

# MOTOR VEHICLE EMISSIONS BUDGETS (MVEBS) SAFETY MARGINS

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## Historic Sensitivity Tests

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MWAQC TAC  
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# MVEB Safety Margins

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- EPA released a new emissions model: MOVES3
- TPB staff ran preliminary sensitivity tests comparing MOVES3 emissions to MOVES2014b emissions
- Sensitivity tests showed significant increases in NO<sub>x</sub> when using MOVES3 compared to MOVES2014b (over 50% in some of the analysis years)
- MWAQC TAC agreed to update current MVEBs in the 2008 ozone maintenance plan
- MWAQC TAC asked for background information about the 20% buffer in current MVEBs



# Non-Project Elements Affecting Emissions

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Mobile source emissions inventory developed for federal air quality conformity analysis is affected by inputs that are neither highway nor transit projects. Such elements include:

- ✓ • EPA emissions model
- ✓ • Vehicle fleet data
- Travel demand model
- Demographic Data



# Changes Due to EPA Emissions Model - 1

## Mobile6.2 vs MOVES2010 2012 Constrained Long Range Plan (2011 VIN Basis)

### Year 2020

Pollutants	Emissions Inventories		Differences	Ratios
	Mobile6.2	MOVES2010a		
VOC 8-hr (t/d)	40.60	47.25	6.65	1.164
NOX 8-hr (t/d)	50.82	90.75	39.93	1.786
Precursor NOX (t/y)*	17,891.10	32,777.29	14,886.19	1.832
Direct PM2.5 (t/y)*	713.73	1,475.27	761.54	2.067

### Year 2040

Pollutants	Emissions Inventories		Differences	Ratios
	Mobile6.2	MOVES2010a		
VOC 8-hr (t/d)	40.99	46.76	5.77	1.141
NOX 8-hr (t/d)	35.05	72.24	37.19	2.061
Precursor NOX (t/y)*	12,732.28	26,546.14	13,813.86	2.085
Direct PM2.5 (t/y)*	764.21	1,339.81	575.60	1.753

Source: Constantine, Elena. "Potential Impacts of VIN and Emissions Model Changes on the 2012 Air Quality Conformity Determination-A Sensitivity Test." Presented at the Technical Committee of the National Capital Region Transportation Planning Board, held at the Metropolitan Washington Council of Governments, Washington, D.C., July 6, 2012.  
<https://www.mwcog.org/events/2012/07/06/tpb-technical-committee/>



# Changes Due to EPA Emissions Model - 2

## MOVES2014 vs MOVES3: NOx tons/day

Year	MOVES2014B	MOVES3.0.3	MOVES3.0.3 versus MOVES2014B
2021	66.824	67.442	1%
2023	54.016	56.382	4%
2025	42.566	46.377	9%
2030	27.536	34.666	26%
2040	19.140	29.183	52%
2045	19.131	29.434	54%

Source: Vuksan, Dusan, Park, Jinchul, Son, Daniel. Memorandum to the Metropolitan Washington Air Quality Committee Technical Advisory Committee. "MOVES3 Model Sensitivity Testing," September 12, 2022. Presented to MWAQC TAC September 13, 2022. <https://www.mwcog.org/events/2022/9/13/mwaqc-tac/>



# Changes Due to New Vehicle Reg. Data

## MOTOR VEHICLE EMISSIONS COMPARISON

	2017		2025	
	NOx (t/yr)	PM2.5 (t/yr)	NOx (t/yr)	PM2.5 (t/yr)
<b>2011 VIN Basis</b>	41,709 <sup>(1)</sup>	1,787 <sup>(4)</sup>	27,400 <sup>(7)</sup>	1,322 <sup>(10)</sup>
<b>2005 VIN Basis</b>	33,468 <sup>(2)</sup>	1,465 <sup>(5)</sup>	25,406 <sup>(8)</sup>	1,187 <sup>(11)</sup>
<b>Difference</b>	<b>8,241 <sup>(3)</sup></b>	<b>322 <sup>(6)</sup></b>	<b>1,994 <sup>(9)</sup></b>	<b>136 <sup>(12)</sup></b>
<b>Ratio</b>	1.25	1.22	1.08 <sup>⊙</sup>	1.11 <sup>⊙</sup>

Source: Slide 7, Constantine, Elena. "The Potential Impact of Changes in the Regional Vehicle Fleet on Future NOx and PM2.5 Emissions: A Sensitivity Test." Presented at the Technical Committee of the National Capital Region Transportation Planning Board, held at the Metropolitan Washington Council of Governments, Washington, D.C., June 1, 2012.

<https://www.mwcog.org/events/2012/06/28/metropolitan-washington-air-quality-committee-mwaqc/>



# MVEBs and Conformity – Mismatch

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- MVEBs are set for a long duration of time in SIP/Maintenance plans and are typically not updated
- Non-transportation inputs used to set MVEBs change frequently and based on the past sensitivity tests, such inputs frequently yield higher emissions
- Transportation conformity required to use updated non-transportation inputs that differ from SIP/MP inputs
- This leads to an apples-to-oranges comparison of MVEBs to conformity inventories over time



# MVEB Safety Margins

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- Failure to demonstrate transportation conformity would result in disruption of most federal transportation funding (highway and transit)
- Federal regulations recognize and allow safety margins when developing MVEBs
- Region started using safety margins in 2012 (PM2.5 Maintenance Plan)
  - Settled on 20% safety margin to account for typical changes to non-transportation technical inputs
  - Agreed to revise MVEBs for unusually high changes to non-transportation technical inputs



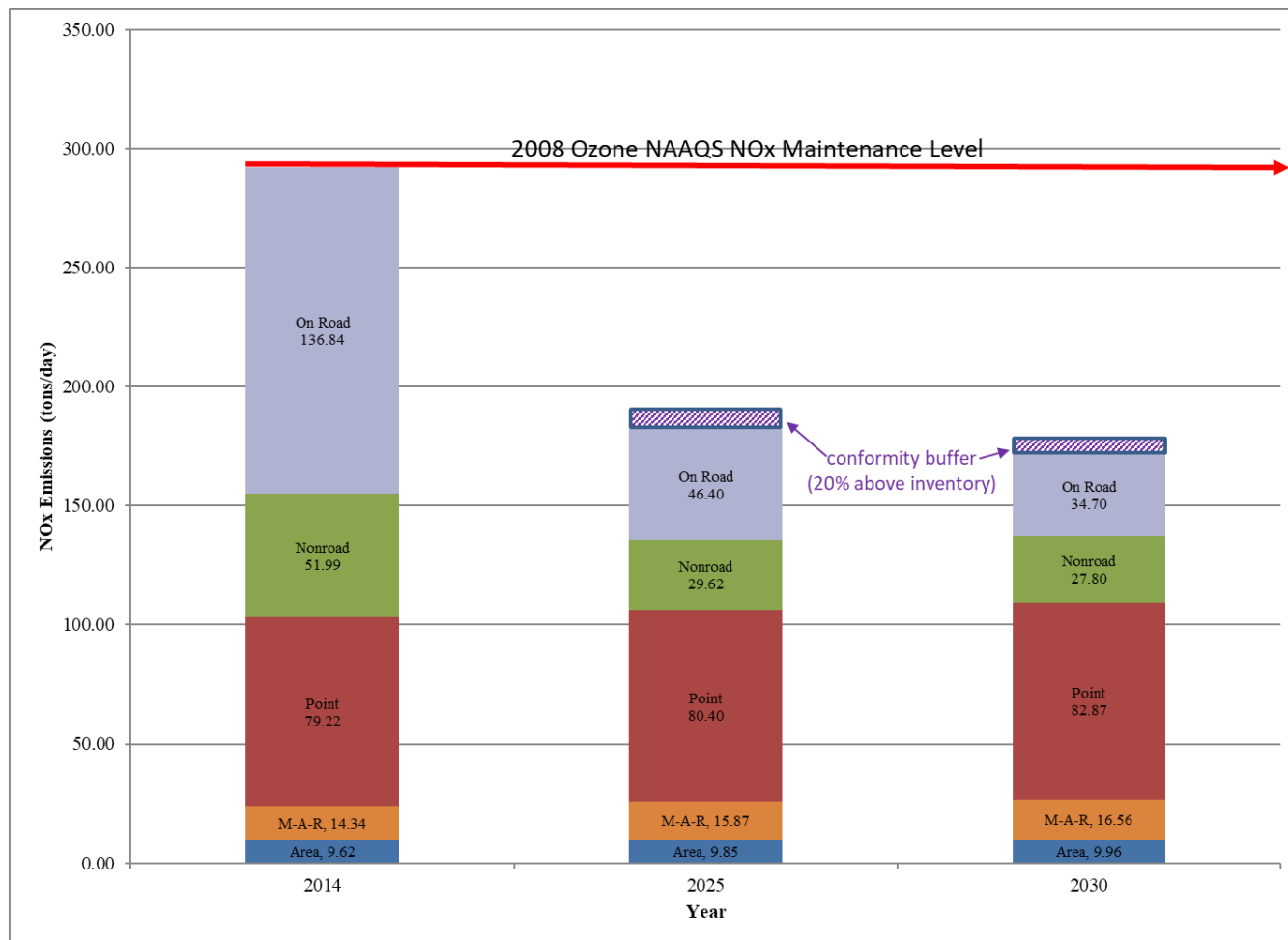


# MVEB Safety Margins: Current MVEBs

- Current MVEBs from 2008 ozone Maintenance Plan set using MOVES2014, 2014 vehicle registration data, and Round 9 Cooperative Forecasts
  - 2014 (attainment), 2025 (interim), 2030 (out year)
- Developed using 20% “safety margin” in two tiers
  - Tier 1 set at mobile emissions inventory level
  - Tier 2 set 20% above mobile emissions inventory level
- TPB’s planned conformity analysis will be using MOVES3, 20?? vehicle registration data, and Round 10 Cooperative Forecasts
- EPA did not revoke 2008 ozone NAAQS with 2015 ozone NAAQS so region will need to continue to adhere to MVEBs set in 2008 maintenance plan
- Region is set to revise 2008 MVEBs – to include safety margins



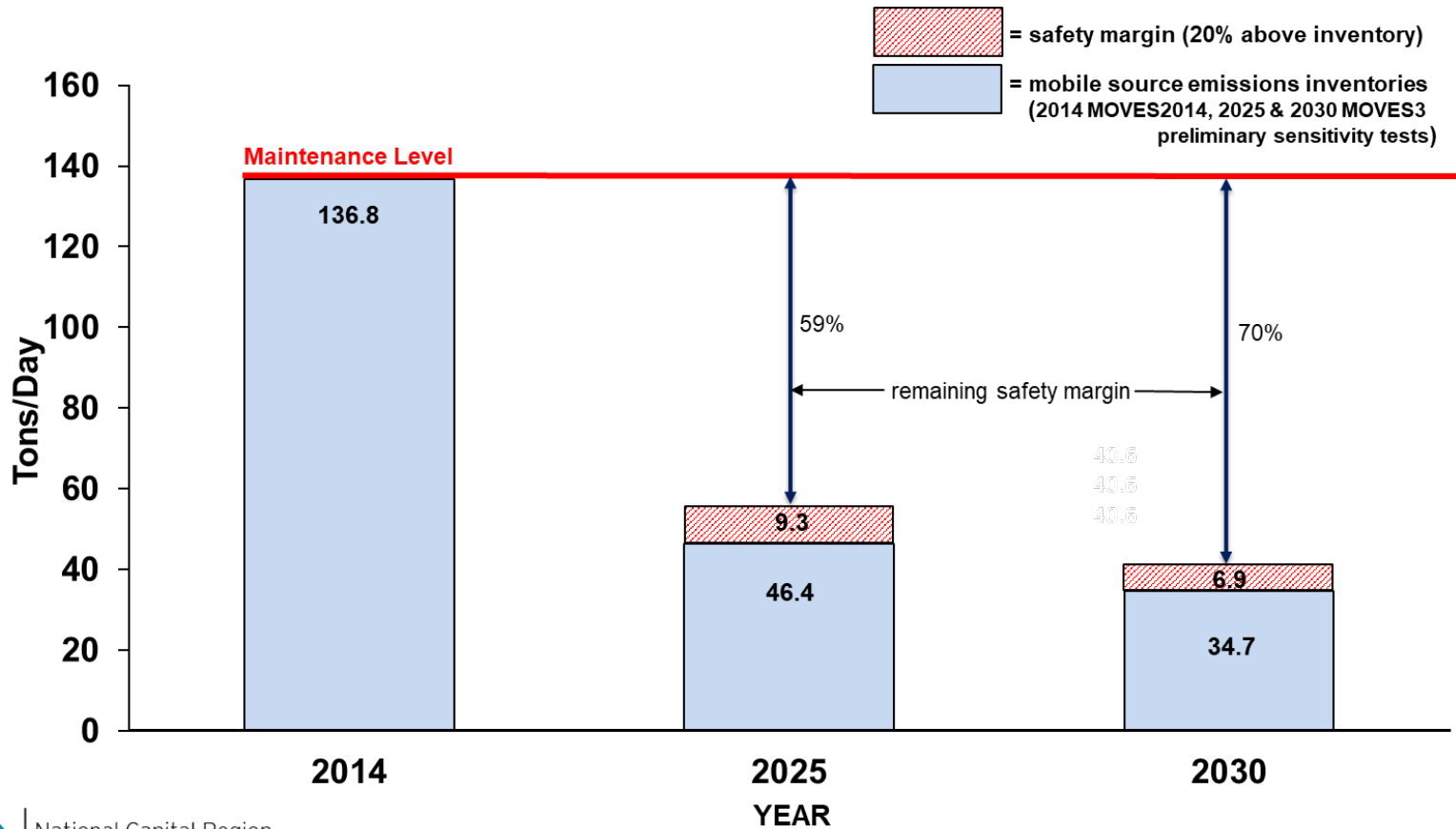
# Updated 2008 Ozone Maintenance Plan: 20% Safety Margins



# Updated 2008 Ozone Maintenance Plan: 20% Safety Margins

MOBILE SOURCE EMISSIONS INVENTORY INCLUDING SAFETY MARGIN: NITROGEN OXIDES  
(SOURCE: MOVES3 PRELIMINARY SENSITIVITY TESTS)

**DRAFT**



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