MOBILE EMISSIONS INVENTORIES FOR FINE PARTICLES POLLUTION and IMPLICATIONS FOR AIR QUALITY CONFORMITY

Background Information
and
Overview of Key Findings

Transportation Planning Board Meeting
February 15, 2012

PM2.5 REDESIGNATION REQUEST and MAINTENANCE PLAN

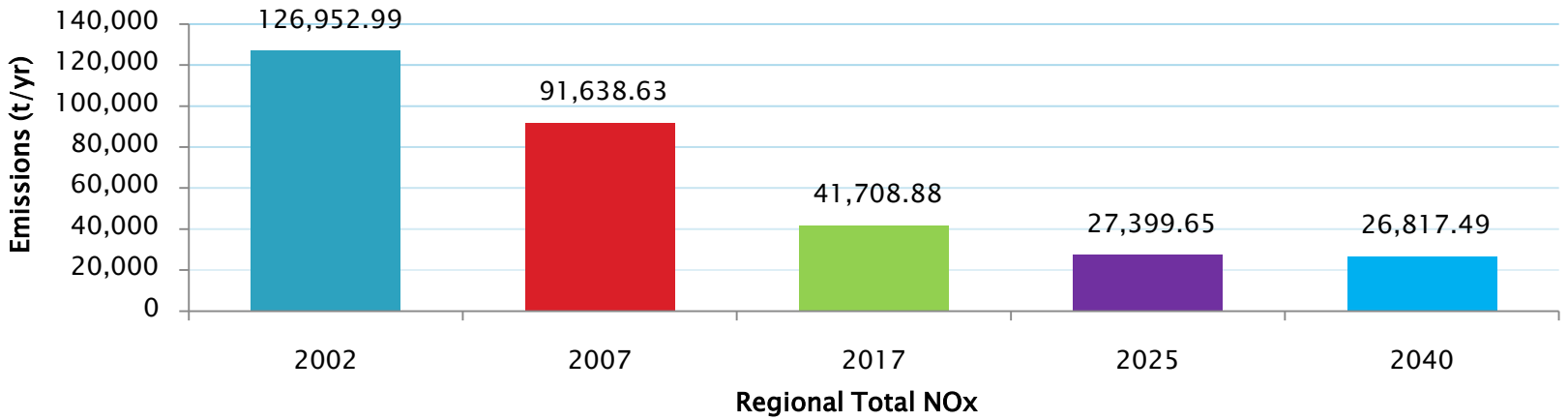
- A SIP for PM2.5 was submitted to EPA in 2008, showing attainment by 2009
- EPA issued a "Clean Data Determination" in 2009, based on ground monitors
- States are requesting redesignation to attainment status, with a Maintenance Plan showing compliance for all sources of emissions (Point, Area, Non-Road, On-Road) for the milestone years:
  - 2002 (Base Year)
  - 2007 (Attainment Year)
  - 2017 (Interim Year)
  - 2025 (Out Year)

MOBILE SOURCE EMISSIONS INVENTORIES FOR PRECURSOR NOx AND PRIMARY PM2.5

- For milestone years 2002, 2007, 2017 and 2025 (per Maintenance Plan)
- For year 2040 (out-year of the CLRP) for informational purposes
- Based on TPB Version 2.3 travel demand forecasting model, 2011 CLRP, and MOVES (2010a) emissions model

PM2.5 MOBILE EMISSIONS INVENTORIES

Summary of Findings (Precursor NOx)

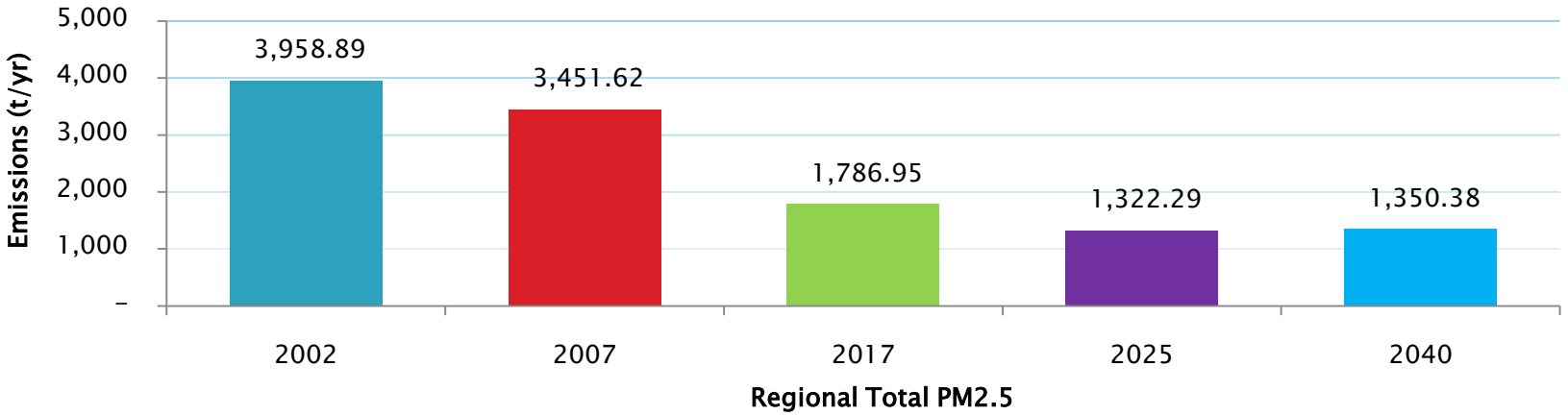


Annual Inventories of Precursor NOx (t/yr)					
State	2002	2007	2017	2025	2040
DC	9,962.80	7,511.73	3,395.06	2,005.43	1,890.08
Suburban MD	63,391.74	47,279.13	22,097.45	14,225.15	13,381.33
Northern VA	53,598.46	36,847.77	16,216.37	11,169.07	11,546.08
Regional Total	126,952.99	91,638.63	41,708.88	27,399.65	26,817.49

2025-40 Difference = 582.16 t/yr

PM2.5 MOBILE EMISSIONS INVENTORIES

Summary of Findings (Primary PM2.5)



Annual Inventories of PM2.5 (t/yr)					
State	2002	2007	2017	2025	2040
DC	302.27	272.39	157.14	123.80	120.25
Suburban MD	2,056.87	1,756.91	890.64	637.90	645.89
Northern VA	1,599.75	1,422.32	739.17	560.59	584.24
Regional Total	3,958.89	3,451.62	1,786.95	1,322.29	1,350.38

2025-40 Difference = 28.09 t/yr

PM2.5 MOBILE EMISSIONS INVENTORIES

Key Findings (Regional)

- On-road precursor NOx and primary PM2.5 emissions inventories declining significantly since 2002:
  - NOx emissions for 2025 just 22 percent of 2002 levels
  - PM2.5 emissions for 2025 just 33 percent of 2002 levels

PM2.5 MOBILE EMISSIONS INVENTORIES

Key Findings (Jurisdictional)

- On-road precursor NOx emissions inventories in suburban Maryland are projected to decline between 2025 and 2040, a trend that was attributed to the California Clean Car Program that was instituted in the state

- On-road precursor NOx emissions inventories in Northern Virginia are projected to increase by about 3 percent between 2025 and 2040, but the overall declining pattern of the region will be maintained

- On-road primary PM2.5 emissions inventories are projected to increase between 2025 and 2040 due to growth in vehicle use in suburban areas of MD and VA while in the District of Columbia a small decrease is projected; overall the regional total will increase by about 2 percent between 2025 and 2040

PM2.5 MOBILE EMISSIONS INVENTORIES

Precursor NOx Emission Inventories (Detailed)

	Regional Totals		
	2025	2040	2040-2025 Change
Start Exhaust	5,184.38	5,341.59	157.21
Running Exhaust	19,561.52	18,329.64	-1,231.88
Extended Idle Exhaust	2,652.05	3,145.73	493.68
Crankcase Start Exhaust	0.12	0.11	-0.02
Crankcase Running Exhaust	1.46	0.36	-1.10
Crankcase Extended Idle Exhaust	0.12	0.06	-0.06
REGIONAL TOTAL	**27,399.65**	**26,817.49**	**-582.16**

PM2.5 MOBILE EMISSIONS INVENTORIES

Primary PM2.5 Emission Inventories (Detailed)

	Regional Totals		
	2025	2040	2040-2025 Change
Start Exhaust	167.62	189.84	22.22
Running Exhaust	705.97	669.45	-36.52
Extended Idle Exhaust	5.57	4.93	-0.64
Crankcase Start Exhaust	1.54	1.52	-0.02
Crankcase Running Exhaust	26.79	5.29	-21.50
Crankcase Extended Idle Exhaust	0.36	0.04	-0.32
Brake wear	321.37	374.17	52.80
Tire wear	93.07	105.14	12.07
REGIONAL TOTAL	1,322.29	1,350.38	28.09

PM2.5 MOBILE EMISSIONS INVENTORIES

Transportation Conformity Regulations

Motor vehicle emissions budgets will be developed for the Maintenance Plan per EPA Transportation Conformity Regulations:

§93.118(e)(4):

"The motor vehicle emissions budget(s), when considered together with all other emissions sources, is consistent with applicable requirements for….maintenance;

The motor vehicle emissions budget(s) is consistent with and clearly related to the emissions inventory ….. in the submitted maintenance plan."

§93.124(a):

"Unless the implementation plan explicitly quantifies the amount by which motor vehicle emissions could be higher while still allowing a demonstration of compliance with the milestone ….maintenance requirement …the MPO may not interpret the budget to be higher than the implementation plan's estimate of future emissions."

PM2.5 MOBILE EMISSIONS INVENTORIES

Considerations for Motor Vehicle Emissions Budgets

- Considerable uncertainty in inventories for 2017 and 2025 stemming from:
  - Future vehicle fleet mix projections
  - New versions of emissions estimating models (currently MOVES2010a with MOVES2010b announced for this month and MOVES2013 for next year)
  - For example: From 2005 to 2011, the regional vehicle fleet aged an average of 1.21 years. If (hypothetically) the vehicle fleet were to age another 1.21 years by 2025, emissions inventories would increase by 19 percent for precursor NOx and 16 percent for primary PM2.5

PM2.5 MOBILE EMISSIONS INVENTORIES

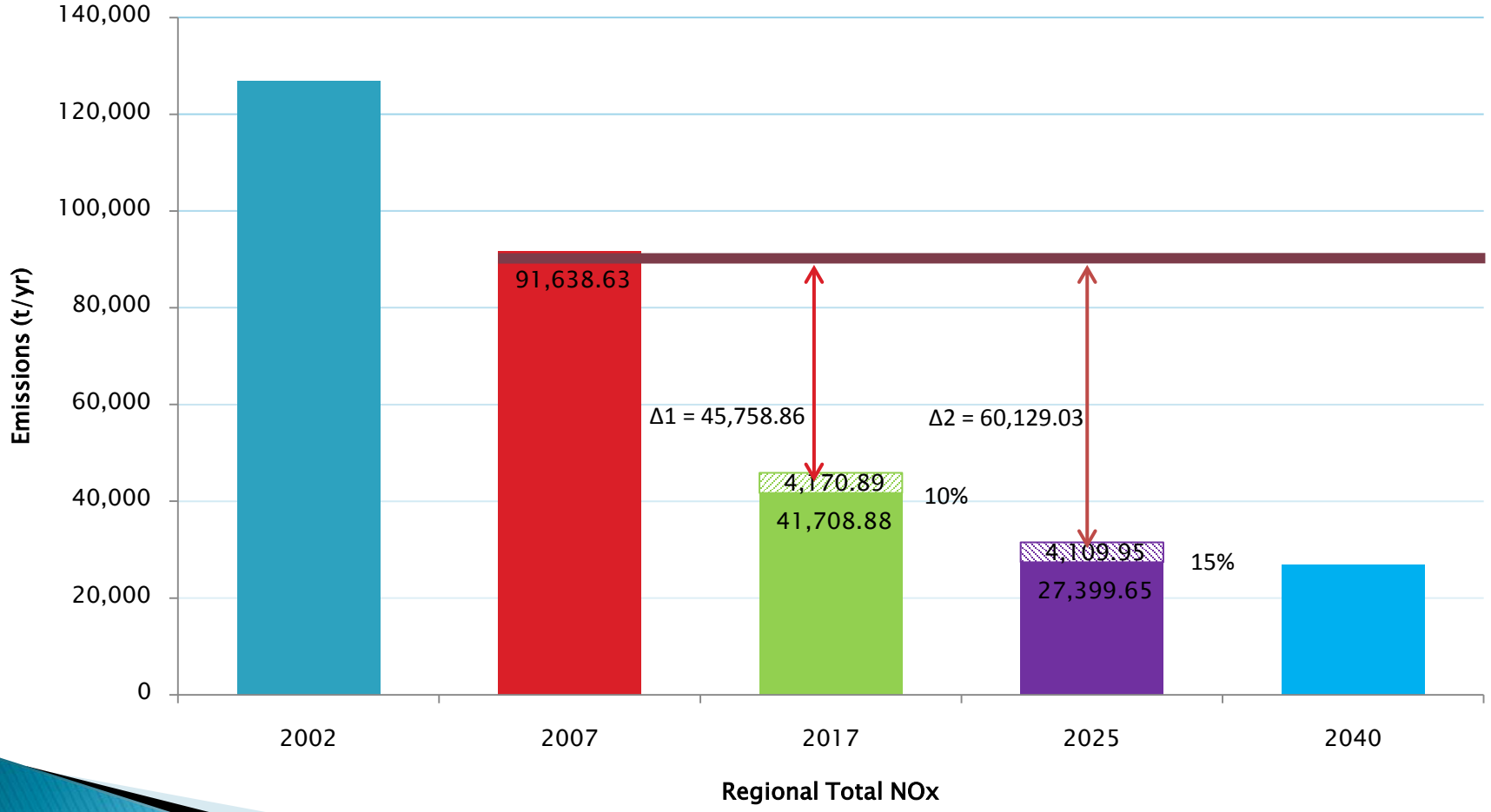
Considerations for Motor Vehicle Emissions Budgets

- Budgets may include “safety margins”, which allow motor vehicle emissions to be higher than inventory levels as long as overall maintenance requirements are met

- Between 2007 and 2025, motor vehicle emissions are projected to decline dramatically: by 70 percent for precursor NOx and by 62 percent for primary PM2.5, providing ample room for safety margins

PM2.5 MOBILE EMISSIONS INVENTORIES

Example of On-Road Emissions Safety Margins NOx



PM2.5 MOBILE EMISSIONS INVENTORIES

Example of On-Road Emissions Safety Margins PM2.5