

Modeling Committee Update

OTC Annual Meeting

June 11th, 2014

Baltimore, MD



OZONE TRANSPORT COMMISSION

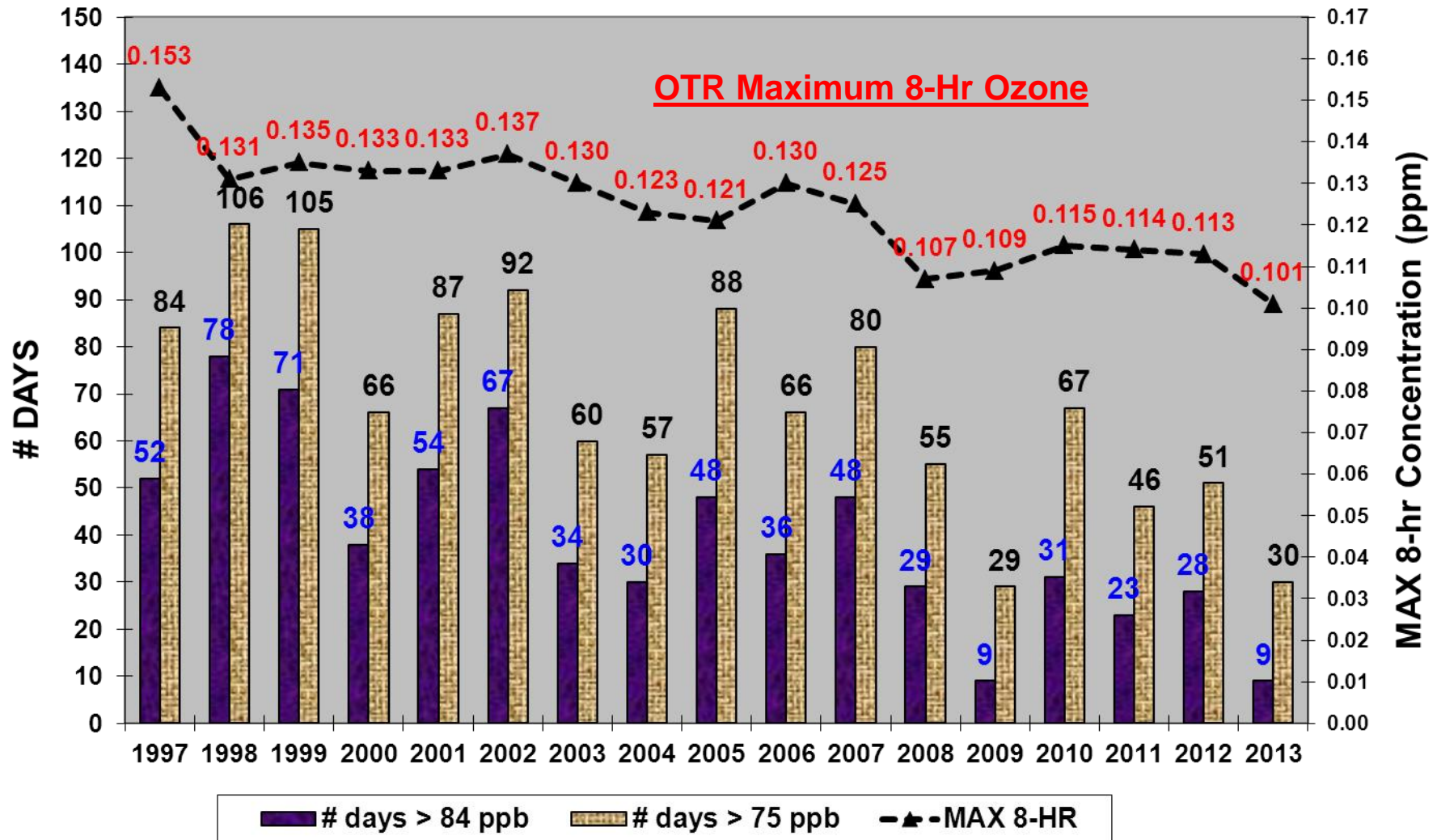
Overview

1. Current Ozone
2. Level 3B Screening Runs
3. 2011 Modeling Platform Update
4. ERTAC EGU Update
5. Inventory Update

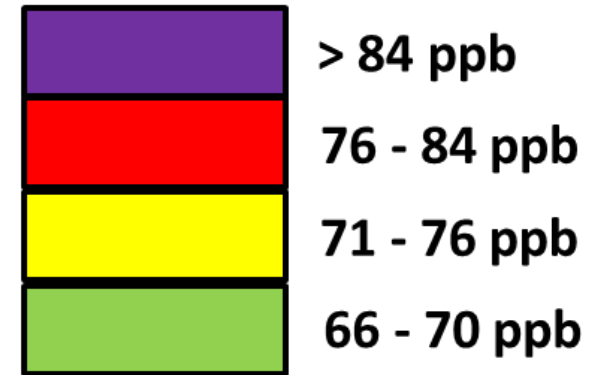
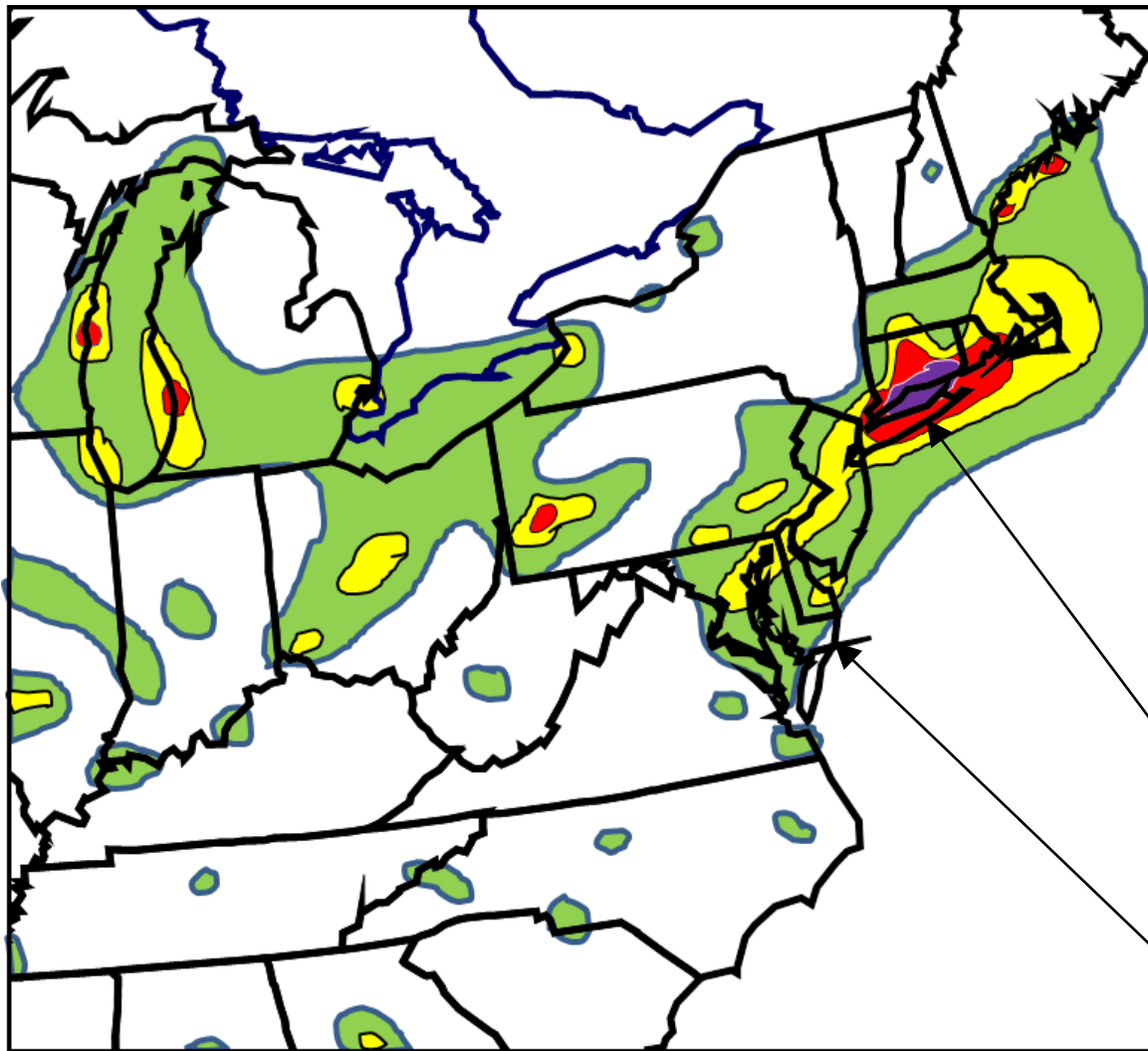
Background

- Eight OTR states, plus DC, have areas designated as nonattainment for the 2008 Ozone NAAQS of 75ppb
 - Most areas need a 3-year period where monitoring must comply starting in 2015
 - Maryland has a higher classification and owes a State Implementation Plan (SIP) in 2015
- EPA to propose a new ozone NAAQS in December 2014 in the range of 60-70ppb

OTR Ozone Trend Days 1997-2013



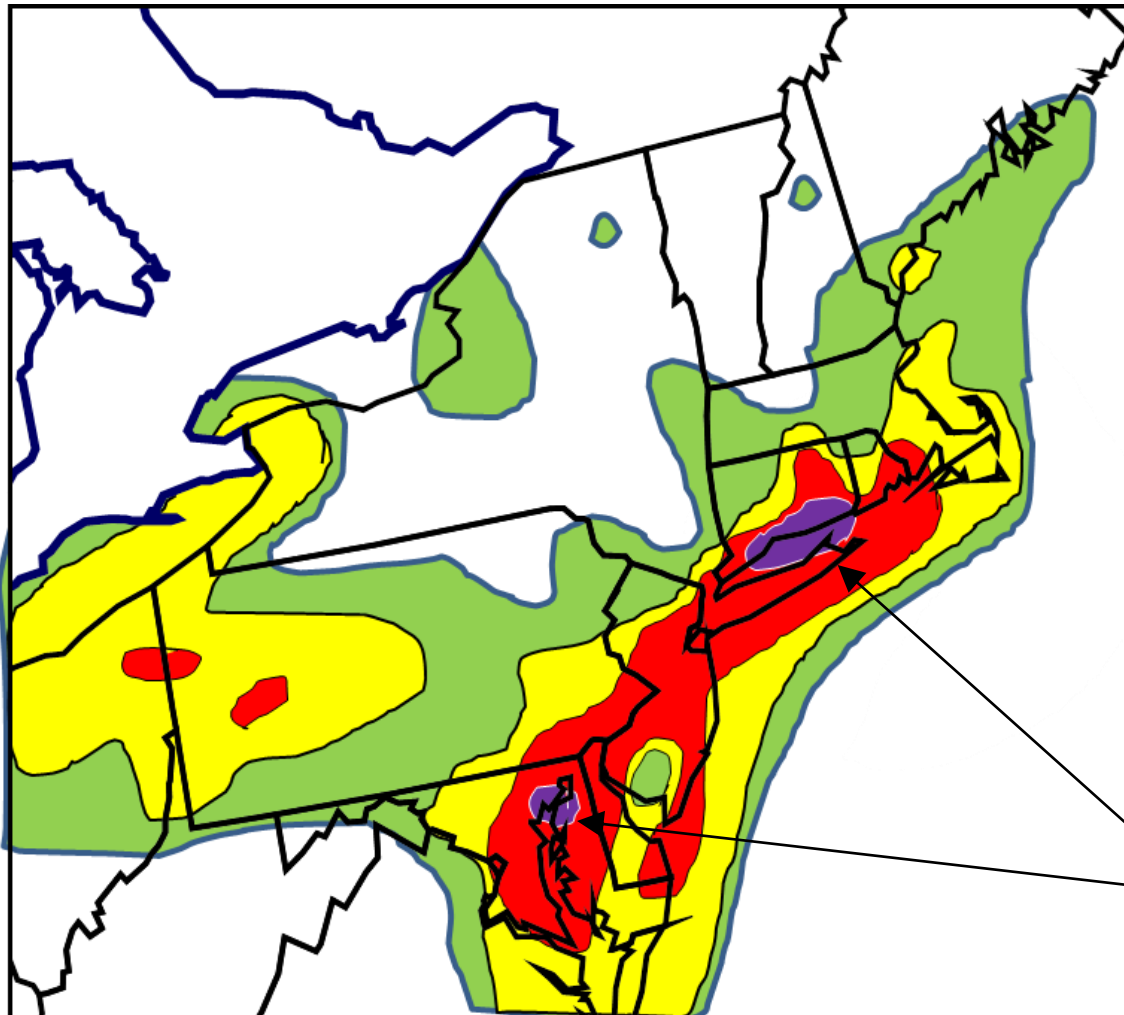
2013 Ozone 4th Highest 8-hr Value



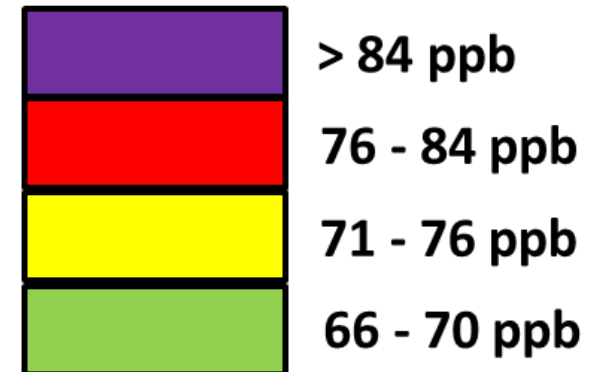
High values in north
OTR - especially CT

Low in South OTR

2011-2013 Ozone Design Values



3-Year average of the 4th
high concentration for
2011, 2012, 2013

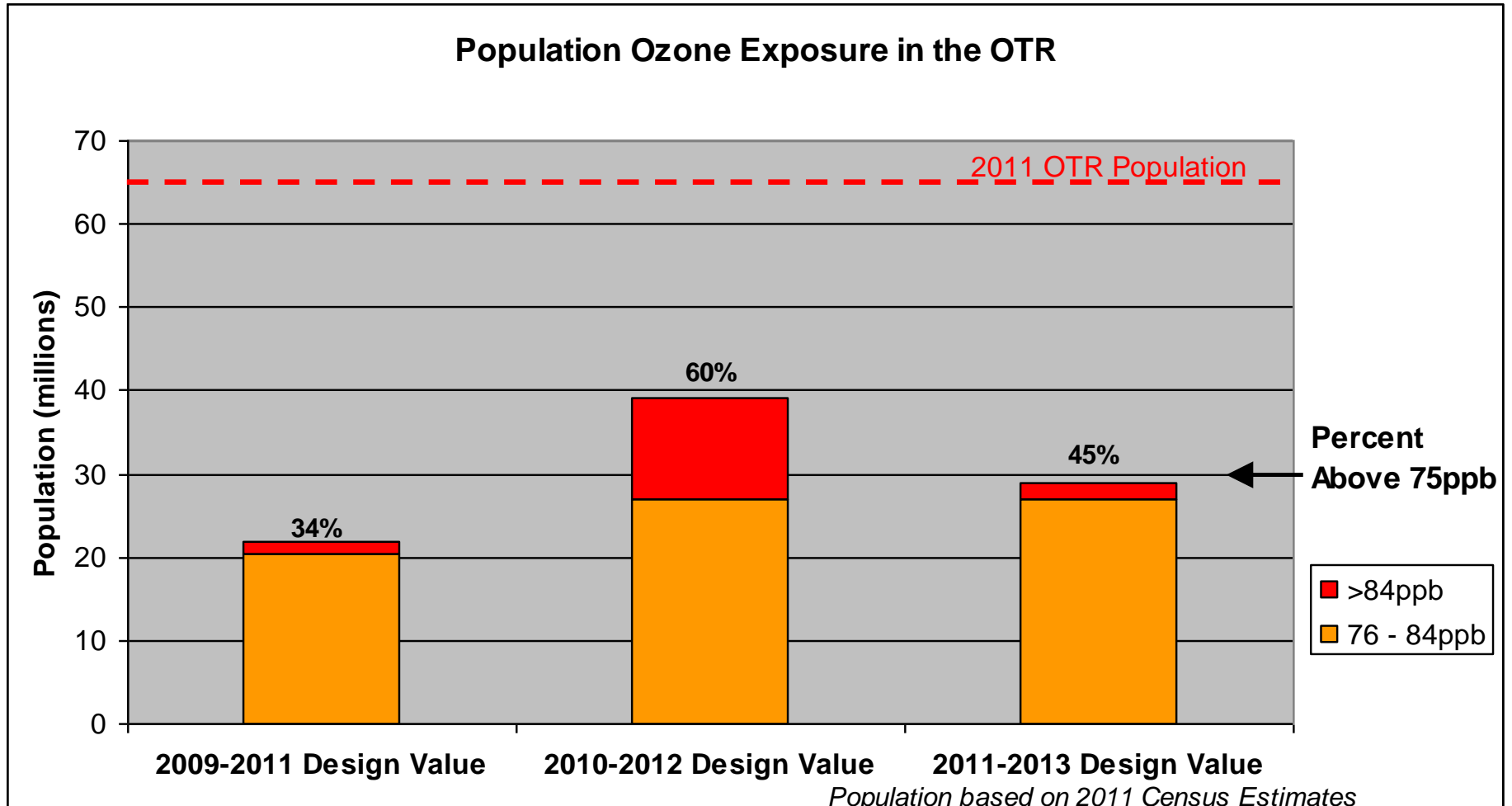


High values in CT
and MD

Ozone Monitored by State

State	2013 4 th High	2011- 13 DV	State	2013 4 th High	2011- 13 DV
CT	90	89	NJ	74	84
DE	72	77	NY	78	81
DC	66	79	PA	78	80
ME	76	75	RI	79	78
MD	72	85	VT	62	62
MA	78	75	VA	67	79
NH	69	69	(OTR)		

Ozone Population Exposure Three Recent Design Value Periods



OTR Summer 2014 Through June 7

- 5 days have exceeded 75ppb
- 5 states have exceeded 75ppb
- Middletown, CT reached 86 ppb on 5/27
- 5 locations in Connecticut already have their preliminary design values for 2012-2014 exceed 75ppb
 - Groton
 - Madison
 - Middletown
 - Stratford
 - Westford

Level 3B Screening Runs

Level 3B Modeling Runs – Last Year

1. Updated 2020 Base Case

- ERTAC (version 1.7) EGU Emissions
- Oil & Gas Estimate (2011 NEI)
- ICI Boiler Projections

2. 2018 Base Case

- 2018 ERTAC (version 1.7) EGU Emissions
- Oil & Gas Estimate (2011 NEI)
- Interpolation for Other Sectors

3. “Scenario 7” 2018 Optimistic Scenario

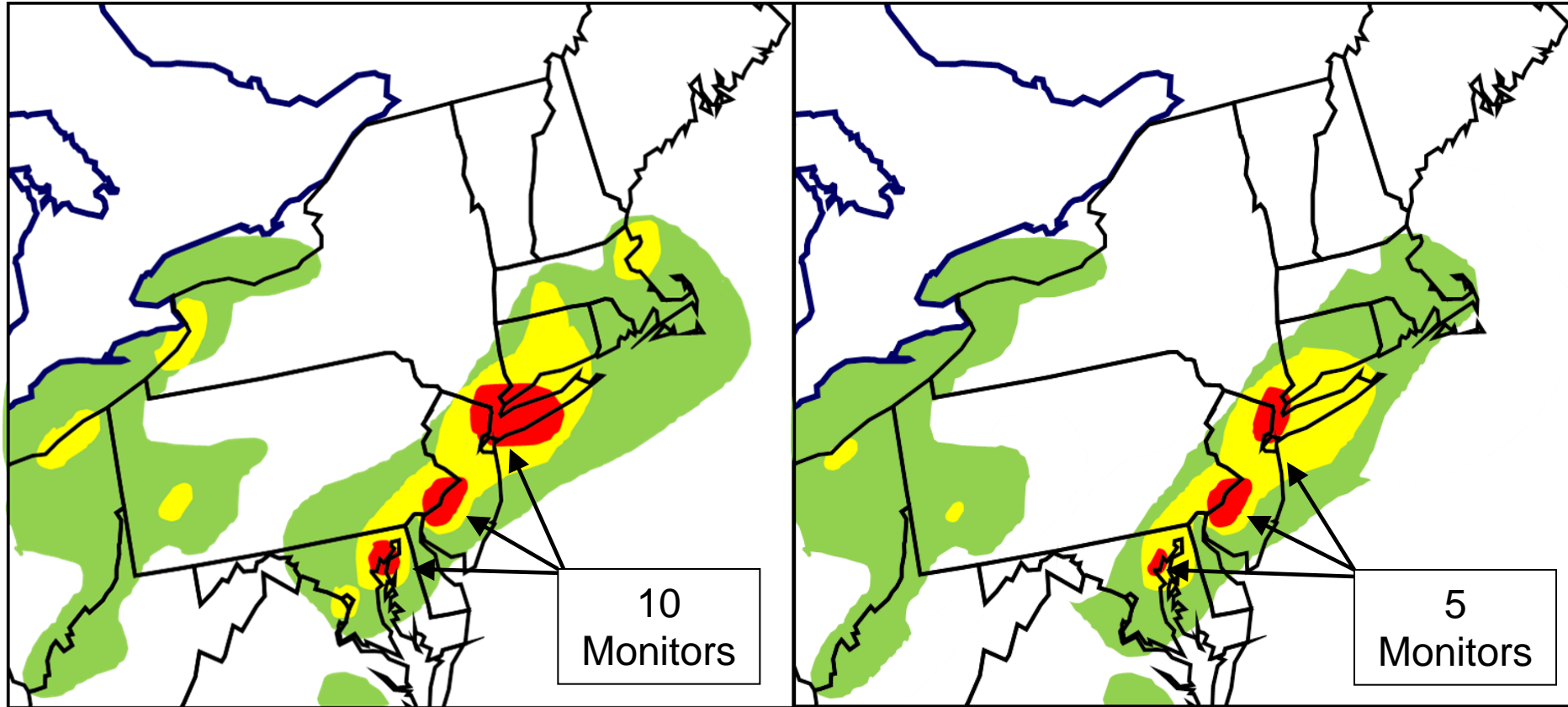
- Tier 3 Adoption (OnRoad)
- PJM Shutdown List (EGU)
- Lower emitting ICI Boiler retrofits

Level 3B 2018 Base vs 2020

2018 Base

L3B

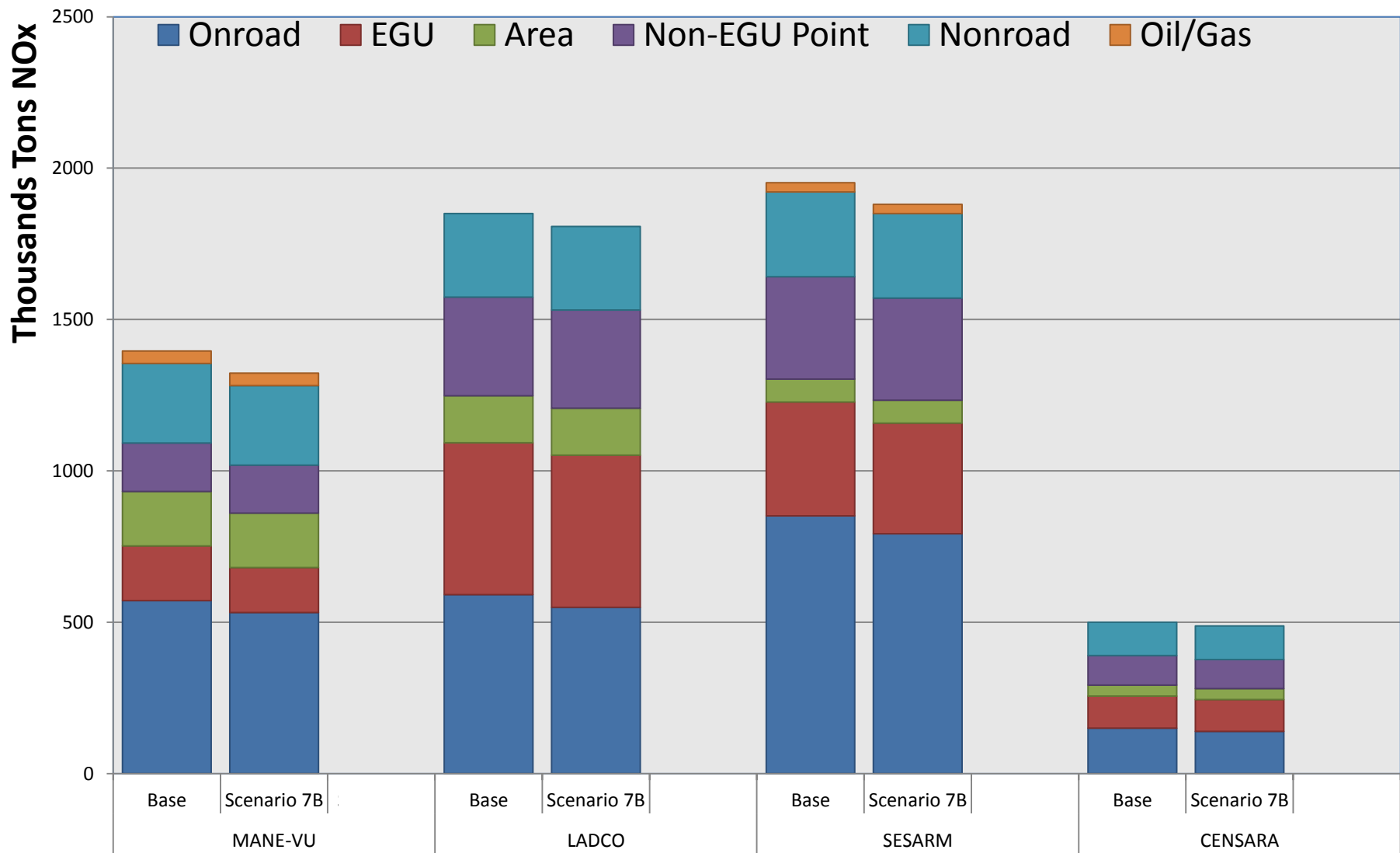
2020 Base



Scenarios 7B Overview

- “Scenario 7B”
 - Uses ERTAC version 1.7 EGU results that consider the PJM Shutdown List rather than approximations
 - Otherwise identical to “Scenario 7”

Annual Modeling Level 3B Domain-Wide NOx 2018 Projected Emissions



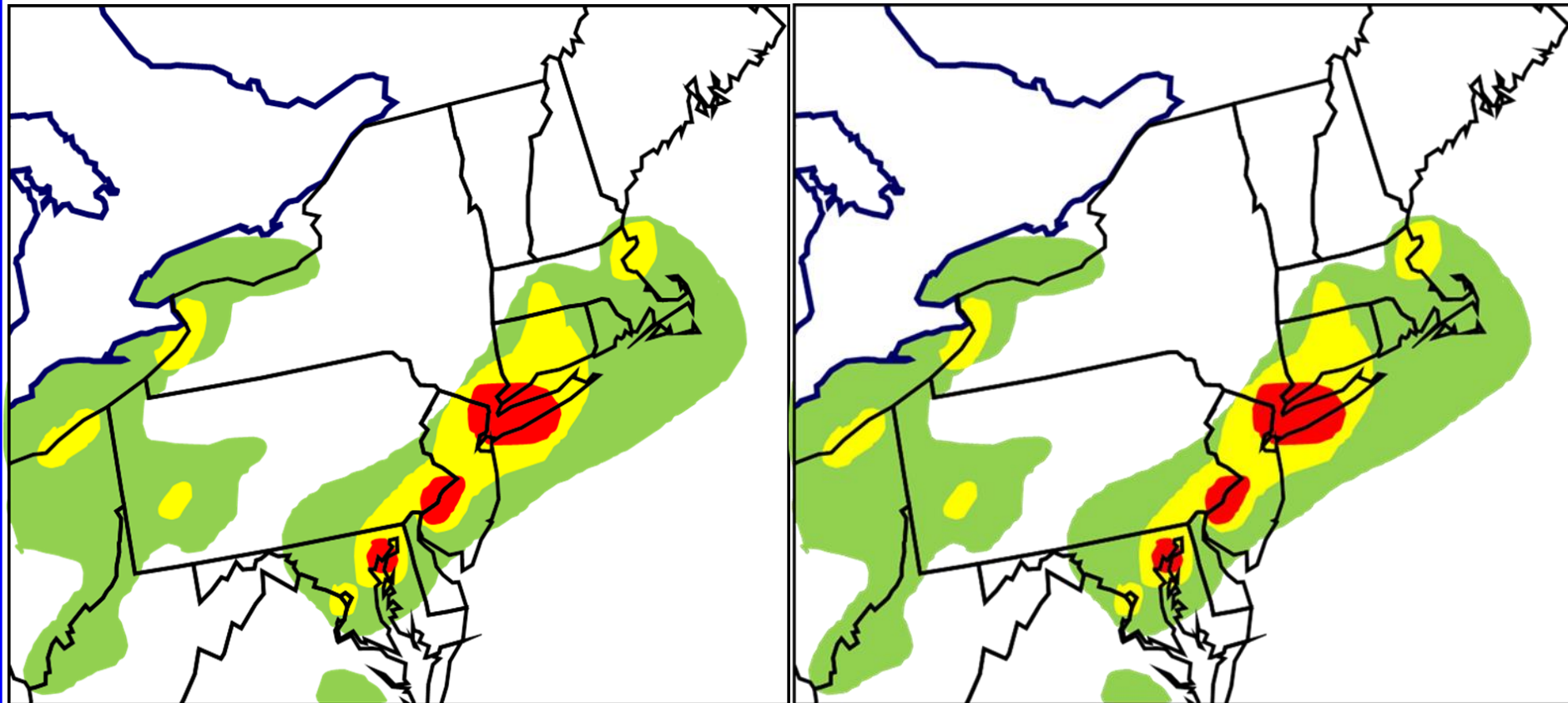
Scenario 7B

Optimistic 2018 Base Case

2018 Base

L3B

Scenario 7B 2018 Optimistic



Modeled 8-hour Ozone
Design Values

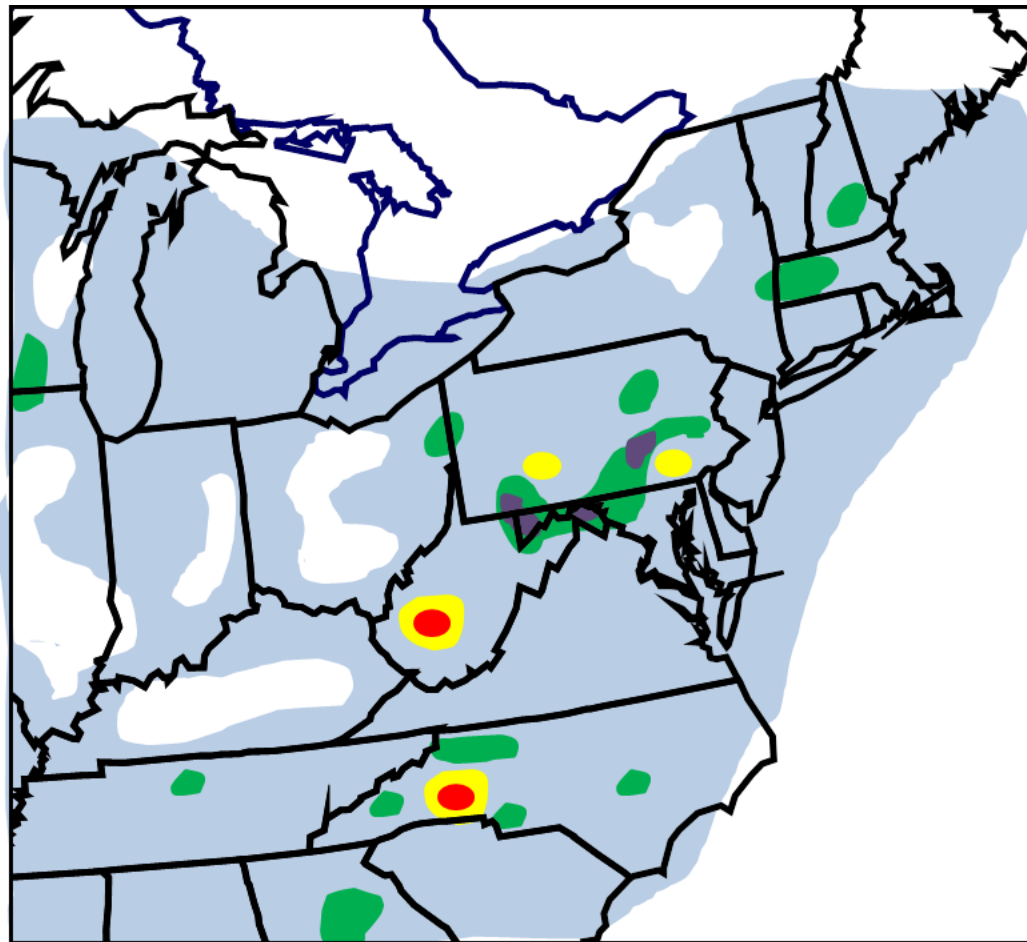


> 75 ppb

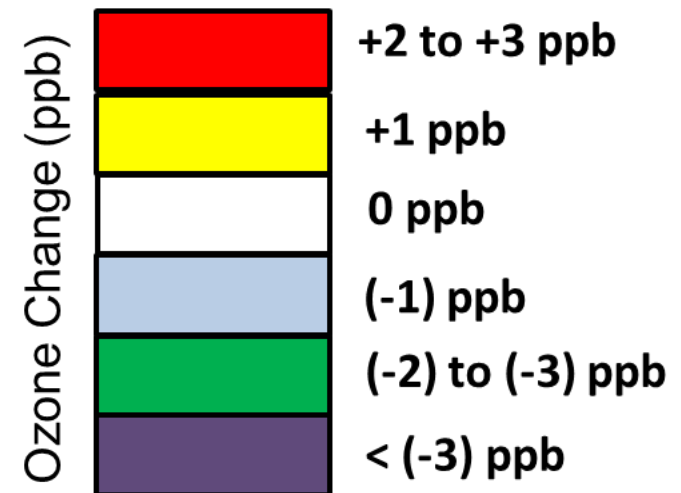
70 - 75 ppb

65 - 70 ppb

Ozone Change Scenario 7B from Base 2018



Impact of Tier 3
& EGU
Shutdowns



Scenarios 7B Screening Results

High Values by OTR State

State	2007 Base Design Value	2018 Base Case	2018 Scen 7B	State	2007 Base Design Value	2018 Base Case	2018 Scen 7B
CT	89	77	76	NJ	85/88	85/79	84/78
DE	81	69	69	NY	88	78	77
DC	85	71	70	PA	91	80	79
ME	80	66	65	RI	81	67	66
MD	91	78	77	VT	71	58	57
MA	88	73	71	VA (OTR)	85	71	70
NH	78	63	62				

Note: Further investigation needed on the Bayonne, NJ monitor.

Scenarios 7B Screening Results

High Values by nonOTR State

State	2007 Base Design Value	2018 Base Case	2018 Scen 7B		State	2007 Base Design Value	2018 Base Case	2018 Scen 7B
GA	92	78	77		NC	91	73	72
IL	80	74	73		OH	85	74	72
IN	80	75	75		SC	82	65	64
KY	81	69	68		TN	86	71	70
MI	87	76	75		WV	79	70	69

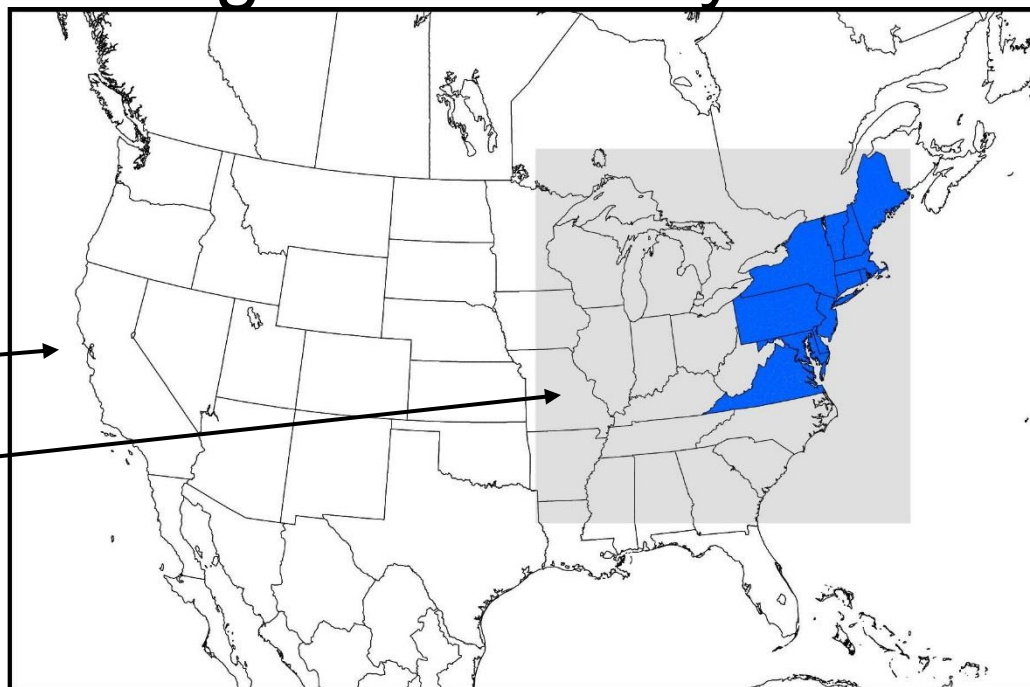
Modeling Summary

- Eight OTC States currently are not meeting the 75ppb ozone NAAQS
- Modeling predicts that five OTC states will not attain by 2018 (CT, MD, NJ, NY, PA) without additional measures
 - Optimistically, if everything we envision goes right, these five states get closer to attaining, but still fall short.

2011 Modeling Platform Update

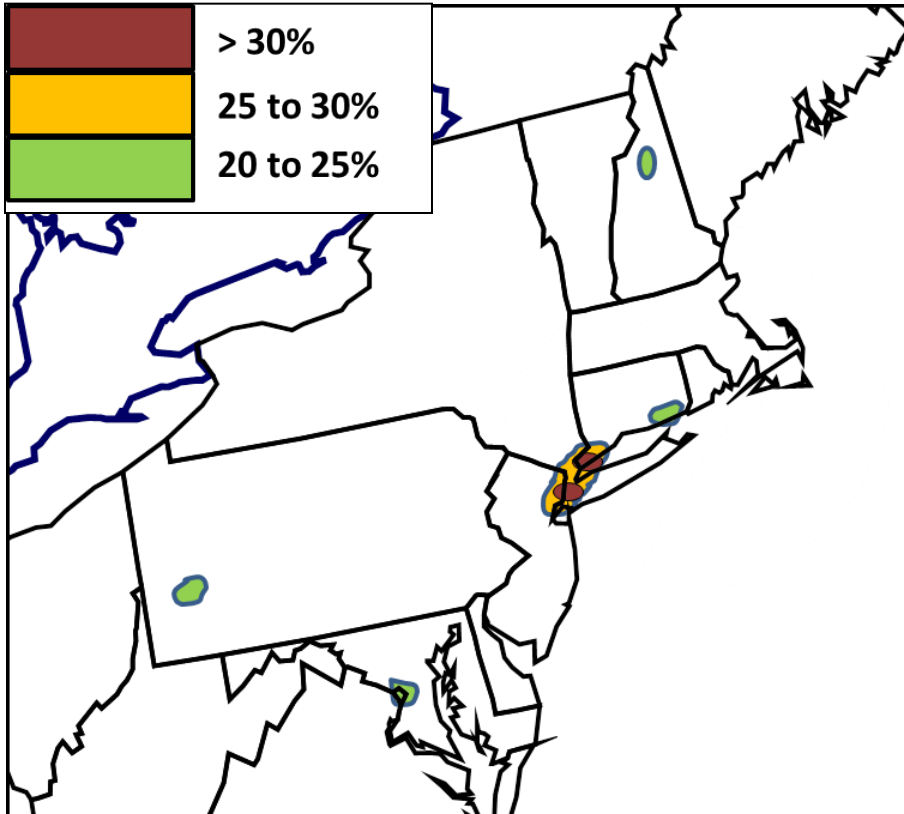
- EPA NEI 2011 version 1
- WRF 3.4 – WRF 12 km data cover CONUS provided by EPA (second version)
- CMAQ 5.01 with CB5 gas chemistry and AE6 aerosol scheme

National Domain
OTC Domain



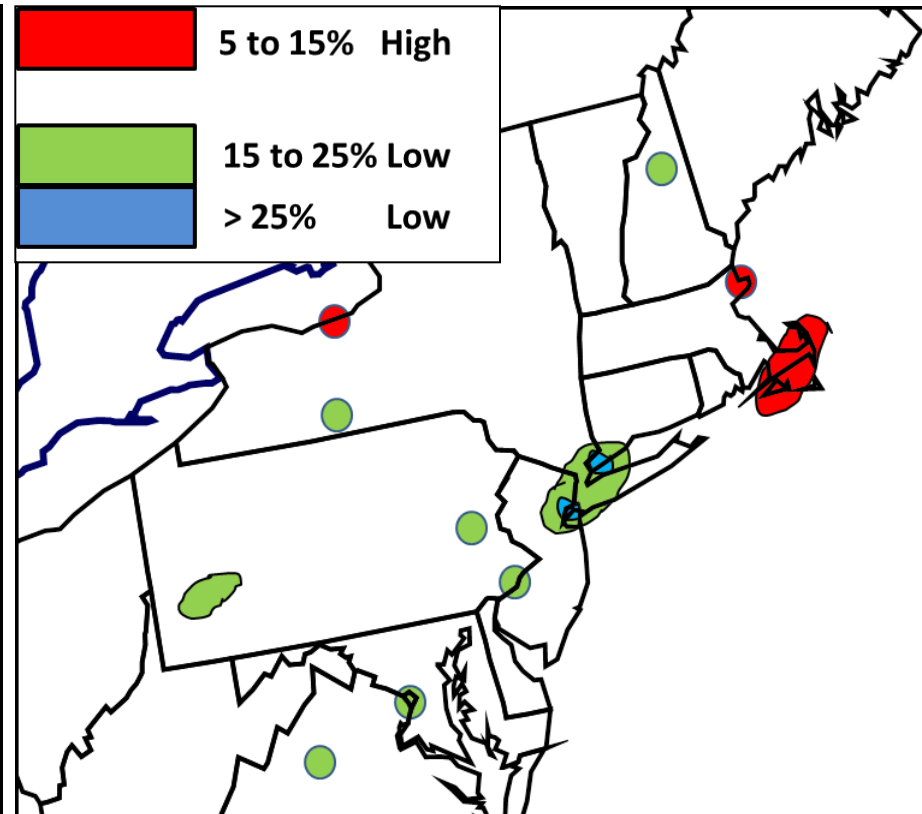
2011 Modeling Platform Performance

Mean Fractional Error



223 of 225 sites below 30%

Mean Fractional Bias

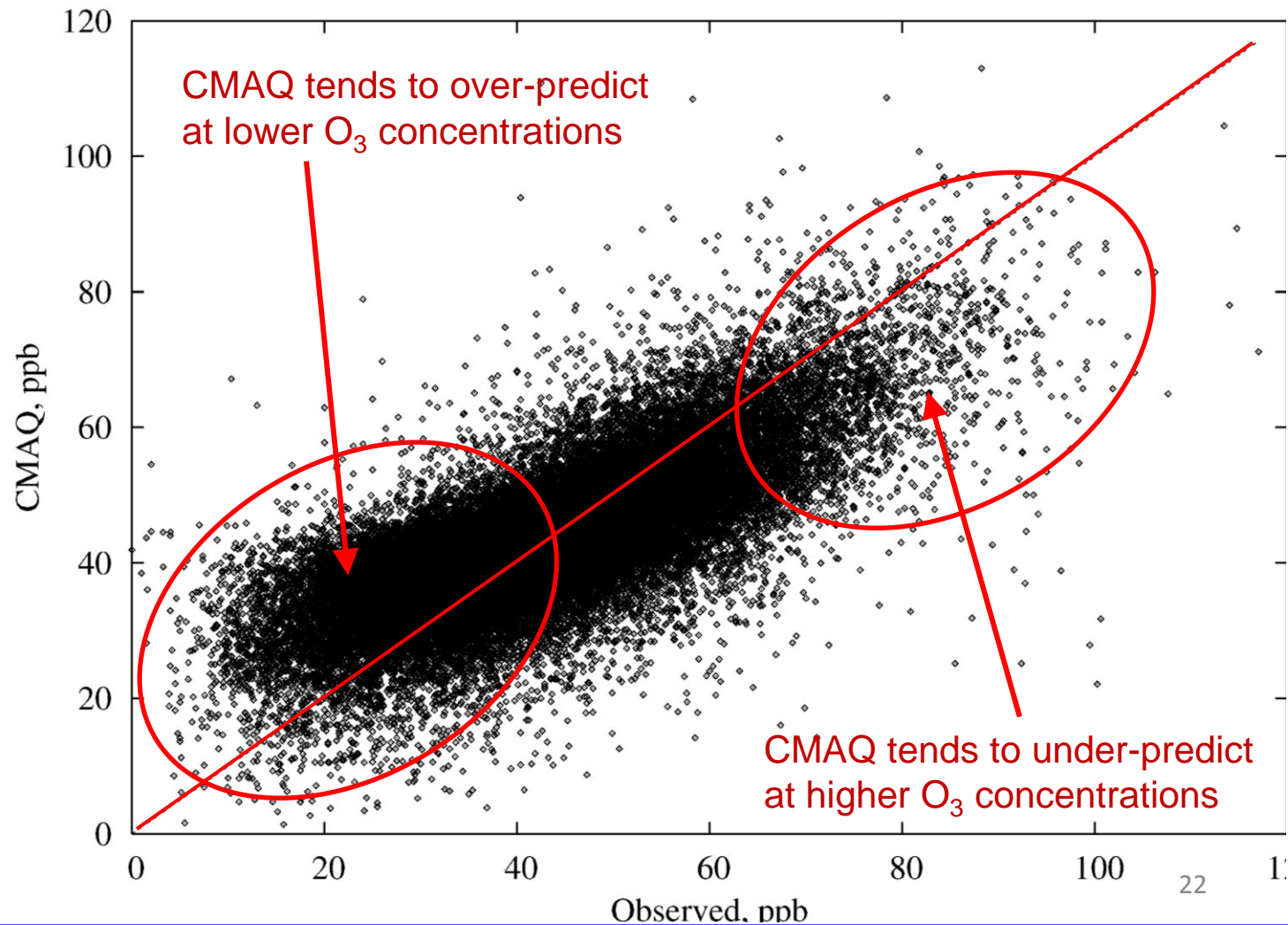


206 of 225 sites within 15%

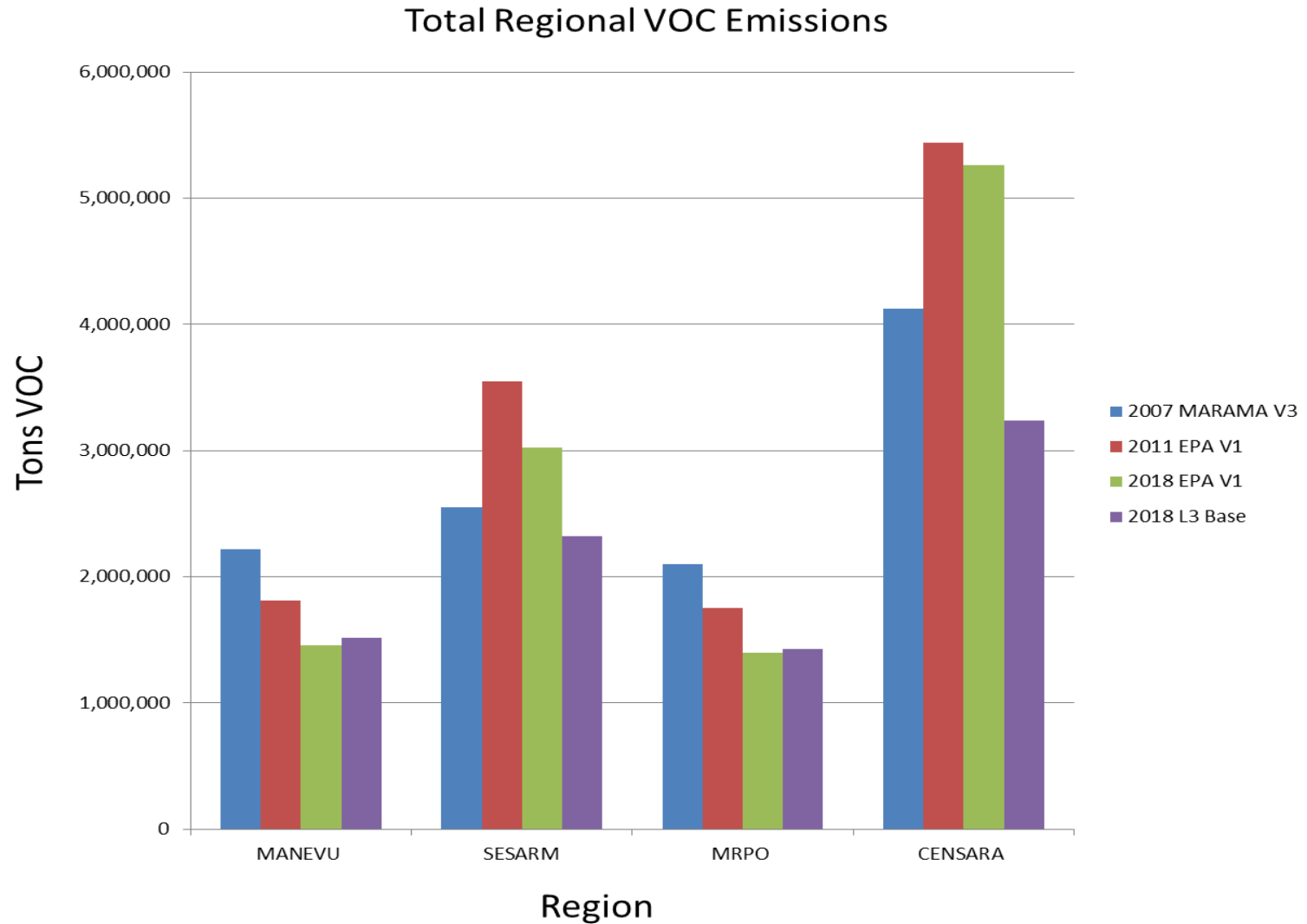
Model performance is good, but could be better in some urban areas, especially near the coast.

2011 CMAQ vs Observed

Daily maximum 8-hour O₃ at all sites across the OTR+VA



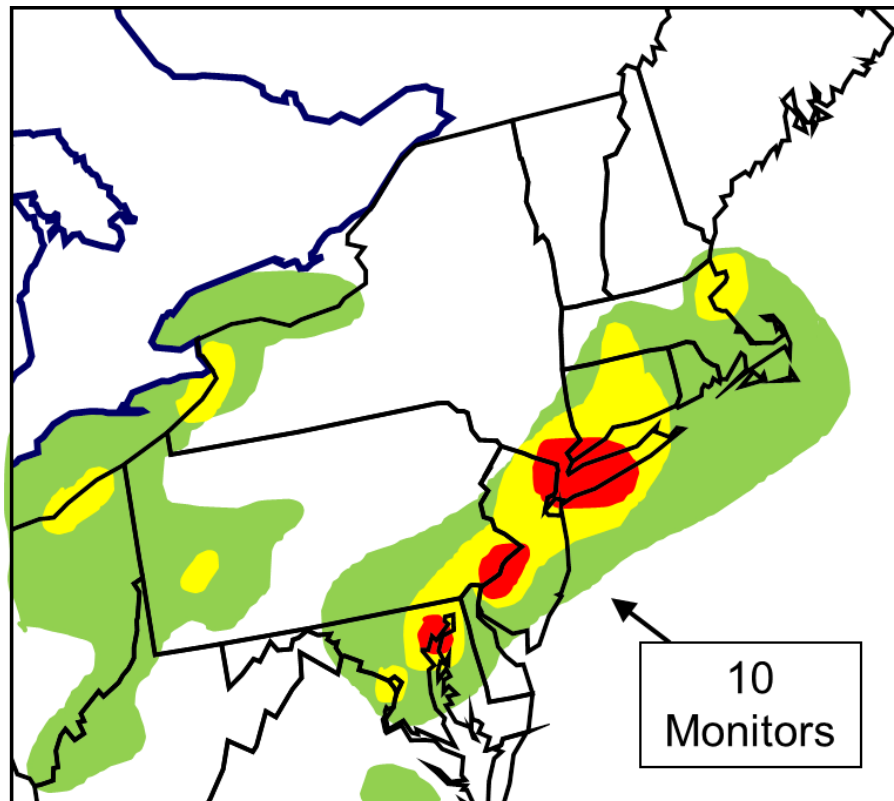
2011 Modeling Platform Emissions



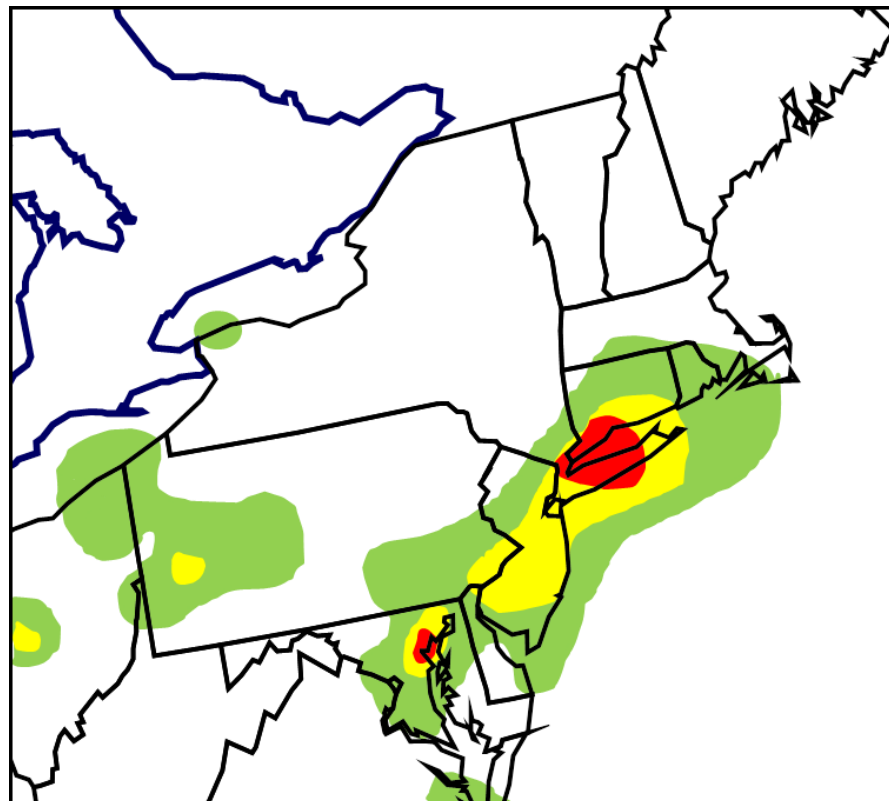
CMAQ 2018 Modeling

(2007 vs 2011 Based Modeling Platforms)

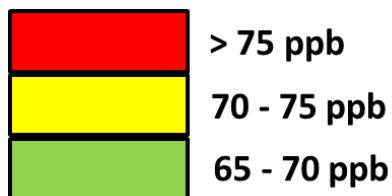
2018 DVF (2007 Platform)



2018 DVF (2011 Platform)



2018 MARAMA EI



2011 NEI version_1 -- 2018 Projection

NOTE: 2011 modeling is very preliminary

ERTAC EGU Update

ERTAC Reference Case Updates

- Current QAed version is v2.2 (2011 base)
 - Inputs up to date as of 4/4/14
 - New base case uses code with several improvements and bug fixes
 - Workgroup is seeking stakeholder feedback until July 31, 2014

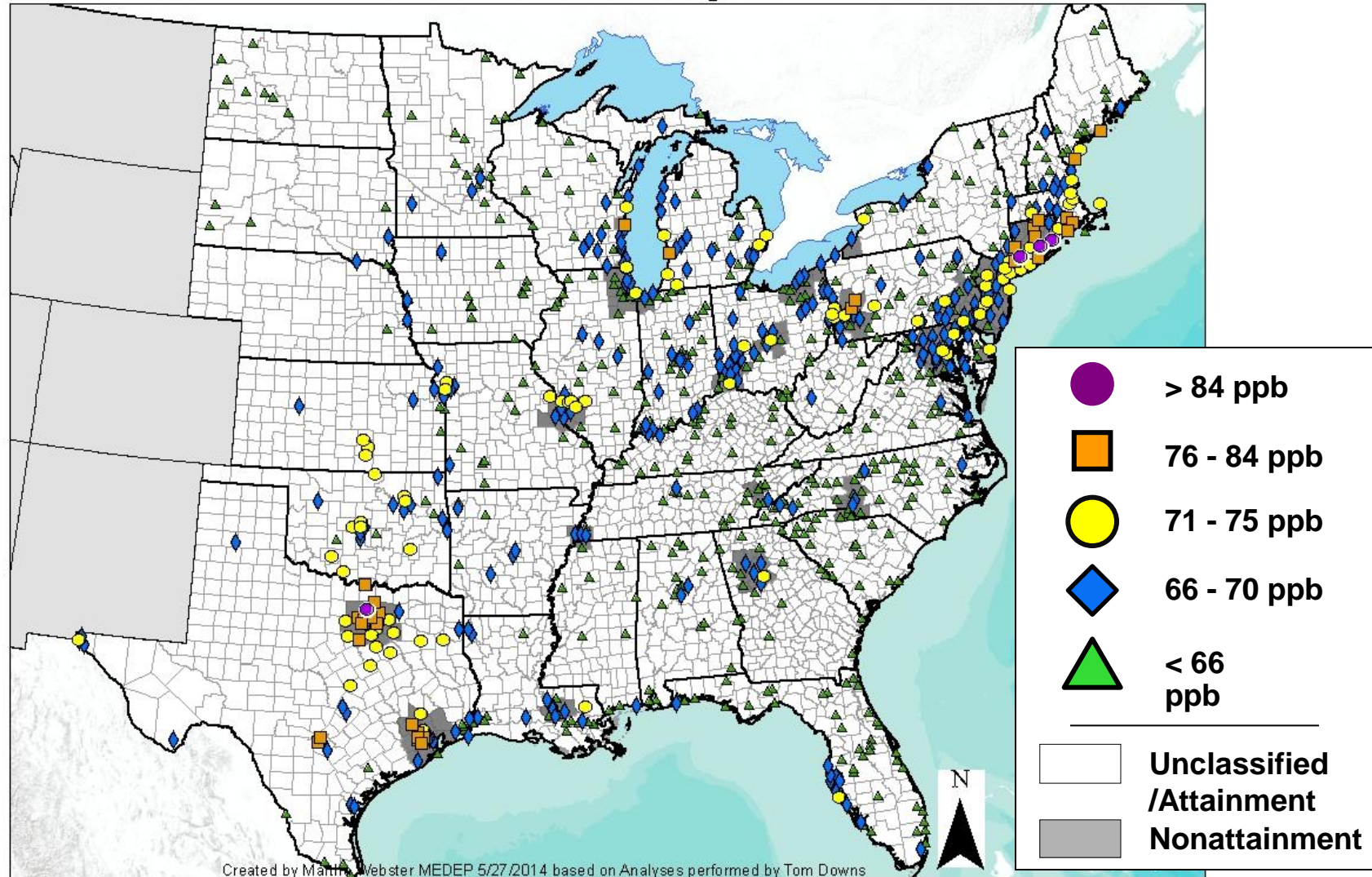
Inter RPO Workgroup Scenarios

- High/Low Gas
 - Examines EIA's projections of the effect of high and low gas prices on the fuel mix
 - Currently being reviewed by the workgroup
- MATS
 - Examines meeting MATS through different technologies and retirement criteria
 - Five scenarios were completed and reviewed
 - After receiving stakeholder feedback, many sources appear to be using the option of measurement rather than installing scrubbers
 - Workgroup found that the reference case best represents MATS

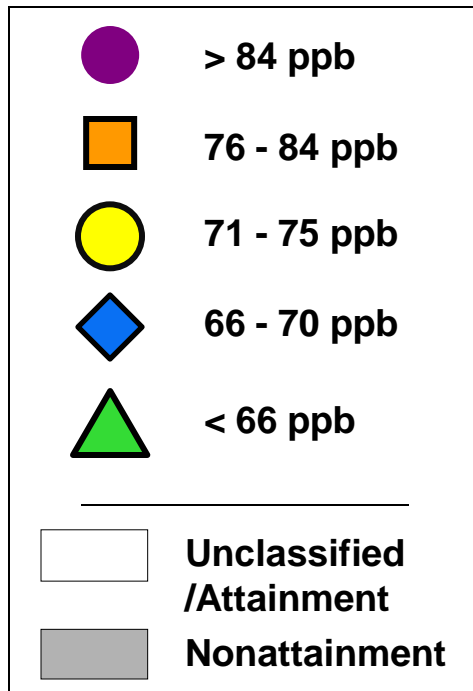
Questions

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- Emissions Inventory Lead:
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- OTC Committee Lead:
 - Joseph Jakuta
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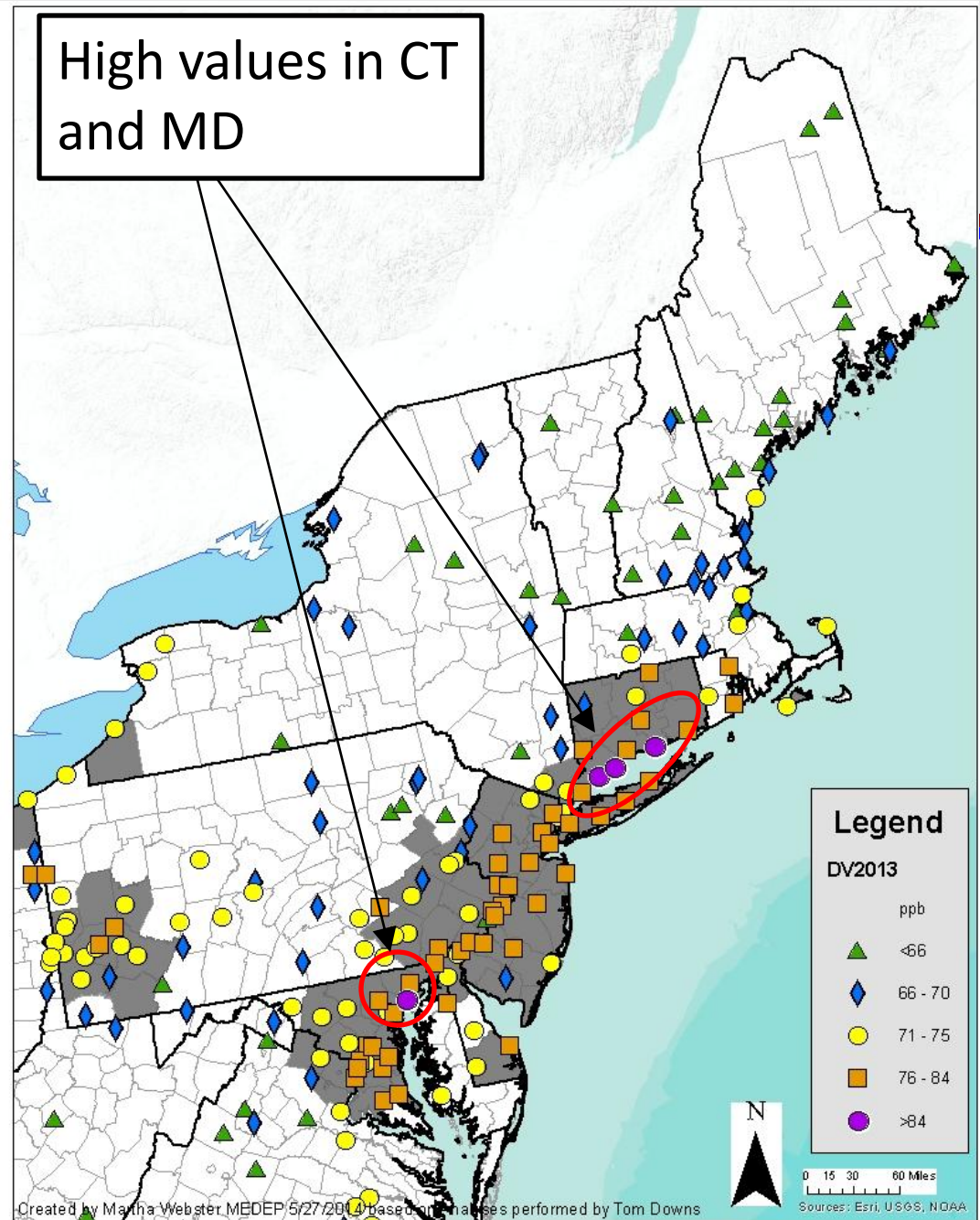
Preliminary 2013 Ozone 4th Highest 8-hr Value



Preliminary 2013 Ozone Design Values



3-Year average of the 4th high concentration for 2011, 2012, 2013

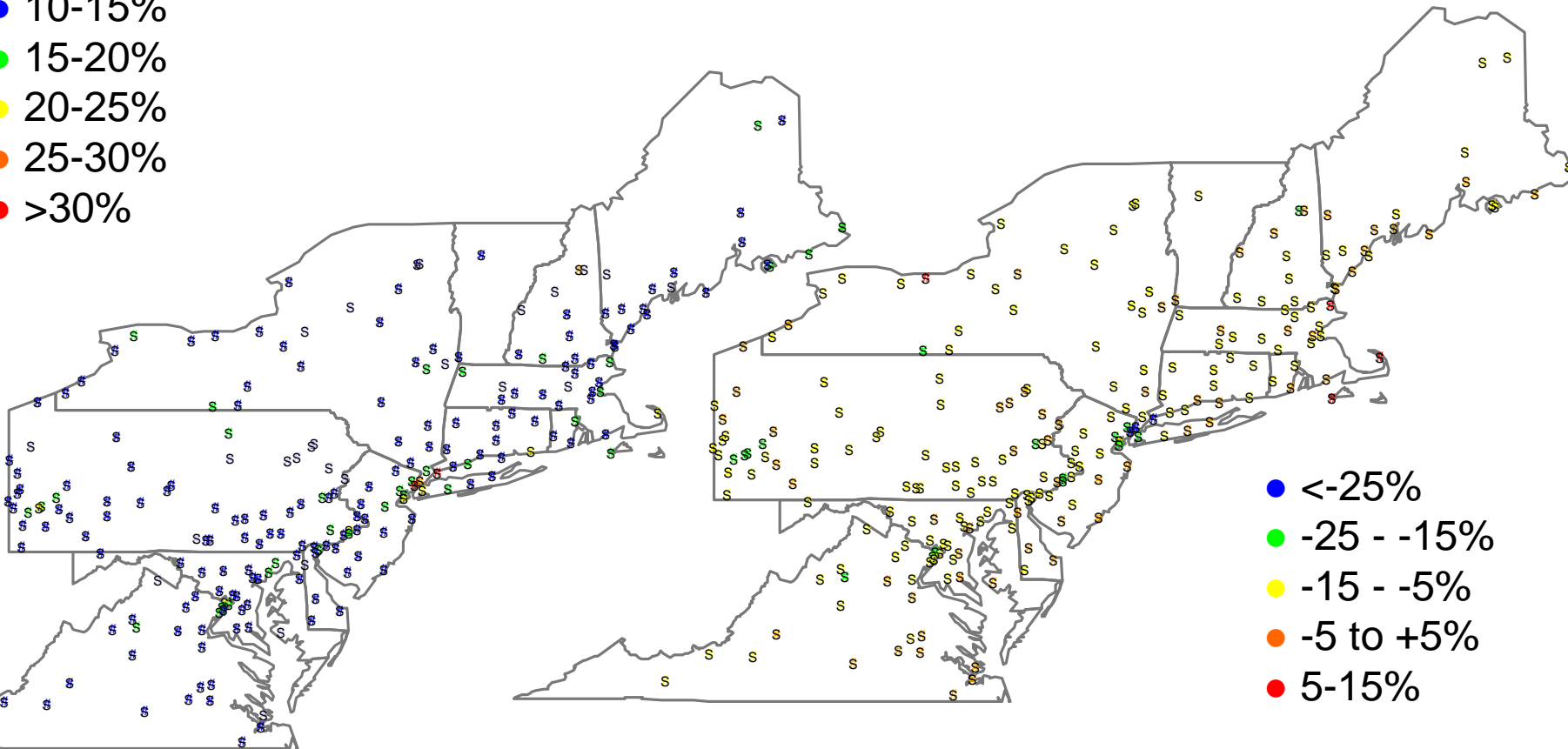


Mean fractional error, 4/16-10/30

- <10%
- 10-15%
- 15-20%
- 20-25%
- 25-30%
- >30%

Mean fractional bias, 4/16-10/30

- <-25%
- -25 - -15%
- -15 - -5%
- -5 to +5%
- 5-15%



223 of 225 sites had MFE < 30%

206 of 225 sites had -15%<MFB<15%