MARAMA
Mid-Atlantic Regional Air Management Association, Inc.

TRANSPORTATION & AIR QUALITY WORKSHOP
February 26 – 27, 2013
Annapolis, MD

Transportation Impacts on Air Quality

Chris Salmi

February 26, 2013

Content

- The Challenge
- Mobile Sources Are Significant Emitters
- What Can States Do?
- OTC Regional Efforts
- Federal Actions

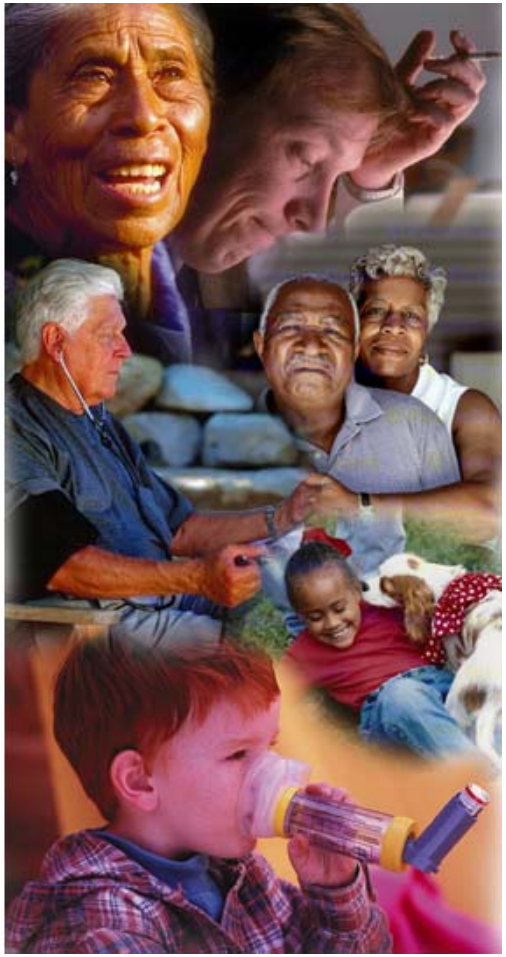
Fine Particles

- Premature death
- Respiratory related hospital admissions and emergency room visits
- Aggravated asthma
- Coughing and difficulty or pain breathing
- Chronic bronchitis
- Decreased lung function
- Diesel carcinogen
- Work and school absences

2012 12 ug/m^3 Annual

2009 – 2011 Data

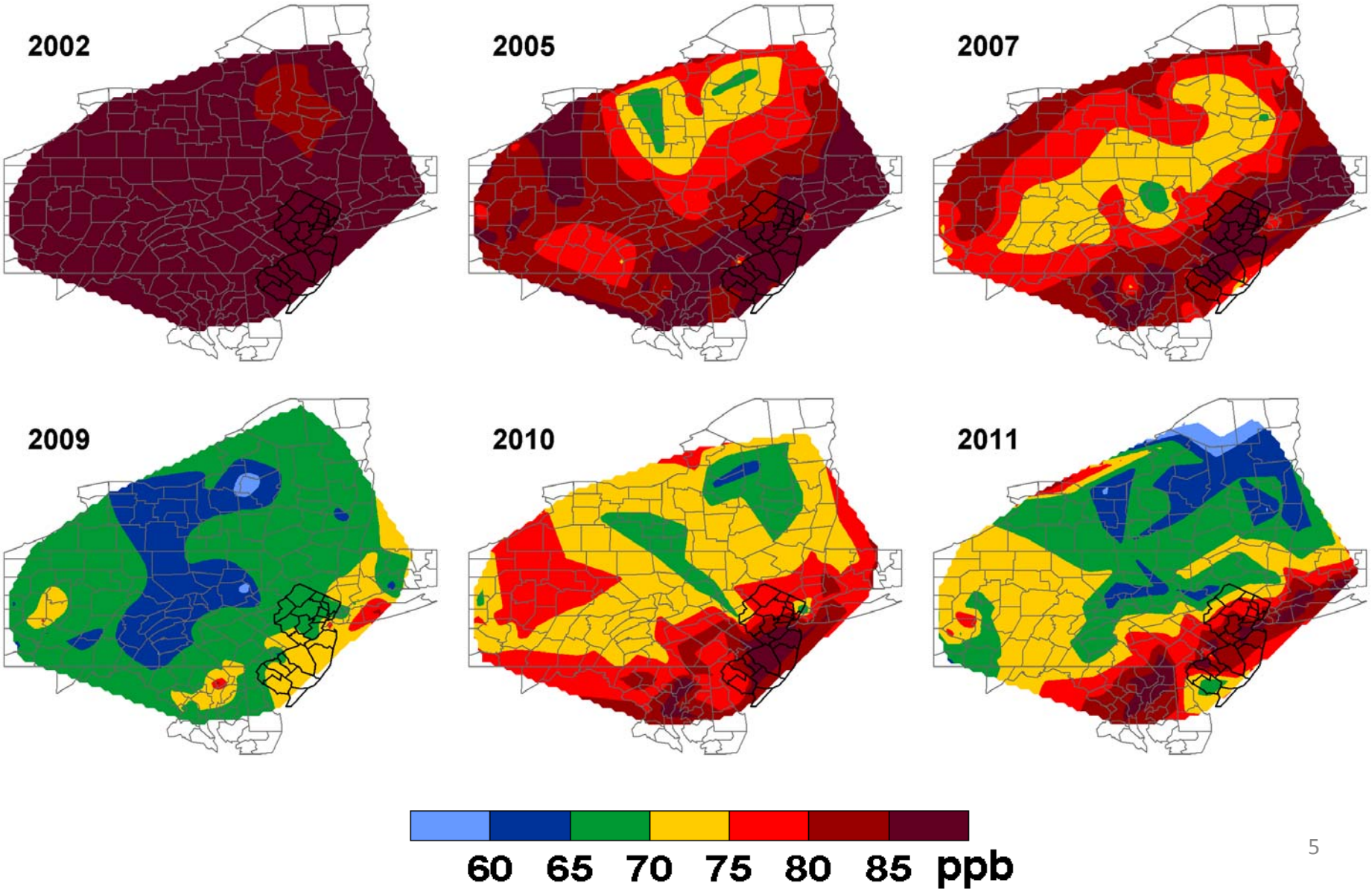
Ozone Health Effects



- Decreases lung function
- Coughing and pain in the chest
- Increases susceptibility to respiratory infections
- Permanent damage to lungs
- Promotes allergic reactions
- Death

We Have Made Great Progress!

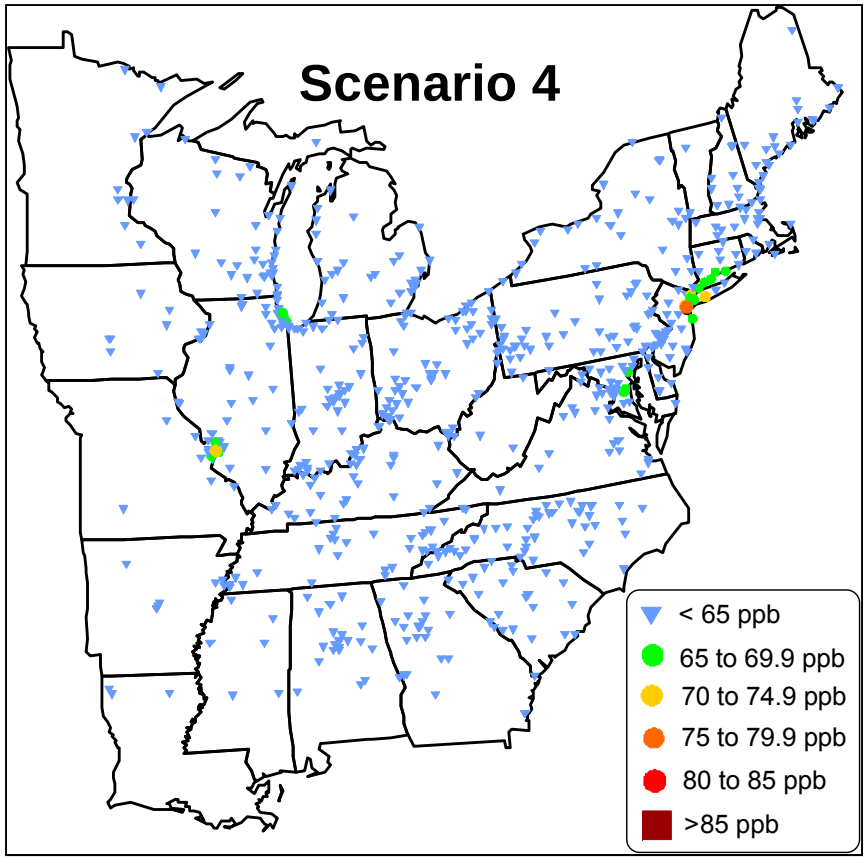
4th Highest 8hr Ozone



Attaining the Ozone Health Standard Success is within Reach!

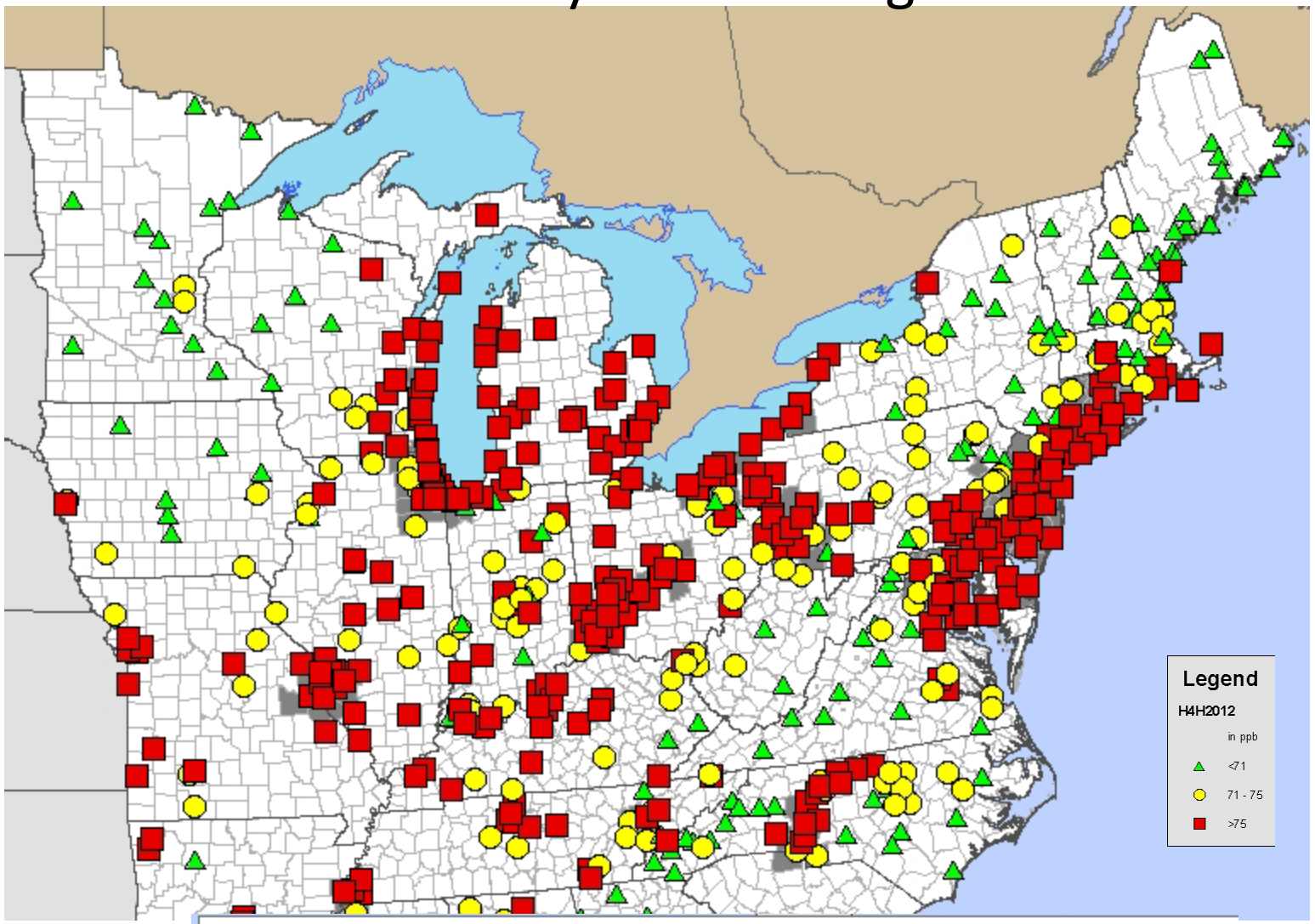
OTC Scenario 4 Screening Run

- Strong Power Plant Controls
- Strong ICI Boiler and Cement Kilns Controls
- ~ Tier 3 Vehicle and Gasoline Standards
- 5% Additional NOx Reductions in the OTR
- ~ 2020 Fleet Turnover onroad and nonroad
- Based on 2007 Proxy Inventory

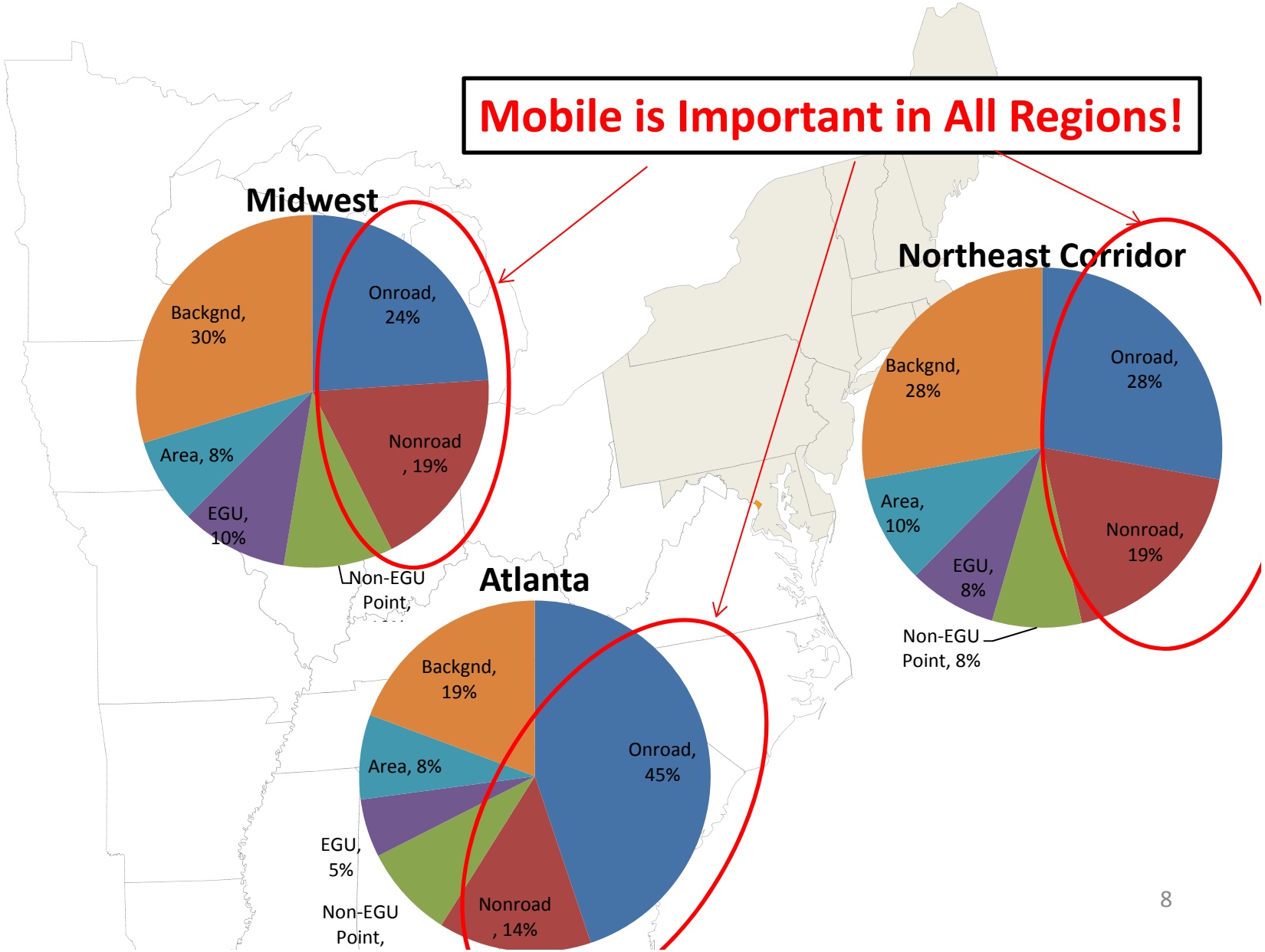


The Challenge Remains!

Preliminary 2012 4th High Ozone

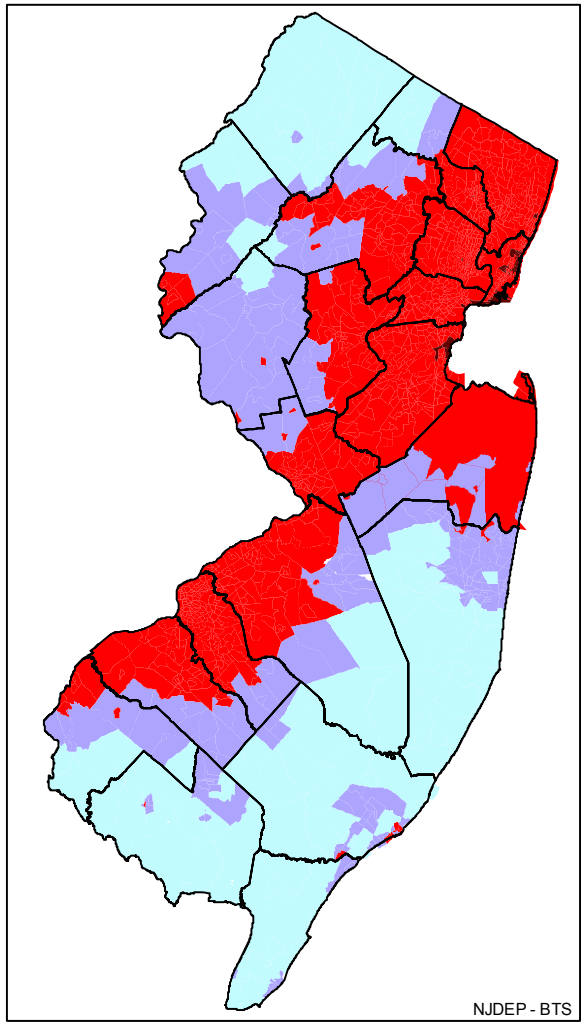


2011 USEPA Analysis: Percent Contribution Based on US Emissions

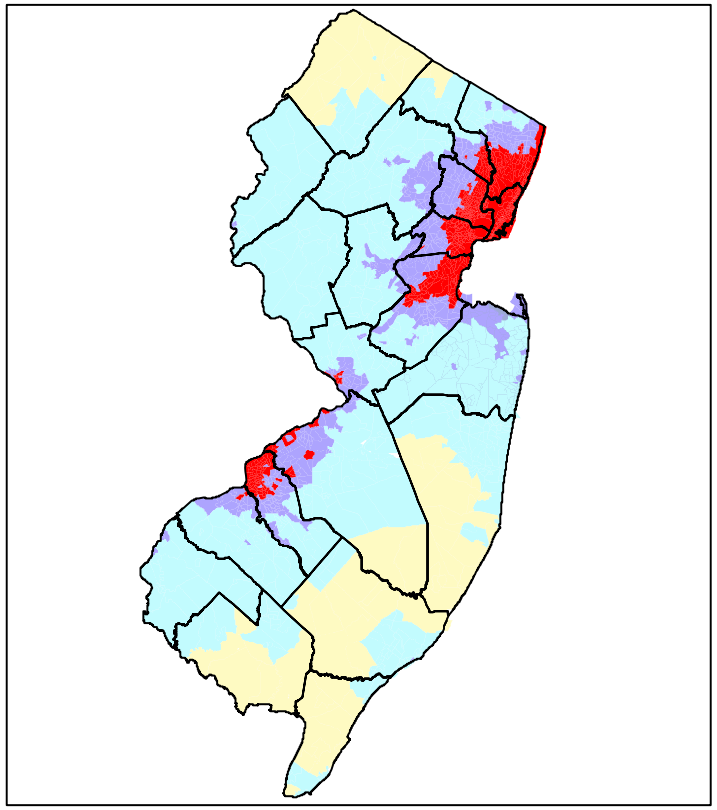


Estimated Diesel Particulate Risk in New Jersey from Mobile Sources

Estimated Risk in 2005



Estimated Risk in 2020

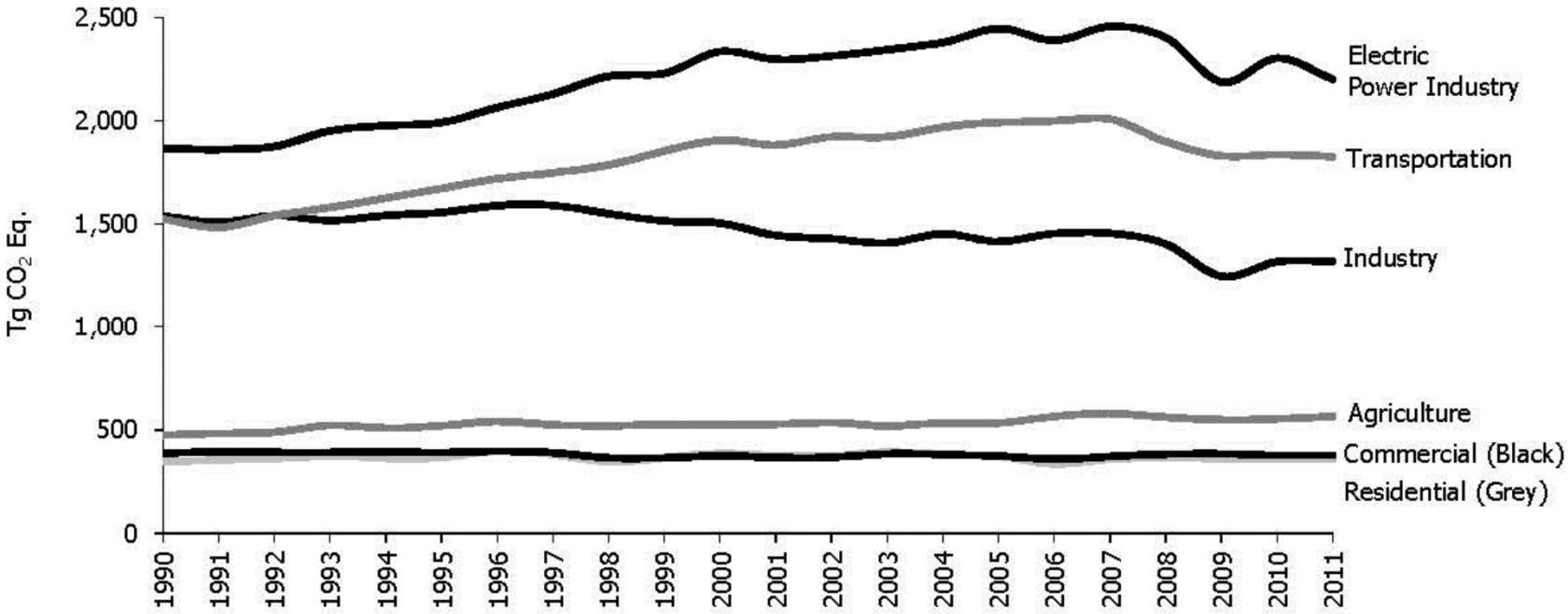


Under 10 times benchmark
10 - 50 times benchmark
50 - 100 times benchmark
100 - 1000 times benchmark
1000 - 2400 times benchmark

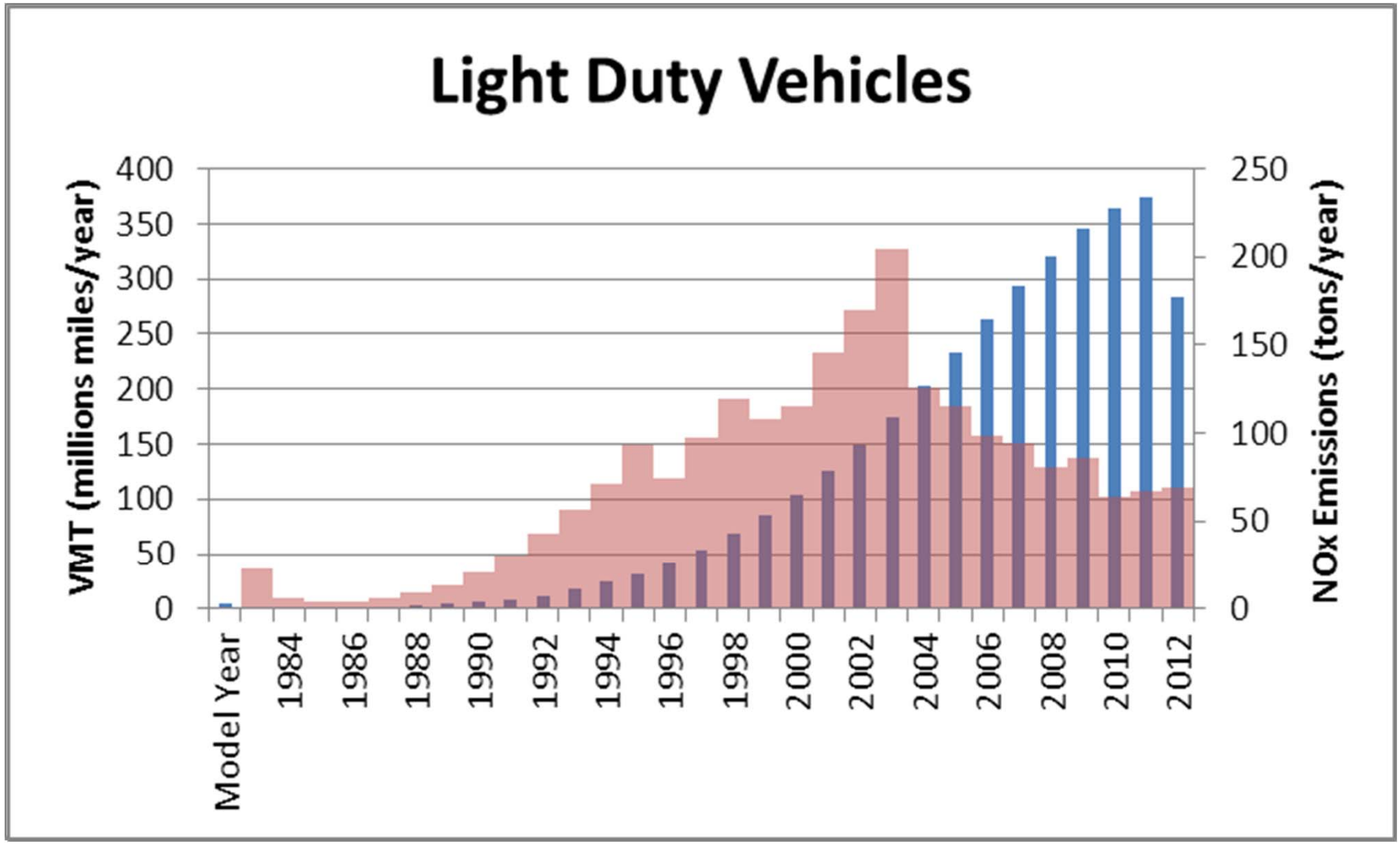
Maps are based on 2005 NATA concentrations and California risk factor.
The 2020 estimates were developed by scaling the 2005 concentrations using state-level emission changes between 2005 and 2020.

NJDEP, November 2012

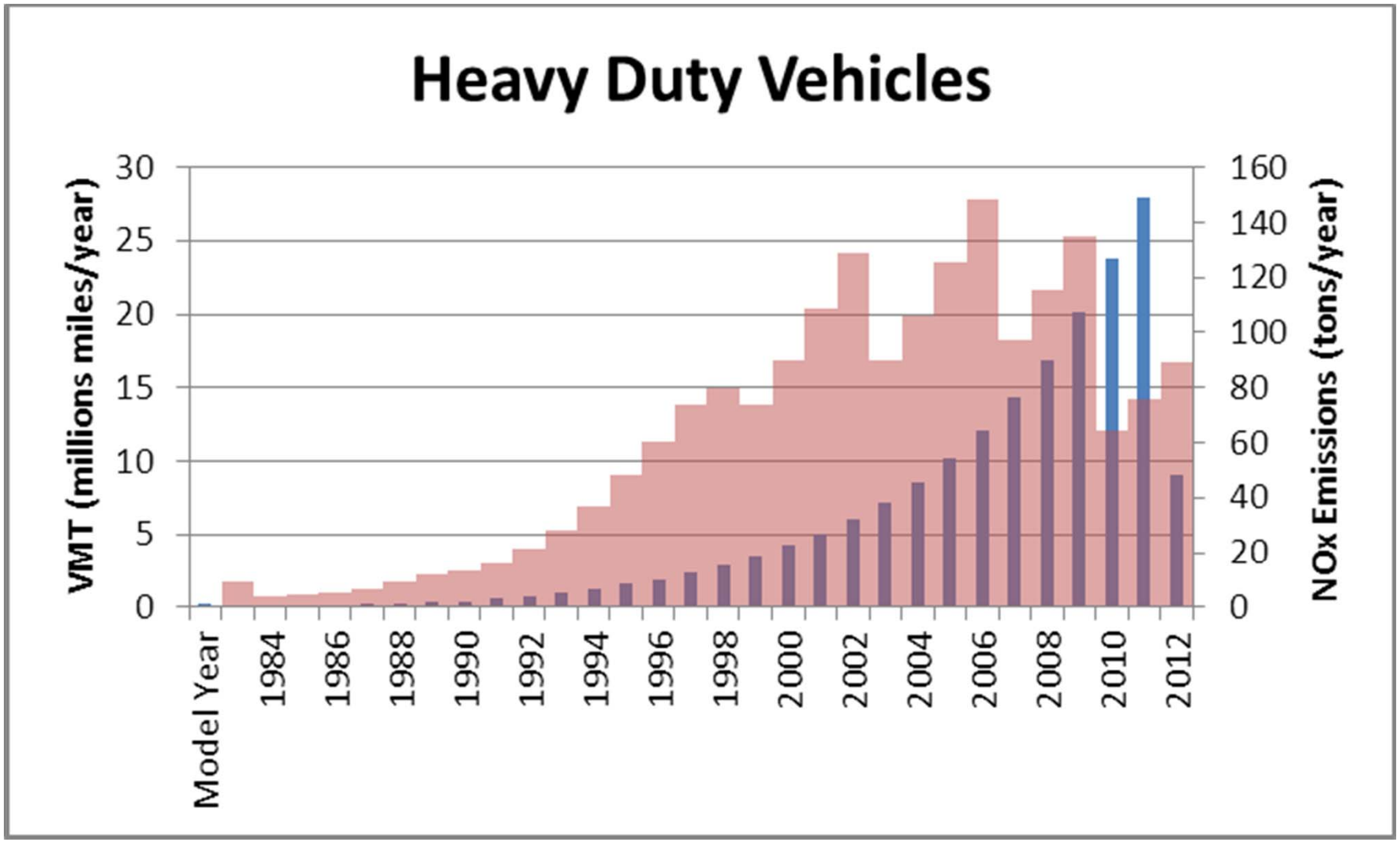
Greenhouse Gases



DRAFT INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2011 (February 2013)
http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html
Figure ES-13



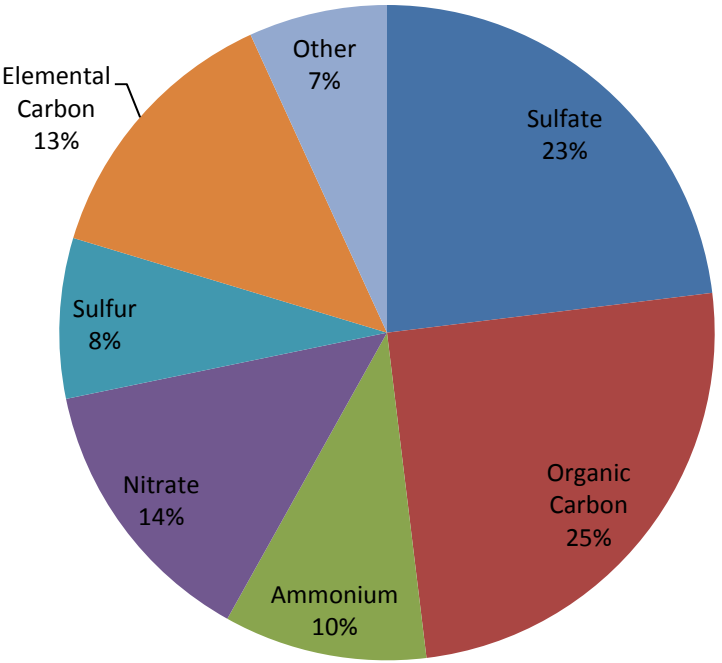
Mercer County, NJ



Mercer County, NJ

Near Roadway Air Monitoring
Air Quality Standards

- Fine Particles
- Carbon Monoxide
- Nitrogen Dioxide



What Can States Do?

	EPA	CA	Other States
New Onroad Vehicle Standards			**CALEV and ZEV**
Fuels for Onroad vehicles			**Limited**
In-Use Onroad Vehicles			I/M Aftermarket Parts Idling Fleet Turnover VMT

What Can States Do?

	EPA	CA	Other States
New Nonroad Equipment / Engine Standards			**CA Program e.g. Spark Ignition Engines >= 50 hp**
Fuels for Nonroad Use			**Limited**
In-Use Nonroad Equipment / Engines			I/M Idling Fleet Turnover Repowering

OTR Success Stories

- Goal: A source for OTC states of successful projects to reduce emissions from mobile sources
- Though PM focused, many projects provide NO_X benefits
  - Projects with biggest NO_X benefits:
    - Tugboat repowering
    - Locomotive repowering and Idling reduction
    - Vehicle Idling
- Funding Sources:
  - DERA (Diesel Emissions Reduction Act)
  - ARRA (American Recovery & Reinvestment Act)
- Voluntary or Required Actions
  - General Conformity
  - VALE (Voluntary Airport Low Emissions)
  - Port Plan

http://otcair.org/upload/Documents/Meeting%20Materials/Mobile%20Reduction%20Success%20Stories.pdf

OTC Aftermarket Catalyst Effort

- EPA's aftermarket catalyst policy was set in 1986. It has not been updated to reflect improvements in technologies & emission standards
- OTC submitted a finalized recommendation for an updated catalyst program to EPA in April, 2011
- OTC Developing White Paper to support national / state rules
- Calculated Emission Reductions:

	NO_X	NMHC	CO
Annual (tpy)	10,000	2,000	27,000
Daily (tpd)	30	6	74

http://www.otcair.org/upload/Documents/Meeting%20Materials/Catalytic%20Converter%20Data%20Analysis121113.pdf

Diesel I/M

- Lead: NESCAUM Heavy Duty Workgroup
- Goal: Proposal to USEPA for SIP Credit for I/M Programs
- Results in Emission Reductions of:
  - Oxides of Nitrogen (NO_X)
  - Fine Particulate Matter ($PM_{2.5}$)
- Methodology:
  - MOVES includes deterioration
  - Deterioration mitigated through maintenance and deterrence through I/M
  - Translates to emissions benefits
- Activities:
  - Gathered & analyzed studies that quantify effect of repairs
  - Developed white paper
  - Working with OTAQ
  - Determining if additional data is needed

Lower Sulfur Gasoline

- Lowering sulfur in gasoline allows pollution controls on cars and trucks to operate more effectively
- Will significantly reduce NO_X and other emissions from all gasoline-powered vehicles by limiting "NO_X creep" associated with sulfur buildups in catalyst
- Emission reductions from the in-use fleet would be achieved concurrent with the introduction of the cleaner fuel, without the need for fleet turnover
- **Cost effective way to achieve large reductions inside and outside of the OTR**

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Status of OTC Federal Measure Asks

OTC Request	Action	Status
Mar 2009	Ships - Emission Control Area	✓
June 2009	Catalyst Replacements (April 2011 – OTC Program Design Recommendation)	✗
Nov 2009	Onroad Mobile Gasoline and Diesel Sources (November 2010 Statement on Tier 3)	✗
	Locomotive Engines	½
	Marine Engines	½

Status of Federal Measure Commitments

Date	Action	Status
Dec 2010	RFS2 Anti-Backsliding	✗
2011	E15 Partial Waiver Decision MY 2001-2006 Motor Vehicles	✓
2012	Heavy Duty Truck Greenhouse Gas Standards	✓
2014	Clean Vehicles 75 ppb Ozone NAAQS Regulatory Impact Analysis	✗

Conclusion

- Air Quality has improved; but more progress is needed to meet the heath goals.
- Mobile Sources contribute to a large portion of the air pollution in our region.
- Federal / state / local / individual actions are needed.
- Success will take hard work but is attainable!

Bonus Material

USEPA Analysis: Approach

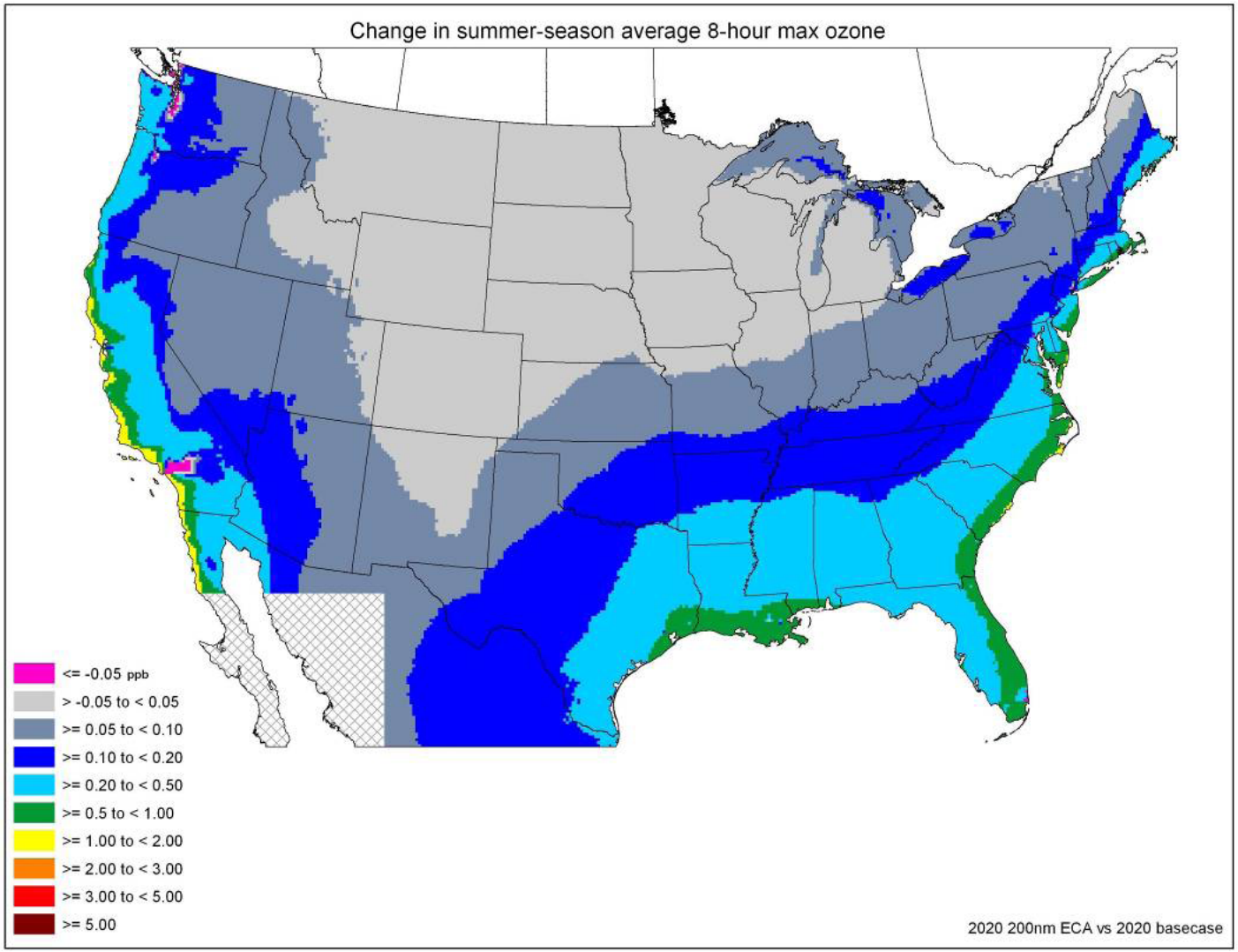
- 2011 USEPA Analysis
- Used the CAMx Model
- Modeling projected from a 2002 base to 2016
  - Includes benefits from the “proposed transport rule”
- Contributions were calculated for monitors > 70 ppb
- Caveats:
  - Modeling does not reflect latest base year and projected emissions inventories
- Conclusion
  - Modeling is dated, but informative

	Scenerio 4 (2020) Reductions for NOX and VOC					
	OTR incl VA		Non-OTR excl VA		CANADA	
	NOX	VOC	NOX	VOC	NOX	VOC
Mobile	Proxy from 2007		Proxy from 2007		OME 2005	
	70+5=75%	30%	70%	30%	70%	30%
EGU	Proxy from 2007		Proxy from 2007		OME 2005	
	65+5=70%	30%	65%	30%	65%	30%
Other Point	MARAMA 2020 Ver.		Proxy from 2007		OME 2005	
	Add. 5%	None	65%	30%	65%	30%
Cat 3 Marine - Offshore	EPA CHIEF 2005		EPA CHIEF 2005		EPA CHIEF 2005	
	65%	70%	65%	70%	65%	70%
MAR	MARAMA 2020 Ver.		Not a separate file, in area & other point files		OME 2005	
	Add. 5%	None			65%	30%
Nonroad	MARAMA 2020 Ver.		Proxy from 2007		Not a separate file	
	Add. 5%	None	35%	30%		
Area	MARAMA 2020 Ver.		Proxy from 2007		OME 2005	
	Add. 5%	None	0%	30%	0%	30%
Oil & gas	Not included		Not included		Not included	
Anthropogenic Chlorine	EPA CHIEF 2005		EPA CHIEF 2005		Not included	
Oceanic Chlorine	EPA CHIEF 2005		EPA CHIEF 2005		EPA CHIEF 2005	
Biogenic	MEGAN		MEGAN		MEGAN	

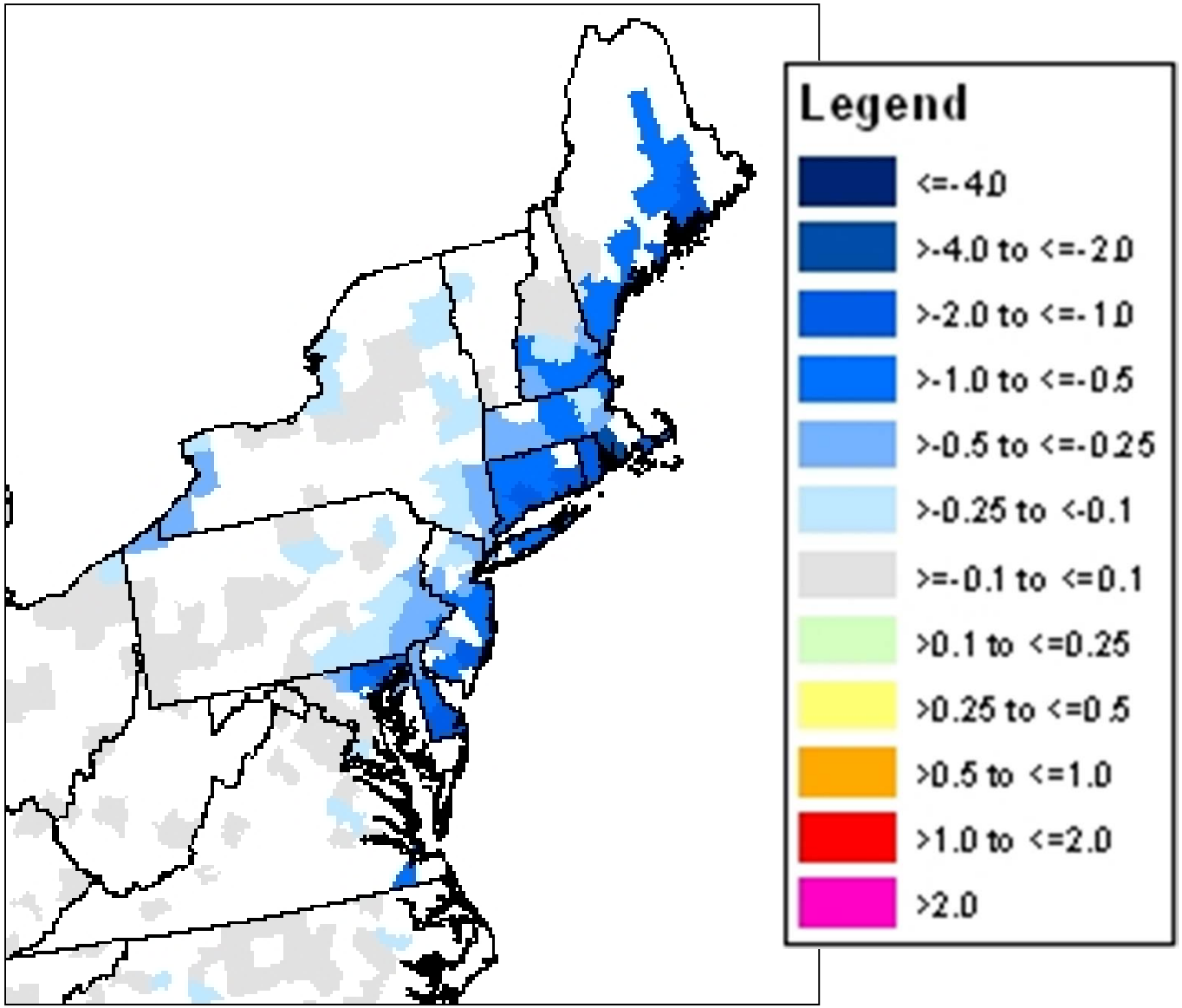
Emission Control Areas (ECA)

- USEPA & International Maritime Organization (IMO) Action
- NO_X and SO_2 requirements on ship near shore
  - 2015: 1000 ppm Maximum Sulfur Fuel
  - 2016: New Engine Standards – Tier 3 (80% reduction)
  - 2010: Existing Engines – 15-20% NO_X reductions
- Cruise line industry is seeking exemption to the ECA regulation

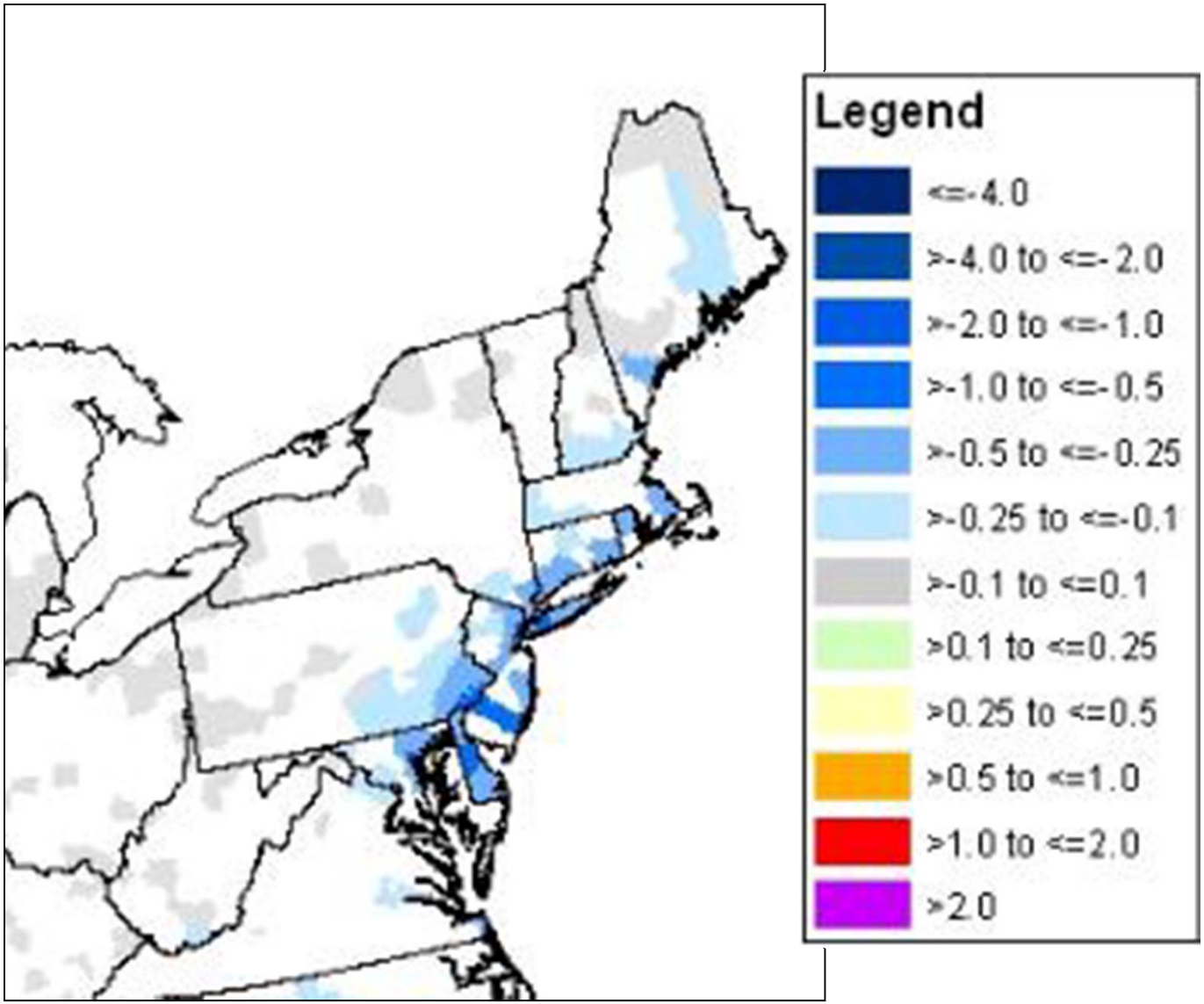
Improvement in Summertime Average 8-hour Average Ozone Concentrations in 2020 Resulting from the Proposed Emission Control Area



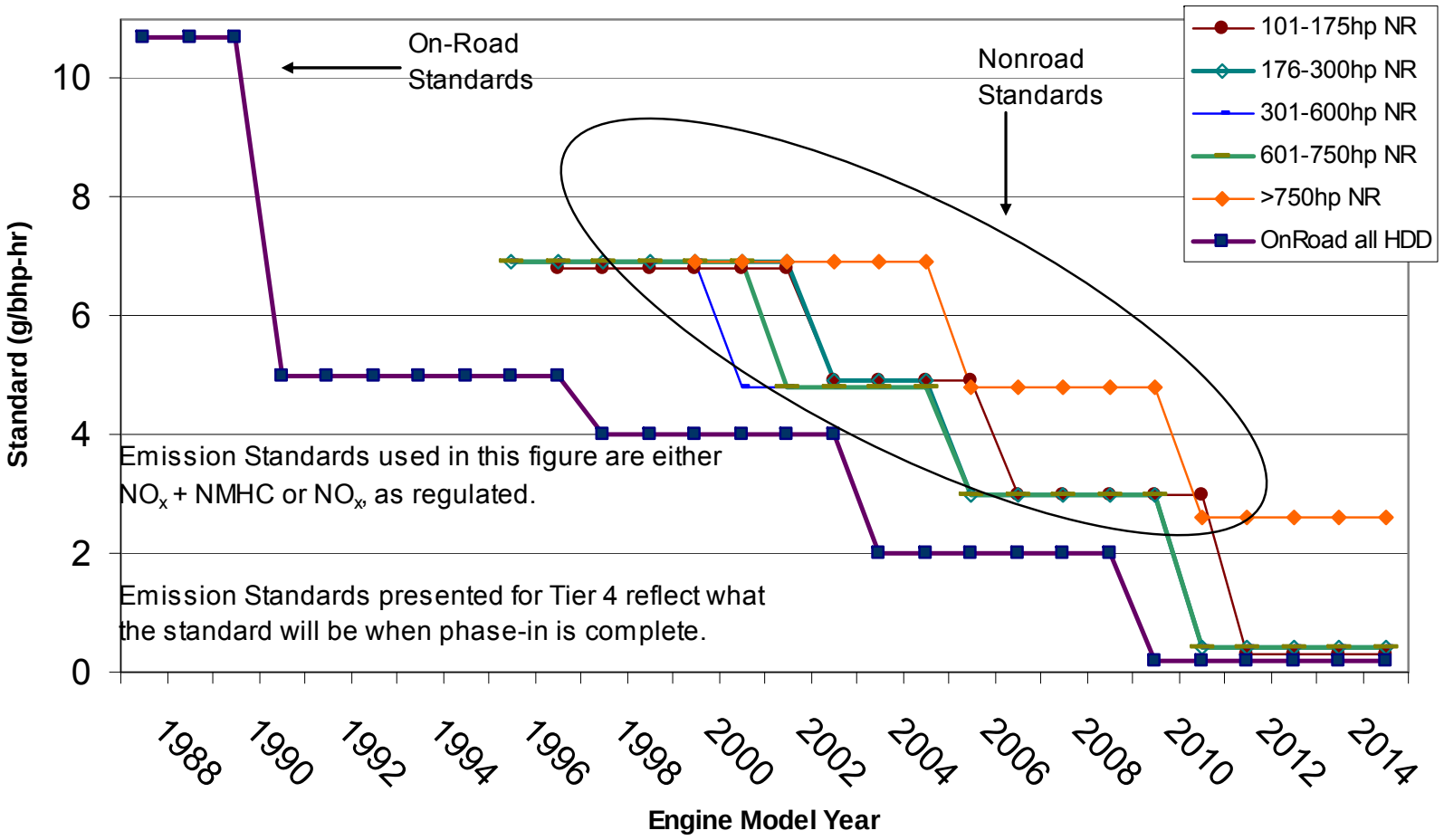
Emission Control Area – Ozone Benefits in 2020

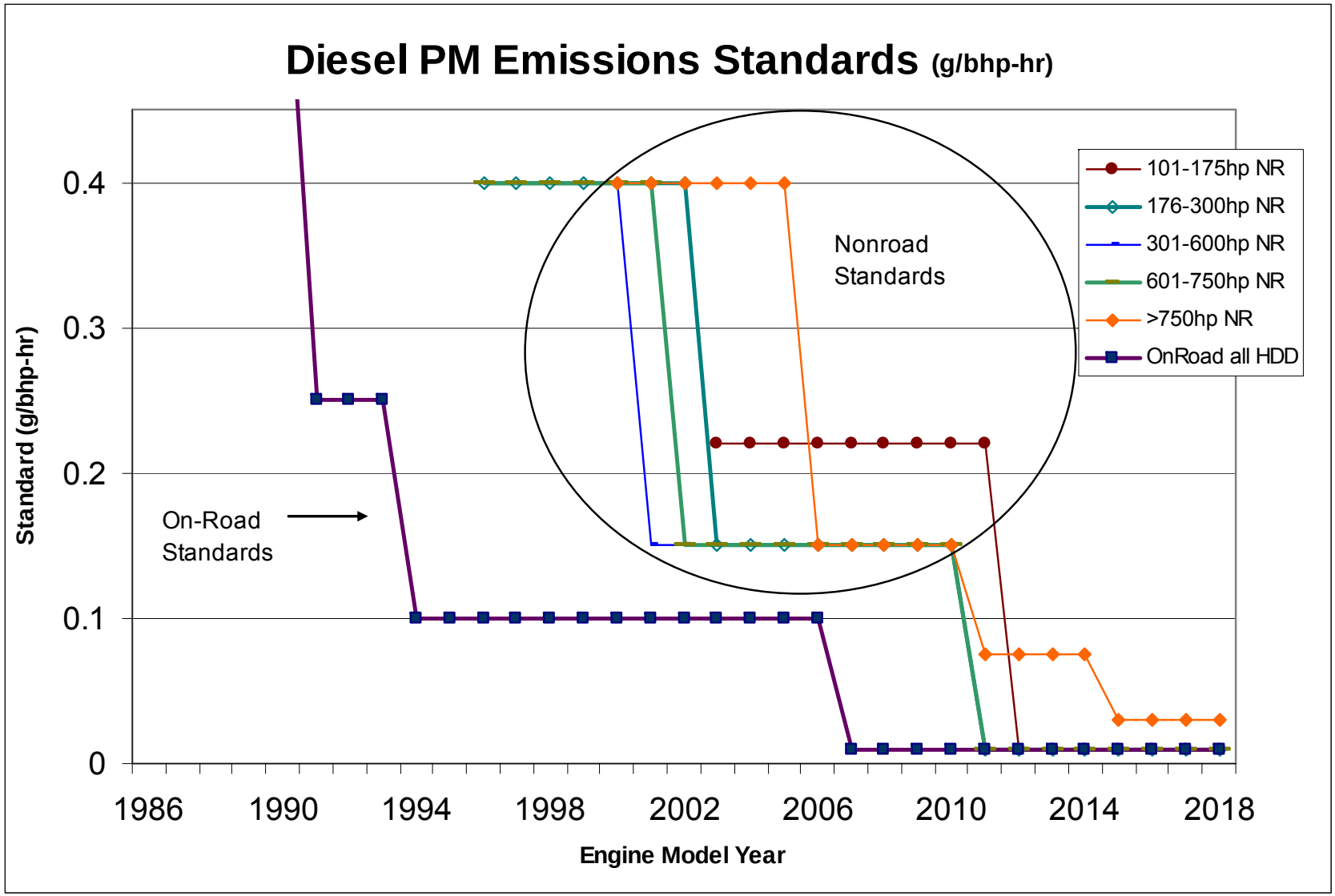


Emission Control Area – PM Benefits in 2020



Diesel NO_x Emissions Standards (g/bhp-hr)




Diesel PM Emissions Standards (g/bhp-hr)
Standard (g/bhp-hr)
0.4
0.3
0.2
0.1
0
1986
1990
1994
1998
2002
2006
2010
2014
2018
Engine Model Year
Nonroad Standards
On-Road Standards
101-175hp NR
176-300hp NR
301-600hp NR
601-750hp NR
>750hp NR
OnRoad all HDD