Cleaning the Air

Fine Particles: Well below health standards

Ozone: Lowest levels in 30 years

Mercury: Huge emission reductions

New Ozone & Sulfur Dioxide Standards: Our next set of challenges ... but new programs on the way
Topics Covered

• Maryland’s air quality
  – 10 years of dramatic progress

• What happened to drive that progress?

• New Challenges

• Opportunities to work together for even cleaner air
CLEANING THE AIR
DRAMATIC PROGRESS
OVER THE PAST 10 YEARS
Progress in Cleaning Maryland’s Air

1-Hour Ozone

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8-Hour Ozone

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Annual Fine Particulate

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Daily Fine Particulate

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<td>Daily PM$_{2.5}$ (µg/m$^3$)</td>
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<td>20</td>
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Clean Air Progress in Baltimore

- Baltimore has historically measured some of the highest ozone in the East

- From 2013 to 2015, the Baltimore area did not exceed the current ozone standard
  - First time in 30 years ... weather did play a role

- EPA has now finalized a “Clean Data Determination”

- With hotter, less ozone friendly weather, Baltimore may see higher ozone ... but continued progress is indisputable

- New, lower standard begins in 2017
  - New challenges
The Shrinking Ozone Problem

- In 2015 no monitors were above the 75 ppb threshold
- In 2015 only small areas of Baltimore, Harford and Cecil Counties were above the new ozone threshold of 70 ppb
The summer of 2016 was warmer than normal and significantly warmer than the past 3 years. However, Maryland had only marginally more exceedance days than the past 3 years.

We no longer see high temperature always drive high ozone ... the atmosphere in the Mid-Atlantic has changed so that continued NOx reductions will create even greater ozone reductions.
Progress Reducing Fine Particles

• Maryland is currently attaining the daily and annual fine particle standards across the state.

• Fine particulate levels continue to trend down as SO$_2$ emission reductions continue.

• This is a major success story as the health risks associated with fine particulate are very significant.
Fine Particle Air Pollution
Lower Levels Across the State

Annual Fine Particles

![Graph showing the trend of annual fine particles from 2002 to 2015. The EPA annual standard of 12 µg/m³ is indicated on the graph. The values for 2002 are around 17.1 µg/m³, decreasing to 9.8 µg/m³ by 2015.]
Fine Particles: Baltimore City Trends

**PM$_{2.5}$ Baltimore City Annual Trends**
- NW Police
- BCFD Truck Co. 20
- Oldtown

**PM$_{2.5}$ Baltimore City 24-hour Trends**
- NW Police
- BCFD Truck Co. 20
- Oldtown

EPA Annual Standard 12 µg/m$^3$

EPA 24-hour Standard 35 µg/m$^3$
Maryland Air Toxics Trends

TOXICS TRENDS

1,3 BUTADIENE

- Essex
- Oldtown
- HU-Beltsville

BENZENE

- Essex
- Oldtown
- HU-Beltsville

ETHYLBENZENE

- Essex
- Oldtown
- HU-Beltsville

TOLUENE

- Essex
- Oldtown
- HU-Beltsville
What About the City?

Area 8-Hour Ozone Trends

Annual Fine PM Trends

Daily Fine PM Trends

EPA Annual Standard 12 µg/m³

EPA 24-hour Standard 35 µg/m³
WHAT HAPPENED TO DRIVE CLEAN AIR?
Key Pollutants

Over the past 10 years, MDE has worked to reduce emissions of many pollutants. Six of the most critical pollutants include:

- Nitrogen oxide or “NO\textsubscript{x}” - the key pollutant to reduce to further lower ozone levels. Also contributes to fine particle pollution and regional haze
- Sulfur dioxide or “SO\textsubscript{2}” - the key pollutant to reduce for fine particulates and the new SO\textsubscript{2} standard. Also a major contributor to regional haze
- Carbon dioxide or “CO\textsubscript{2}” - the primary greenhouse gas that needs to be reduced to address climate change
- Mercury (Hg) - a very important toxic air pollutant
- Diesel particulate - diesel exhaust
- Volatile Organic Compounds or “VOC” - also a contributor to ground level ozone. Many VOCs are also air toxics
Since around 2005, Maryland has implemented some of the countries most effective emission reduction programs

- These efforts have worked

- Power Plants
- Cars and Trucks
- Other smaller sources
- Area specific initiatives
NO$_x$ Emission Reductions
2005 - 2014

2005 Annual NO$_x$ Emissions
246,000 tons per year

2014 Annual NO$_x$ Emissions
115,000 tons per year
More than a 50% reduction
2005 to 2016 Control Programs

- **Power Plants**
  - The Maryland Healthy Air Act of 2006
  - 2015 NOx reductions for coal plants

- **Cars and Small Trucks**
  - The Maryland Clean Cars Act of 2007

- **Diesel Trucks**
  - Multiple Maryland initiatives

- **Climate Change**

- **Area Specific Initiatives**
  - The Port Partnership
Maryland Healthy Air Act

• The most significant emission reducing program ever adopted and implemented in Maryland

• Widely applauded by the environmental community

• Environmental community & utilities worked with MDE as partners to design and implement the law

• Almost $2.6 Billion investment for clean air by Maryland utilities

• Helped to dramatically clean the air
  – Fine particle levels dropped dramatically
  – Ozone levels dropped dramatically
  – Mercury emissions dropped dramatically
Results: Sulfur Dioxide ($SO_2$)

Annual $SO_2$ Emissions

Healthy Air Act
Results: Nitrogen Oxides (NO$_x$)

Annual NO$_x$ Emissions

Healthy Air Act
Results: Mercury & Other Air Toxics

- Mercury
  - Exceeded the 90% reduction requirement for 2012 in 2010
- Hydrogen Chloride (HCl) reduced 83%
- Direct particulate matter reduced 60%
Maryland Clean Cars Act 2007

• Requires Maryland cars to be the cleanest allowed by law
• Works in tandem with Federal vehicle and fuel standards
• Includes requirements to push manufacturers to develop and sell “Zero Emission” vehicles
Mobile Source NO$_x$ Emissions

Annual NO$_x$ in Maryland

<table>
<thead>
<tr>
<th>Year</th>
<th>Tons/year</th>
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<tr>
<td>2005</td>
<td>132000</td>
</tr>
<tr>
<td>2008</td>
<td>85000</td>
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<td>2011</td>
<td>86000</td>
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<td>2014</td>
<td>76000</td>
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Reducing Diesel Emissions

• Since 2004, Maryland has invested over $6.7 Million to clean up diesel vehicles

• Projects include:
  – replacing older port dray trucks
  – retrofitting hundreds of public school buses
  – replacing engines on Baltimore harbor vessels
  – installing stop/start devices on locomotives
  – retrofitting emergency vehicles
The Port Partnership

• A Clean Air Partnership

• Signed by Port of Baltimore and Maryland Departments of the Environment and Transportation in 2015

• Agencies and communities working together to identify, develop and implement new, cost-effective, programs that reduce emissions and increase energy efficiency - also helps create jobs

• Accomplishments so far:
  – $1,090,000 invested to replace older dray trucks with cleaner, new vehicles

• More emission reductions on the way
  – $900,000 for dray trucks, locomotives, and cargo handling equipment
  – New projects on the way using Volkswagen settlement funds
Climate Change

• Maryland has been one of the most aggressive states in the Country in addressing climate change

• Fourth most vulnerable state to sea-level rise

  – 2009 - 25% reduction in Greenhouse Gas (GHG) Emissions by 2020
  – 2015 - Enhanced law now also requires a 40% reduction in GHG emissions by 2030
  – Reduction programs must also have a positive impact on Maryland’s economy and jobs

• 2015 progress report shows that the State is on track to achieve and perhaps exceed the 25% reduction by 2020
NEW CHALLENGES
Continuing the Progress

• In 2015...
  – EPA strengthened the health based standards for ozone and SO\textsubscript{2}
  – The Maryland General Assembly enhanced the GGRA

• This requires additional efforts to:
  – Reduce NO\textsubscript{x} emissions ... the key pollutant for reducing ozone levels
  – Reduce SO\textsubscript{2} emissions ... the key pollutant for the SO\textsubscript{2} standard and continued progress in reducing fine particles
  – Reduce CO\textsubscript{2} and other GHG emissions to address climate change

• The good news is that new control programs are already on the way
Current Hot Topics Linked to Continued Progress

• Maryland’s recent Petition under Section 126 of the Clean Air Act
  – Targets 36 Electric Generating Units (EGUs) in PA, WV, OH, KY and IN
  – Asks EPA to require these 36 EGUs to ... in essence ... comply with Maryland’s 2015 NOx Regs
  – Will drive over 400 tons of NOx reductions on bad ozone days
  – Will reduce ozone from 2 to 4 ppb across much of the East
  – The most significant reduction effort left to help further clean up ozone in MD
  – If these reductions were required ... all of Maryland could comply with the new 70 ppb ozone standard

• The VW Settlement
  – $71 Million to Maryland
  – All to be invested into pollution control projects to reduce NOx and other emissions
  – Will support electric vehicle implementation, diesel replacement and retrofit efforts and much more
New Ozone and SO$_2$ Challenges

• Ozone
  – Significant additional NOx emissions reductions between 2017 and 2020 from:
    • New power plant regulations adopted by the State in 2015
    • New federal controls on vehicles and fuels (adopted in 2015)
    • New federal controls on upwind power plants (adopted in 2016)
  – The new federal controls on vehicles and power plants are absolutely critical for Maryland. Approximately 70 percent of Maryland’s air pollution problem originates in states that are upwind of Maryland

• SO$_2$
  – Lower sulfur coal and new “post-combustion” controls at several of the power plant units at the Wagner Station facility in Anne Arundel County
    • Required by federal rules
  – Crane station units that are also in the Wagner area and Wagner Unit #2 are scheduled for retirement
Climate Change Progress

- Maryland is on track to reduce GHG emissions by 25% in 2020 as required by the GGRA of 2009
  - Over 50 pollution control programs in the State plan

- Comprehensive effort now underway through the Maryland Climate Change Commission to achieve the 40% GHG reduction required by the 2016 enhancements to the GGRA
  - [http://mde.maryland.gov/programs/Marylander/Pages/mccc.aspx](http://mde.maryland.gov/programs/Marylander/Pages/mccc.aspx)

- Reduction programs must also support the States economy and create new jobs

- One of the major areas of focus for the Commission is to ensure that climate change programs benefit environmental justice areas and other underserved populations
Summary

• The air is getting cleaner every year

• Maryland has already implemented aggressive pollution controls on Maryland power plants, cars and trucks and many other sources

• These controls have been very effective and did what they were supposed to do
  – Maryland is measuring attainment for fine particulates and ozone and SO$_2$ levels have dropped dramatically since 2004
  – Still have work to do on ozone and SO$_2$

• New emission control programs are on the way
  – Vehicles, fuels, new power plant controls

• New opportunities - Partnerships and Multi-P benefits
Opportunities

• Partnerships with local communities, local government and the private sector
  – Maryland’s Port Partnership as an example

• Multi-P Benefits
  – Climate benefits from ozone controls
  – Ozone benefits from climate change efforts
  – All helping reduce fine particles, sulfur dioxide, nitrogen dioxide, toxics and regional haze
QUESTIONS