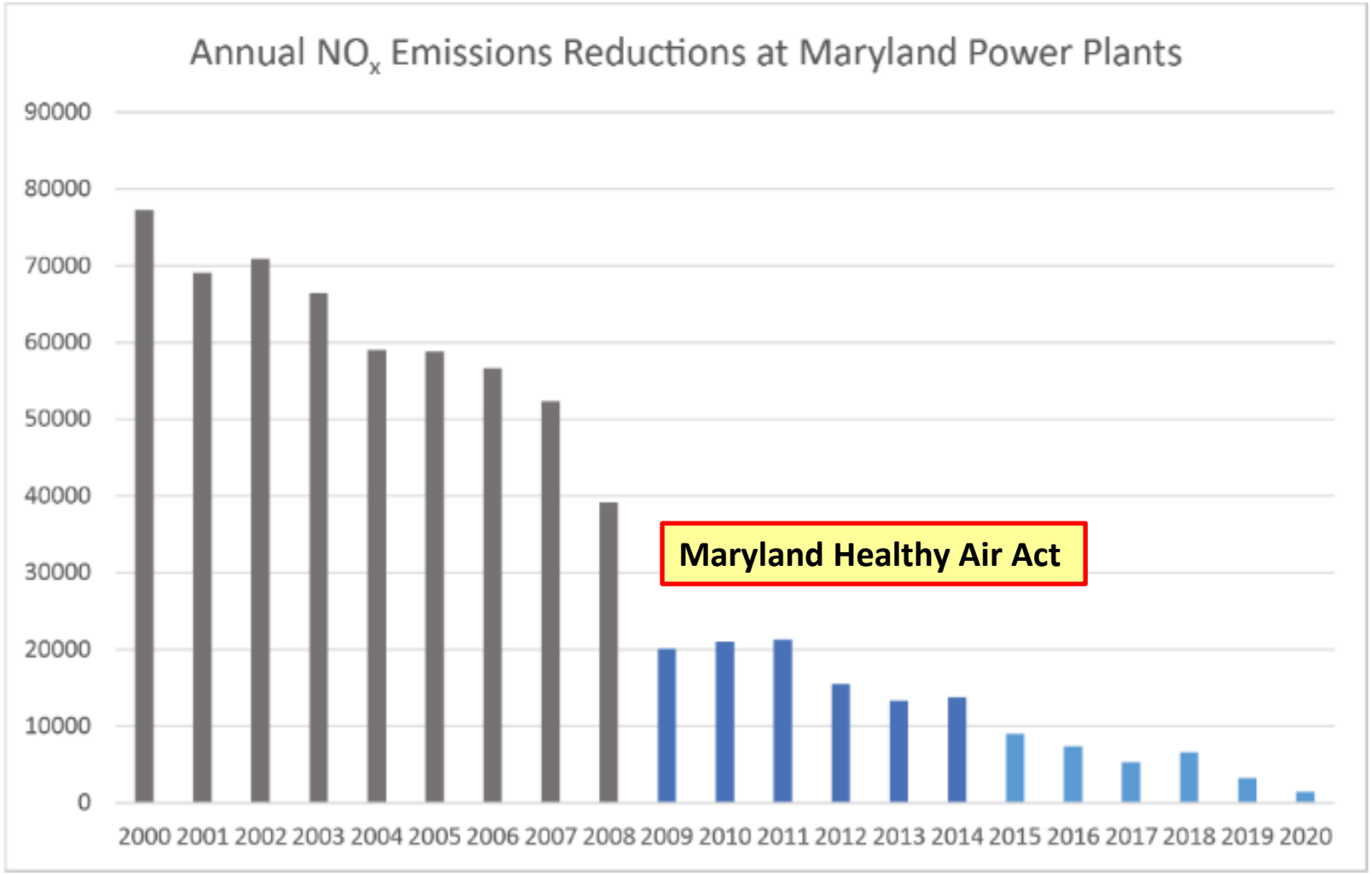
What Has Driven the Progress?

- 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

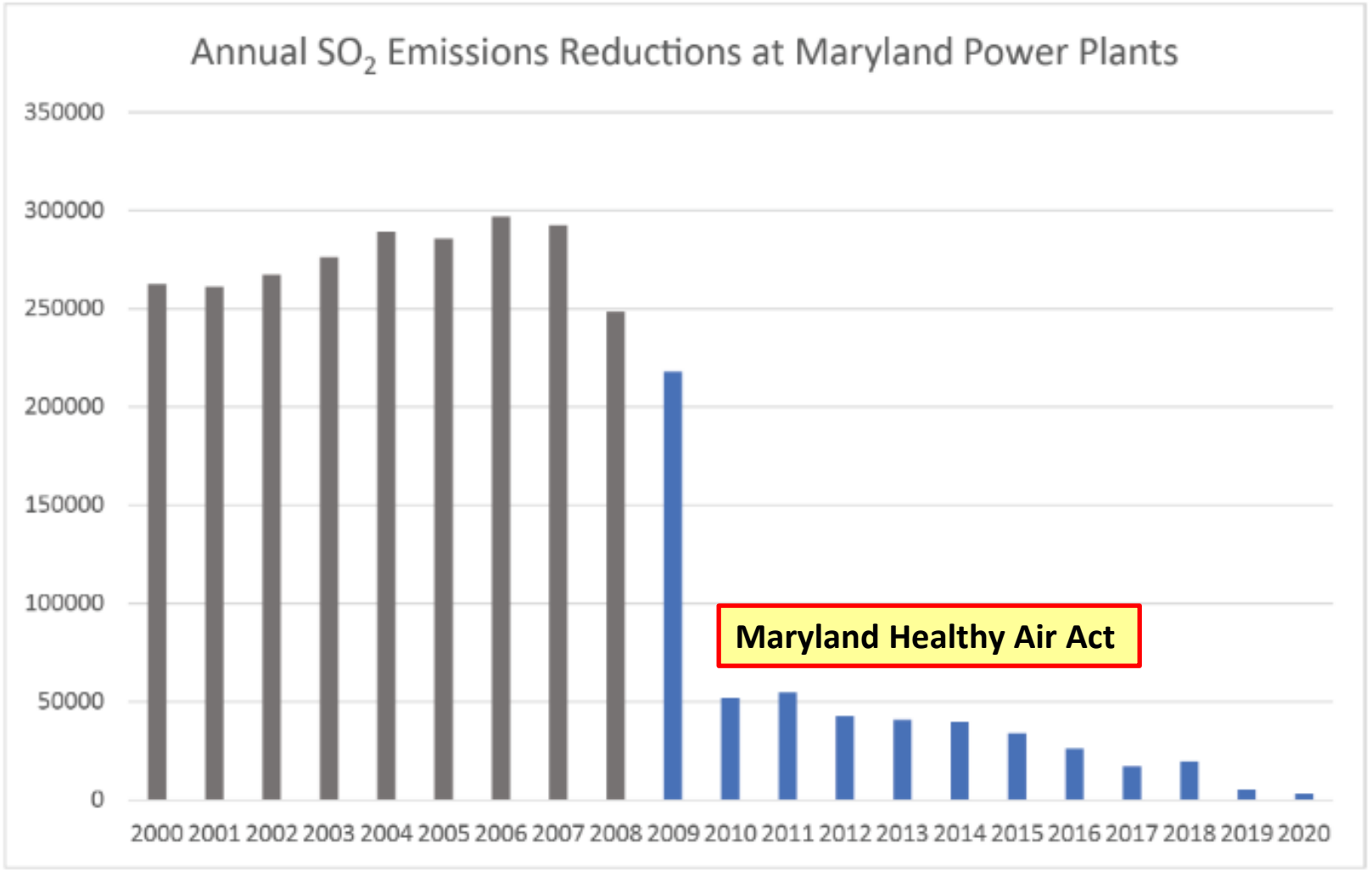
Driving Progress with Research

- 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

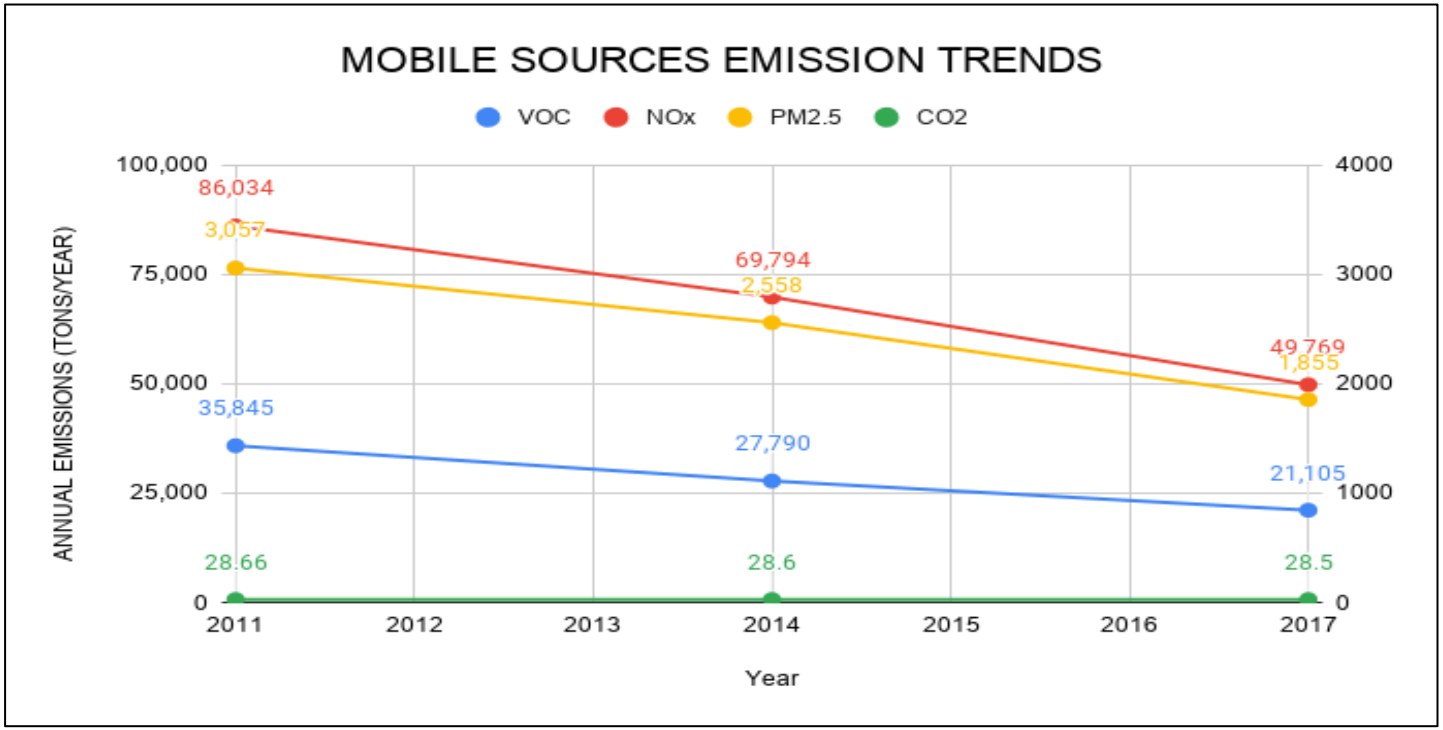


Deactivation of Coal-fired Power Plants

- 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



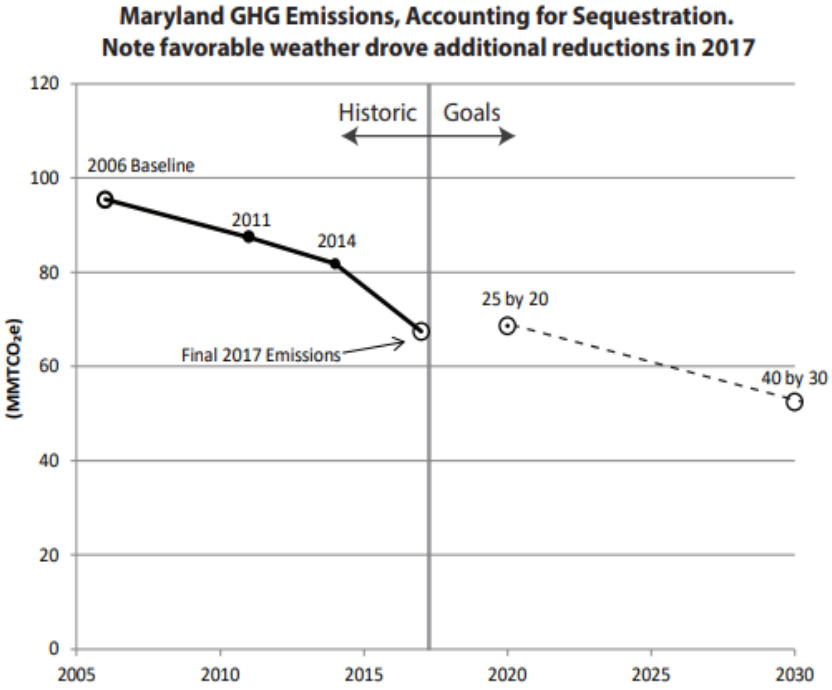
ADDRESSING CLIMATE CHANGE

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

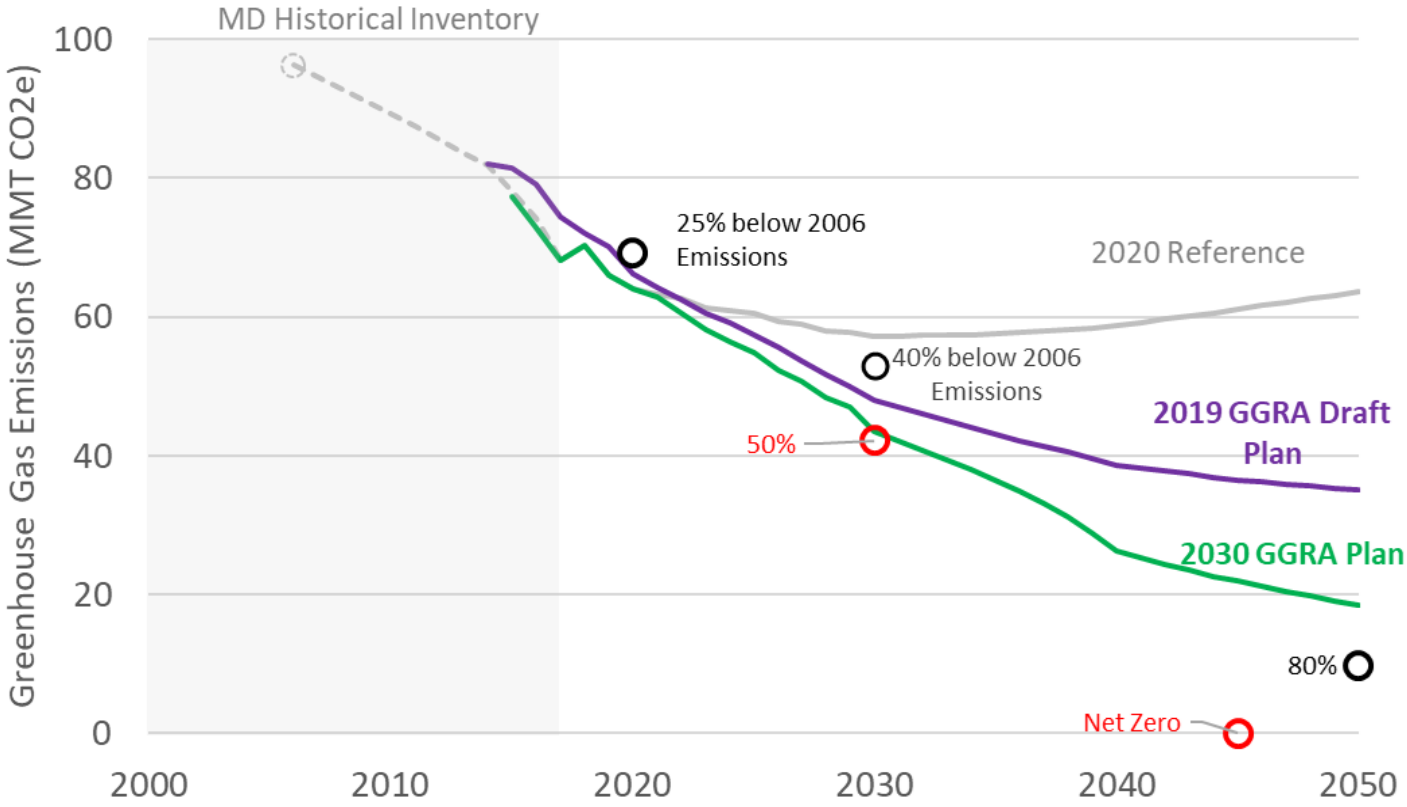
- The final plan incorporates a comprehensive set of more than 100 measures designed to reduce GHG emissions



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)

2021 AND 2022 AQCAC PRIORITIES

A Rapid-Fire Snapshot of 2021/2022 Policy Priorities

- Climate Change
  - GGRA 2030/2050 Plan
    - We still have sensitivity analysis to do: exploring upcoming Federal action once we have a clearer picture of incoming administration's plan.
    - Follow-up analysis of individual program contributions in the coming months.
    - Some underlying planning processes continuing this year, including Buildings Plan (MWG) and Medium/Heavy Duty ZEV Action Plan (Agencies, ZEEVIC, & Multistate ZEV Task Force).
  - Mid-course GGRA progress report due in 2022.

A Rapid-Fire Snapshot of 2021/2022 Policy Priorities

- Legislation
  - Could require major new effort and new deadlines
- Climate Commission
  - Commission and four working groups will continue to meet … Do not expect a let up on the demanding pace
- Short-lived climate pollutants (SLCP)
  - Two down (HFCs and Natural Gas Compressor Stations); regulations for methane at landfills and natural gas distribution sector are next
  - Wastewater treatment plants and black carbon on the horizon

Recent SLCP Adoptions

- On December 16, 2019, AQCAC voted to approve two proposed regulations:
  - Prohibitions on use of certain HFCs
  - Control of methane from the natural gas industry
- HFC regulation – Adopted November 2, 2020
  - Compliance dates beginning January 1, 2021
  - Minor amendments under development
- Natural Gas Compressor Stations (Methane)
  - Adopted November 16, 2020
  - Reviewing Blowdown notification plans

Next Steps on SLCP

- Leaking methane from the natural gas distribution system
  - Regulation may apply LDAR requirements to NG storage facilities, metering and regulating stations, city-gate and other aboveground equipment
  - Standardize pipeline reporting metrics and include annually-declining GHG emission requirements to utilities
- Escaping methane from landfills
  - Regulation will build upon new federal requirements… but also, as necessary, go beyond federal limits to ensure that methane emissions are minimized
  - Next stakeholder meeting **xxxx xx, 2021**

Rapid-Fire Priorities (Continued)

- Ozone
  - Transport
    - Section 184C (PA power plants that don't always run their controls), Cross State Air Pollution Rule (CSAPR) Update and Good Neighbor SIPs are all in the works right now
  - Attainment in 2021?
    - Have a real shot at meeting the 2015 standard in 2021. Would bring Maryland into attainment for all criteria pollutants with standards for the first time ever
  - Municipal Waste Combustors
    - Permit conditions and tougher regulations are in the works
  - Aftermarket Catalysts
    - Still moving on MDE regulation, but federal action is also a possibility
- Sulfur Dioxide (SO2)
  - All areas in MD (3) now meeting the standard
  - Working to wrap-up attainment demo process for all 3 areas

Rapid-Fire Priorities (Continued)

- Mobile
  - Medium & Heavy Duty ZEV MOU a very high priority. Action Plan in Fall
  - The Transportation and Climate Initiative (TCI) also a high priority Analyses and expansion of regional program still ongoing
  - Electric vehicles (EVs) are also another very high priority
    - Will continue to come to AQCAC for reg changes when California makes changes
  - California and Clean Air Act Section 177 opportunities will present themselves in 2021 and 2022
    - Potential regs for and advanced clean truck program, a heavy duty diesel NOx program and an updated california car program are all at a point for consideration under 177 - more today
    - Also a very real possibility that EPA will move to harmonize the federal program with the California program
  - Anti-Tampering …

Anti-Tampering

- A very hot issue … Started with Volkswagen in 2015
- Problem is much bigger than we (states and EPA) understood
  - Tampering taking place with manufacturers like VW, but also at dealers, auction houses and auto repair shops
- EPA has estimated that excess emissions associated with tampering in the MARAMA states is 58,000 tons of NOx
- We will be bringing a regulation to AQCAC in June for approval to clarify exactly what the requirements are
- Already have existing authority in Maryland law to address tampering and have already begun this work
- Announcement of this major enforcement initiative in April/May timeframe

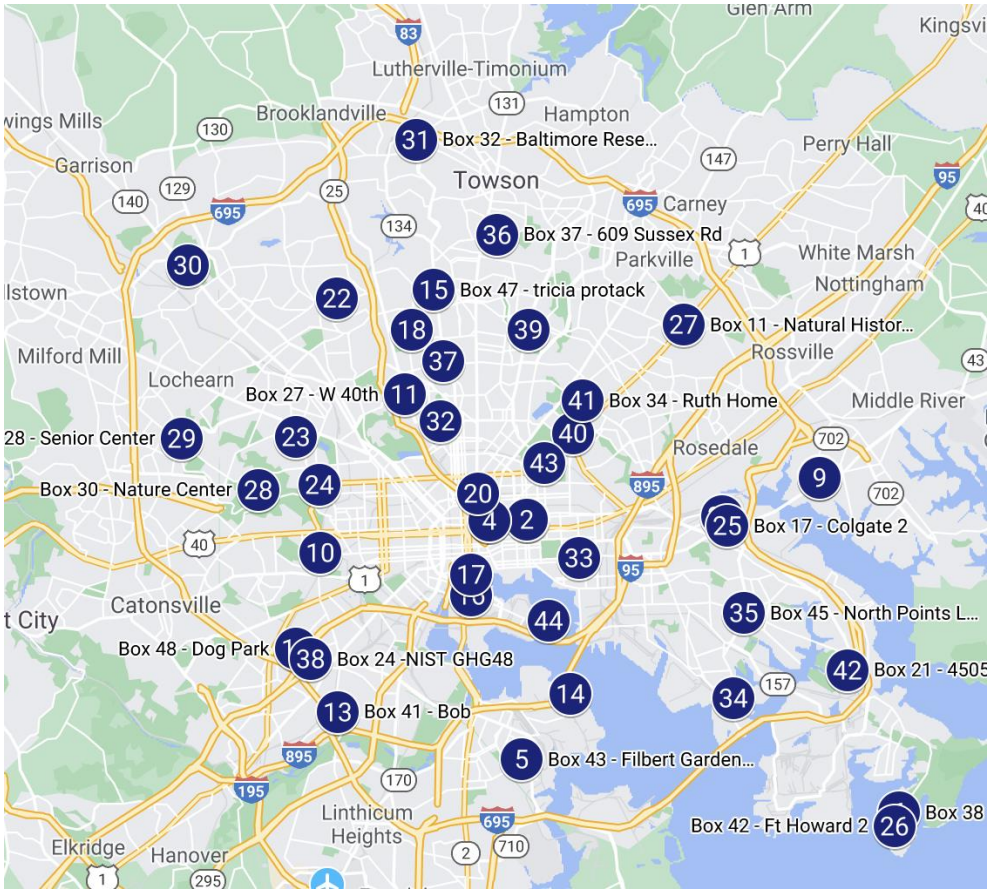
Rapid-Fire Priorities (Continued)

- Environmental Justice
  - Hyper-local air monitoring projects … Now four efforts that are either up and running or soon to be up and running. Baltimore, Cheverly, St. Mary's County and DC area
  - Reinvigorated MDE-wide process for environmental justice is now being implemented
  - Community partnerships - MDE Air Program had initiated partnerships with nine communities … now being blended with MDE-wide effort
  - Permits and compliance
- Maryland's Port and Peak Day Partnerships
  - Port partnership very strong, MDE, MDOT, MEA, the Port and over 15 different communities. Over $15 Million investment into clean air and very large reductions in NOx, greenhouse gases, PM, air toxics and diesel particulate. More reductions on the way.
  - MDE's peak day partnership effort is in its 4th year. Extra effort and reductions on worst ozone days from about 40 stationary NOx sources.

An Example of a Hyper-Local Monitoring Project

The Johns Hopkins/Yale "SEARCH" Project

- Lead by Johns Hopkins and Yale with MDE collaboration
- A project using a large network of low cost air quality sensors to look at air pollution variability across the Baltimore area
- Data on fine particulate, nitrogen dioxide, greenhouse gases and more being collected
- Similar projects in Cheverly, St. Mary's County and DC area



SEARCH sensor map courtesy of Kirsten Koehler (JHU)

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

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 North Point area
  - 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


QUESTIONS ... DISCUSSION

EXTRA SLIDES

Discussion

- Thoughts … comments on briefing?
- What other environmental or climate change issues are most important to you?
  - A future update on state activities to address climate change related sea level rise, severe weather and flooding?
- Ideas on a local diesel emission reduction effort?
- The States climate change plan is huge …
  - How could we best work with you and other communities to insure your input on this plan is considered?
- Other Issues?

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):
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- 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
- MDE benefited immeasurably from the MCCC during the finalization of the 2019 GGRA Draft Plan

NOx Emissions 2019

Top 15 Stationary Sources

No.	2019 Top 15 NOx Emissions Sources in MD	Facility-wide NOx Emissions (Tons Per Year)
1	Lehigh Cement Company LLC	2,614
2	Raven Power Fort Smallwood LLC	1,130
3	Wheelabrator Baltimore, LP	924
4	Luke Paper Company *	861
5	GenOn Chalk Point Generating Station **	611
6	Montgomery County Resource Recovery Facility (MCRRF)	470
7	AES Warrior Run Inc	464
8	Morgantown Steam LLC	457
9	Holcim (US), Inc	349
10	Dickerson Generating Station/GenOn Mid-Atlantic, LLC. ***	241
11	Transcontinental Gas Pipe Line Company, LLC Compressor Station 190	155
12	Vicinity Energy Baltimore Heating, LLP-Spring Gardens Plant	154
13	Mettiki Coal, LLC	149
14	Constellation Power - Notch Cliff ****	144
15	Dominion Energy Cove Point LNG, LP	141
Total Stationary Source NOx Emissions in MD - 2019		11,782 tons

* Shutdown May 7, 2020
** Shutdown June 1, 2021
*** Shutdown July 30, 2020
**** Shutdown June 1, 2020

Reducing Diesel Exhaust Emissions

- This is an area where we have made considerable progress over the past few years
- Much of that progress is in and around the North Point Area
- Over the last 10 years over $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

Diesel Emission Reduction Efforts The Past

- In and around the North Point Area
  - 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
    - 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 underserved comunities
  - Port projects
    - Repower tugs and purchase trucks and handling equipment
    - NOx reduced by 406 tons, $2.97 M investment
  - Private Sector projects
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