MOTOR VEHICLE EMISSIONS BUDGETS FOR PM2.5 and THEIR IMPLICATIONS FOR TRANSPORTATION CONFORMITY

MWAQC Technical Advisory Committee
March 13, 2012

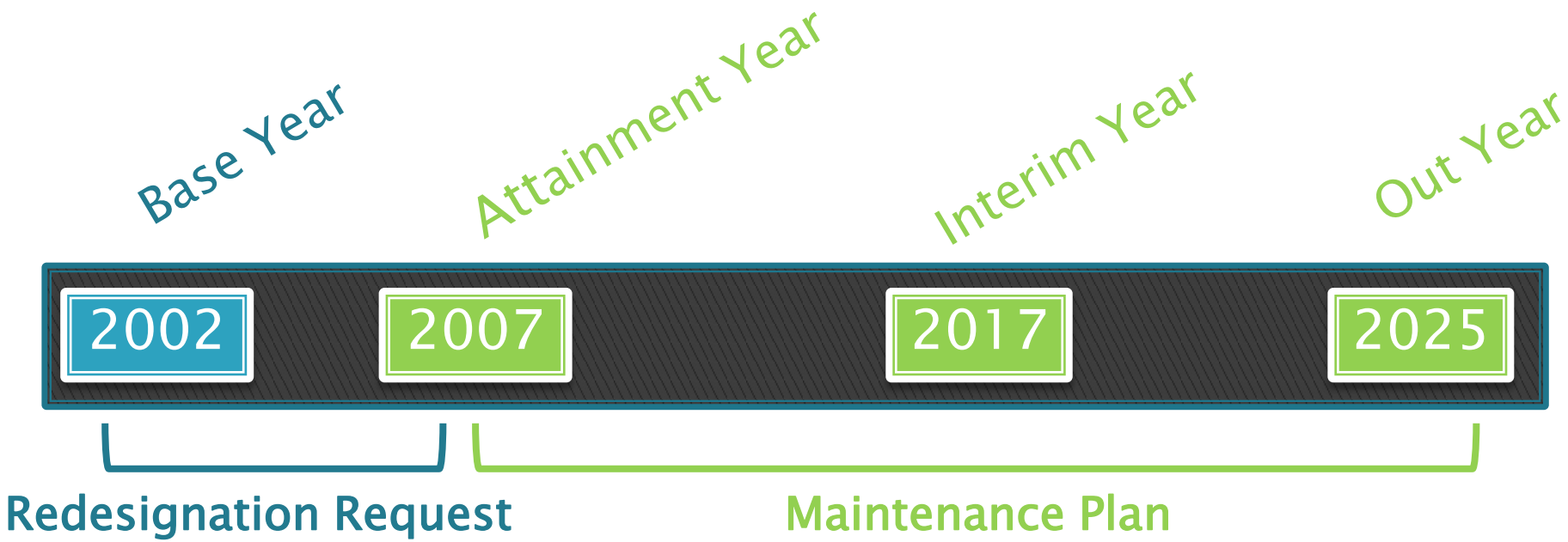
PM2.5 REDESIGNATION REQUEST & MAINTENANCE PLAN OVERVIEW

- A State Implementation Plan (SIP) for PM2.5 was submitted to EPA in April 2008, showing attainment by 2009

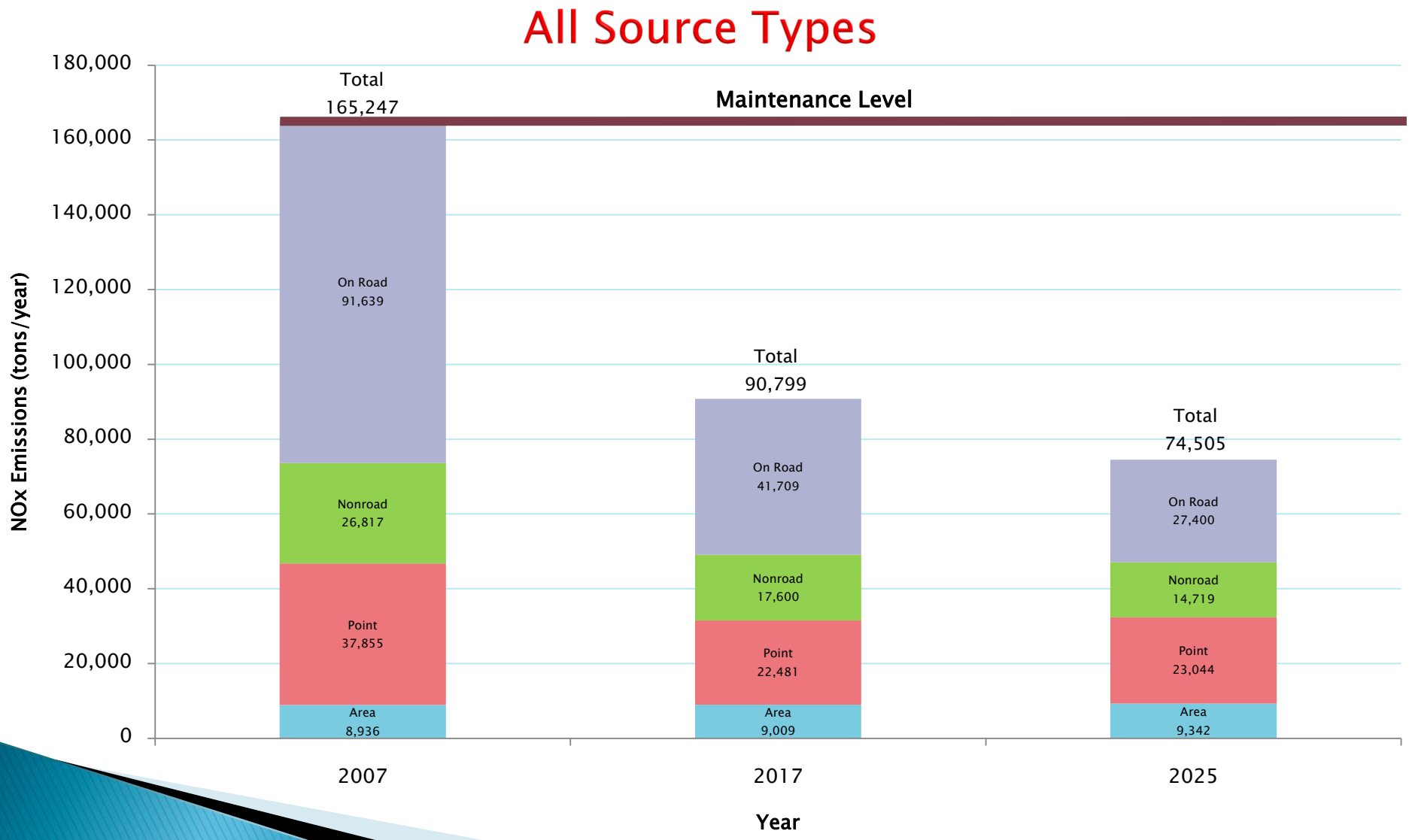
- EPA issued a "Clean Data Determination" in 2009, based on ground monitors

- The three states – DC, VA, and MD -- requesting redesignation to attainment status; the maintenance plan showing compliance with standards for milestone years and for all sources of emissions:
  - Point
  - Area
  - Non-Road
  - On-Road (Motor Vehicle)

MILESTONE YEARS FOR THE PM2.5 MAINTENANCE PLAN

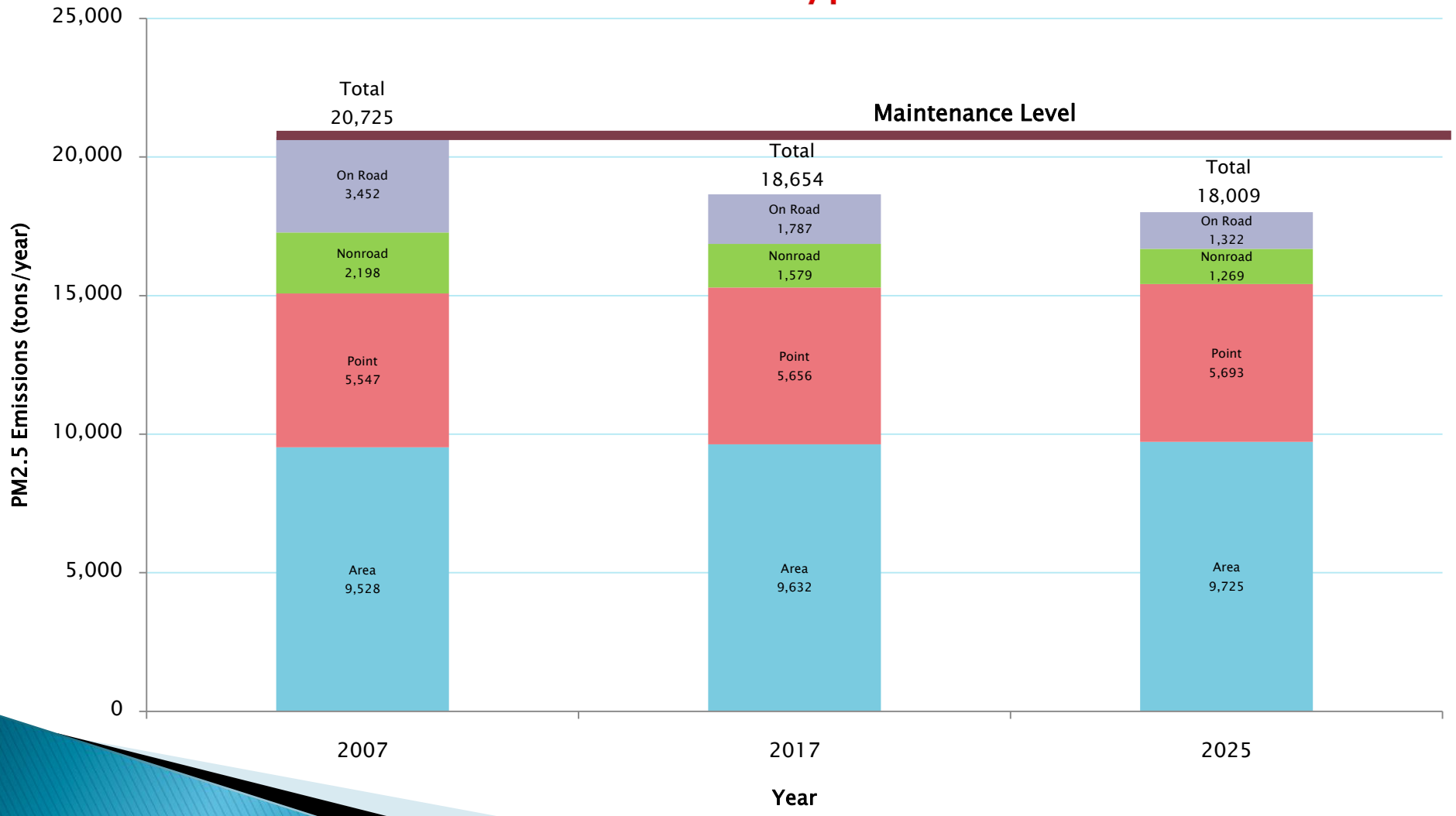


PRECURSOR NOx EMISSIONS INVENTORIES



PRIMARY PM2.5 EMISSIONS INVENTORIES

All Source Types



MOTOR VEHICLE EMISSIONS INVENTORIES

Key Findings

- Motor vehicle emissions decline much faster than any other source type between 2007 (Maintenance Level) and 2025:
  - NOx emissions decline by 70 percent
  - PM2.5 emissions decline by 62 percent

- By comparison, emissions from other source types change as follows between 2007 and 2025:
  - For nonroad sources, NOx emissions decline by 45 percent and PM2.5 emissions decline by 42 percent
  - For point sources, NOx emissions decline by 39 percent and PM2.5 emissions increase by 3 percent
  - For area sources, NOx emissions increase by 5 percent and PM2.5 emissions also increase by 2 percent

SETTING MOTOR VEHICLE EMISSIONS BUDGETS

Motor Vehicle Emissions Budgets

§93.101- Definition:

"Motor vehicle emissions budget is that portion of the total allowable emissions defined in …the maintenance plan for a certain date ….allocated to highway and transit vehicle use and emissions"

§93.118(e)(4) – Criteria & Procedures:

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

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

Source: EPA Transportation Conformity Regulations – March 2010 Update

SETTING MOTOR VEHICLE EMISSIONS BUDGETS

Motor Vehicle Emissions Safety Margins

§93.101 – Definition:

> *"Safety margin means the amount by which total projected emissions from all sources of a given pollutant are less than the total emissions that would satisfy the applicable requirement for …maintenance"*

§93.124(a) – Use of budgets in the Maintenance Plan:

> *"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."*

Source: EPA Transportation Conformity Regulations – March 2010 Update

Widespread use of safety margins in maintenance plans

MOTOR VEHICLE EMISSIONS BUDGETS

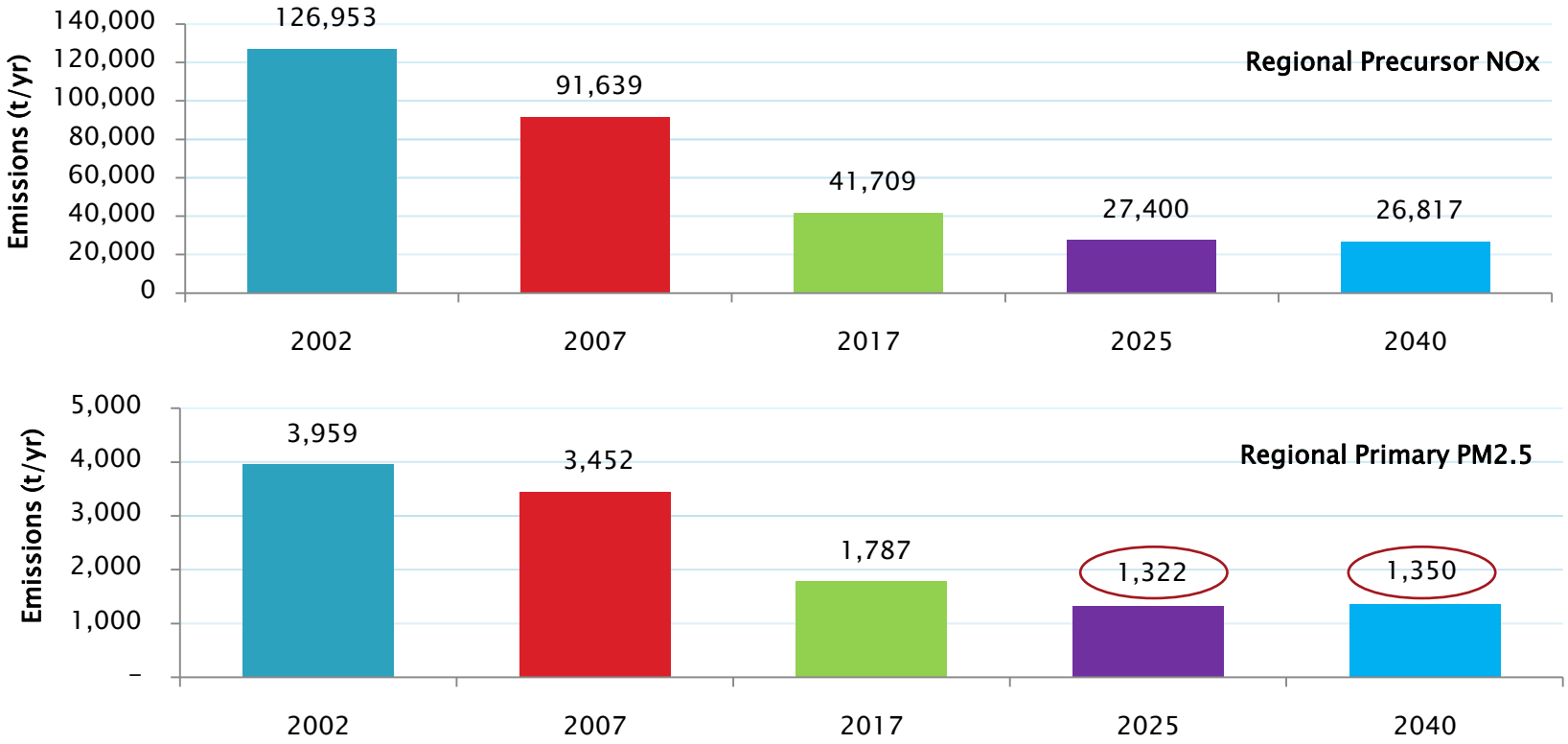
Motor Vehicle Emissions Budgets in Conformity

Once motor vehicle emissions for precursor NOx and primary PM2.5 are defined in the Maintenance Plan and approved by EPA, in order to attain conformity TPB will be required to demonstrate that total projected emissions from motor vehicles are less than or equal to the budgets set for years 2017 and 2025

- For years 2017 through 2024, emissions must be less than or equal to the 2017 budgets
- For 2025 and later years, emissions must be less than or equal to the 2025 budgets

MOTOR VEHICLE EMISSIONS BUDGETS

Implications for the 2011 Constrained Long Range Plan (CLRP)



Example:

- If the 2025 mobile budget for primary PM2.5 had been set and in effect at the inventory level of 1,322 tons per year, conformity could not have been demonstrated for 2040
- The new 2017 and 2025 budgets for precursor NOx and primary PM2.5 could be in effect for the 2013 CLRP update.

MOTOR VEHICLE EMISSIONS BUDGETS

Consequences of Conformity Lapse

- If conformity is not attained, a one-year lapse grace period starts: only projects already in a conforming Plan and TIP can move ahead
- If conformity is not attained within the grace period, the Plan/TIP enter a conformity lapse period: only three types of projects can move ahead:
  - Exempt projects from Air Quality Conformity determination
  - Transportation Control Measures (TCMs), which are in an approved SIP
  - Select phases of project development (e.g., design, R-O-W acquisition or construction having funding commitments, approval or authorization prior to the conformity lapse)
- No major new transit or highway projects could move forward during a conformity lapse period

SETTING MOTOR VEHICLE EMISSIONS BUDGETS

Key Considerations

Uncertainties in the 2017 and 2025 inventories stemming from:

- **Future vehicle fleet mix projections**
  Example: The regional vehicle fleet aged an average of 1.21 years between 2005 and 2011. If (hypothetically) the vehicle fleet were to age another 1.21 years by 2025, precursor NOx and primary PM2.5 emissions inventories would increase by 19 percent and 16 percent respectively

- **New versions of emissions estimating models (MOVES2010a, MOVES2010b, MOVES2013)**
  Example: 2011 CLRP emissions with MOVES for year 2040 were higher by 126 percent for precursor NOx, and 76 percent for primary PM2.5, than corresponding estimates derived using Mobile6.2 for same fleet and travel inputs

- **No requirements to update SIPs** in order to address externally driven changes in key inputs such as regional vehicle fleet and EPA-mandated emissions model updates

SETTING MOTOR VEHICLE EMISSIONS BUDGETS

Transportation Emissions Reductions Measures (TERMs) have limited potential to reduce mobile emissions

- The TERMs already in the adopted 2011 CLRP taken together reduce precursor NOx emissions for year 2040 by approximately one percent and primary PM2.5 by two percent

- The 26 next most cost-effective TERMs taken together would reduce precursor NOx emissions for year 2040 by an additional two percent and primary PM2.5 by an additional one percent, at a cost of $85 million annually

Note: Estimates derived using the Mobile6.2 emissions model

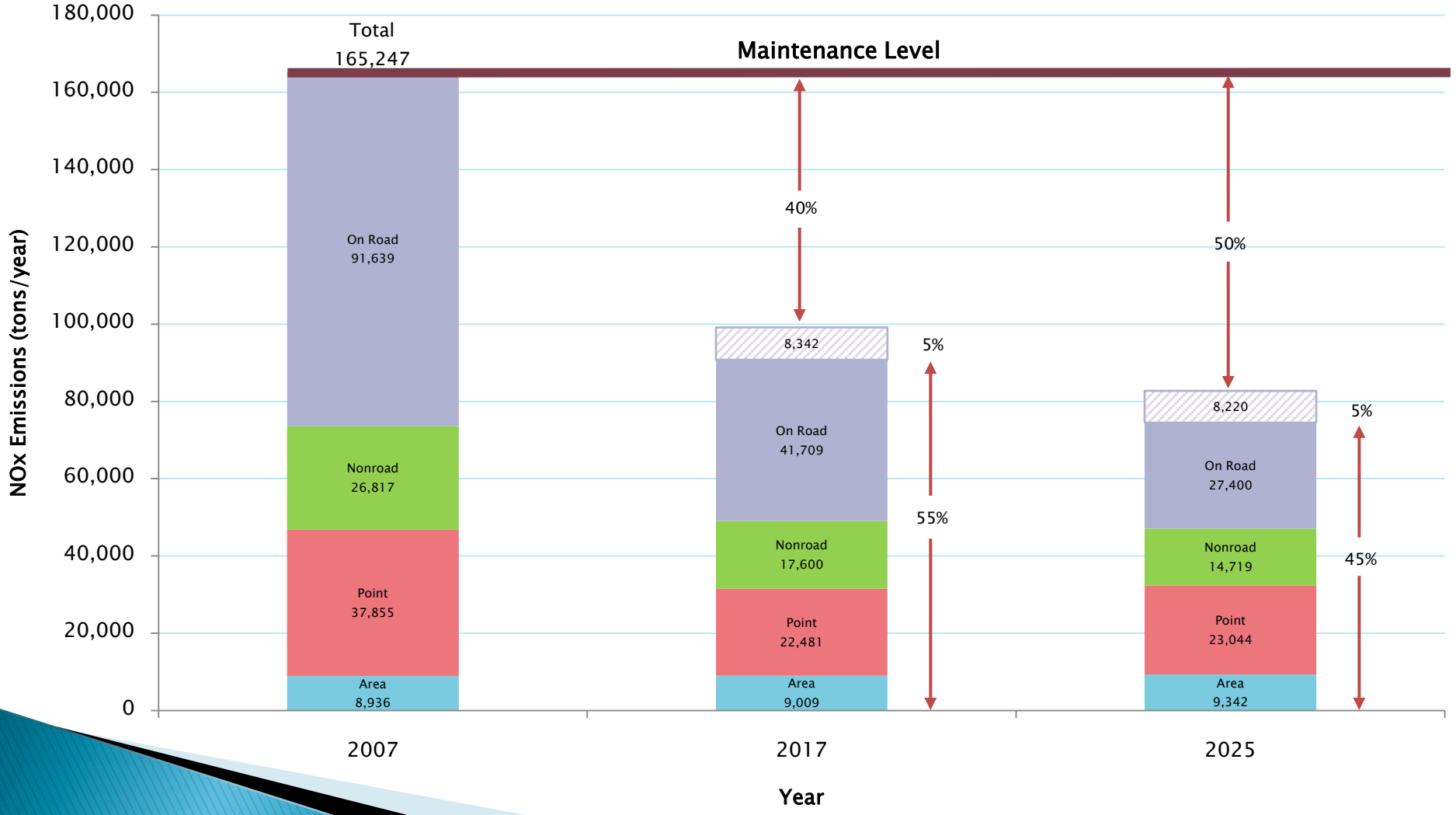
SETTING MOTOR VEHICLE EMISSIONS BUDGETS

Recommended Motor Vehicle Emissions Safety Margins

		Motor Vehicle Emissions Inventories	Recommended Safety Margins		Proposed Motor Vehicle Emissions Budgets
Year	Criteria Pollutant	(t/y)	(t/y)	Percentage of Motor Vehicle Emissions Inventories	(t/y)
2017	NOx	41,709	8,342	20%	50,051
	PM2.5	1,787	357	20%	2,144
2025	NOx	27,400	8,220	30%	35,620
	PM2.5	1,322	397	30%	1,719

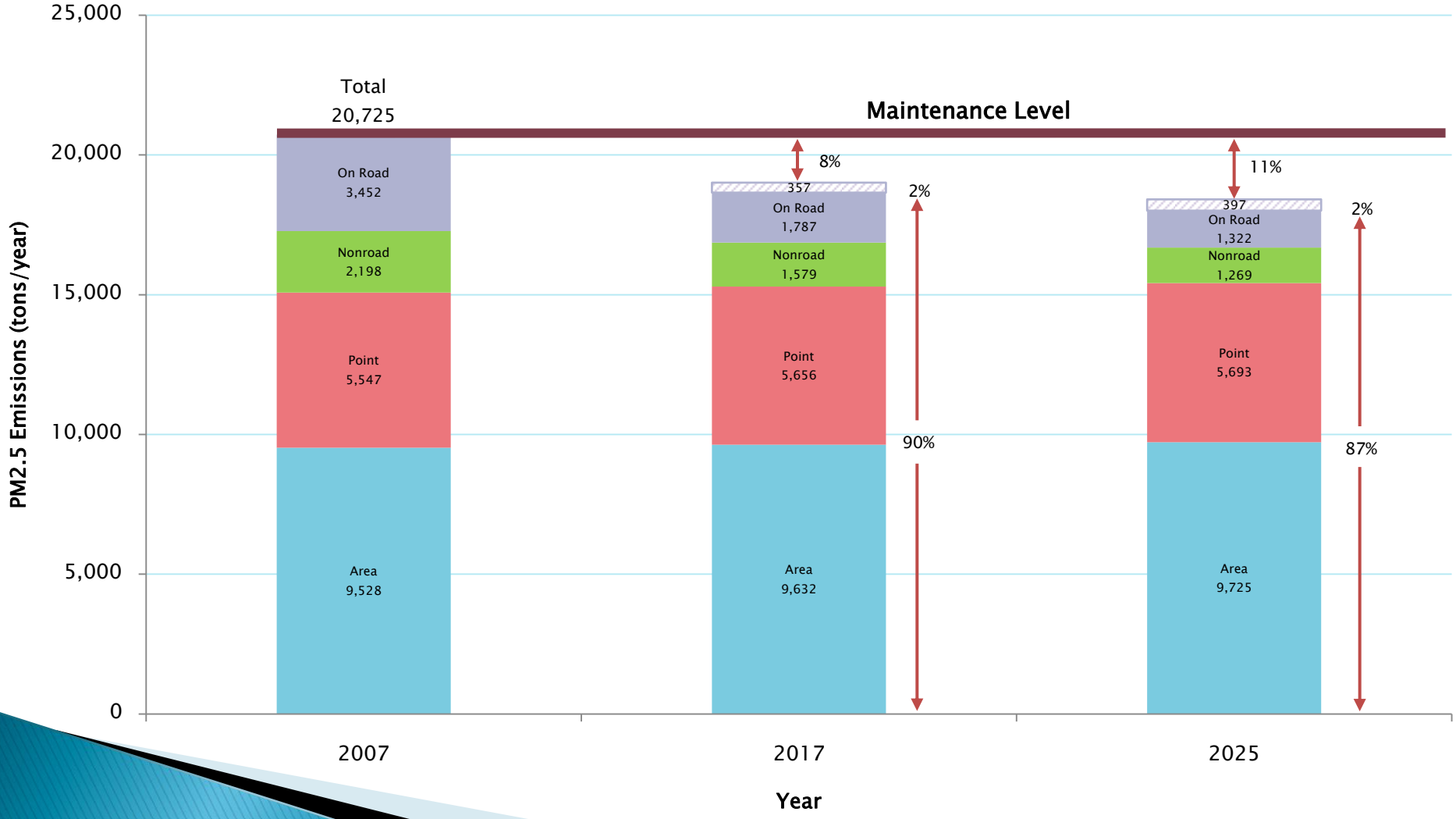
SETTING MOTOR VEHICLE EMISSIONS BUDGETS

Safety Margins as Percentages of Maintenance Level for NOx



SETTING MOTOR VEHICLE EMISSIONS BUDGETS

Safety Margins as Percentages of Maintenance Level for PM2.5



MOTOR VEHICLE EMISSIONS BUDGETS

Action Items

1. TPB to recommend to MWAQC safety margins for the 2012 PM2.5 Maintenance Plan as follows:
   - 20 percent safety margin for precursor NOx and primary PM2.5 for year 2017
   - 30 percent safety margin for precursor NOx and primary PM2.5 for year 2025
2. TPB to prepare a letter of recommendation to MWAQC articulating the need for safety margins for the interim and out years of the Maintenance Plan
3. TPB to urge MWAQC to commit to updating SIPs and motor vehicle emissions budgets when changes to the emissions estimating models mandated by EPA result in significant changes in emissions inventories