

An aerial photograph of a sunset over a vast sea of clouds. The sun is on the left, partially obscured by a bright glow, with rays of light extending across the sky. The clouds below are illuminated from the side, creating a textured, undulating surface of light and shadow. The sky transitions from a pale yellow near the horizon to a deep blue at the top.

OTC Modeling Committee Update

April 11, 2019

2015 Ozone NAAQS Planning Timeline

October 2015
Final 2015 Ozone NAAQS



July 2018
Designations Complete



October 2018
Infrastructure and Good Neighbor SIPs Due



August 2020 RACT Emission Statement SIP



August 2021
Nonattainment SIPs Due

Monitoring for 2018-2020

Monitoring for 2021-2023

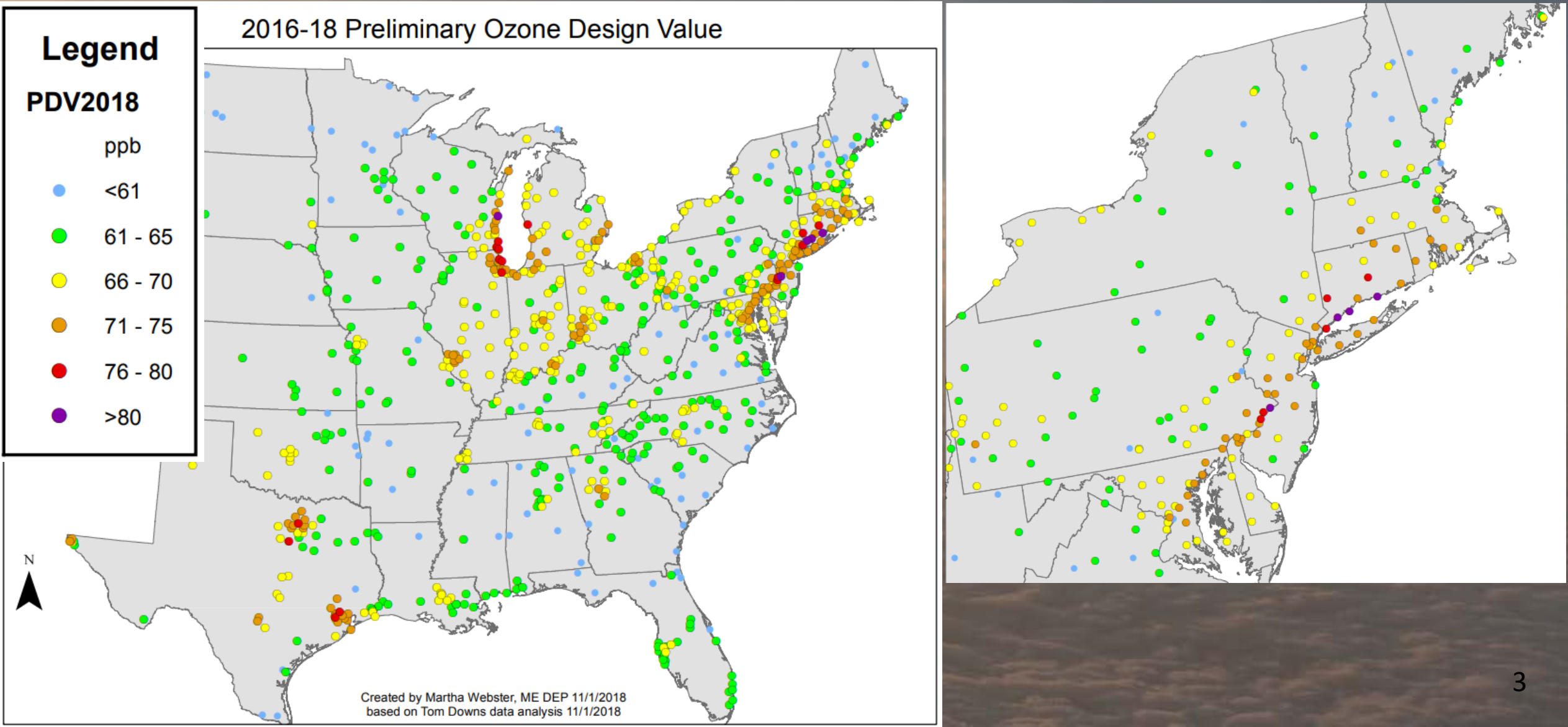


August 2021 Marginal Attainment



August 2024 Moderate Attainment

2016-2018 Preliminary Design Values



2015 8-Hour Ozone NAAQS Designations

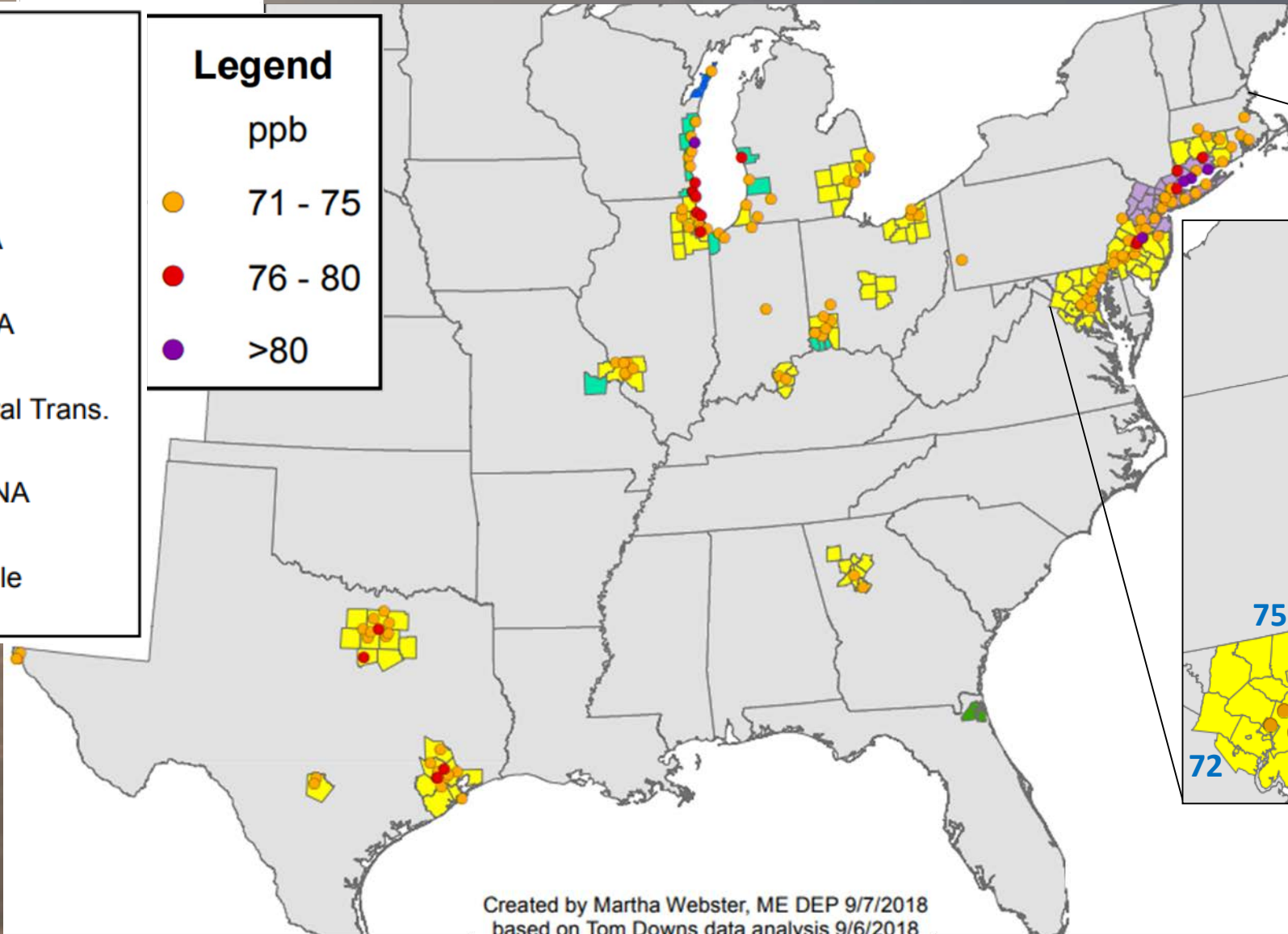
Legend

Designations

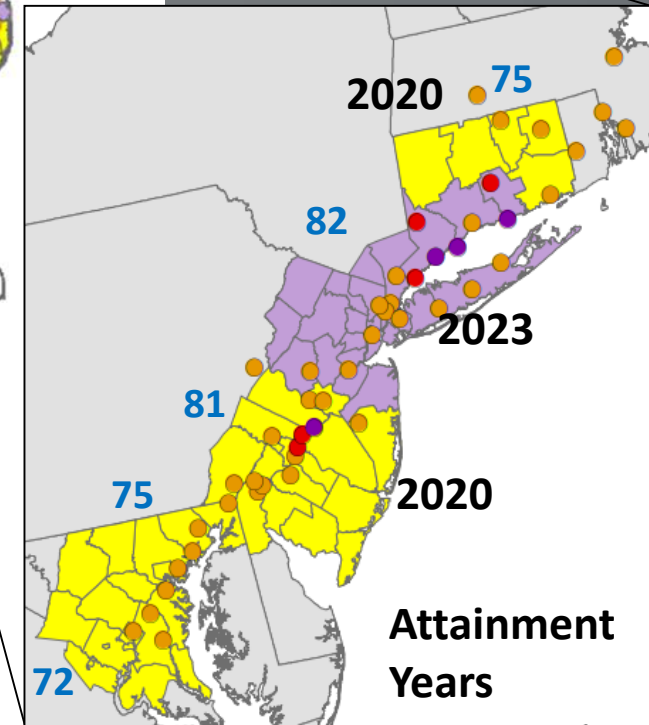
2020	Marginal NA
2023	Moderate NA
	P Marg. Rural Trans.
2020	P Marginal NA
	Unclassifiable

Legend

ppb	
71 - 75	●
76 - 80	●
>80	●

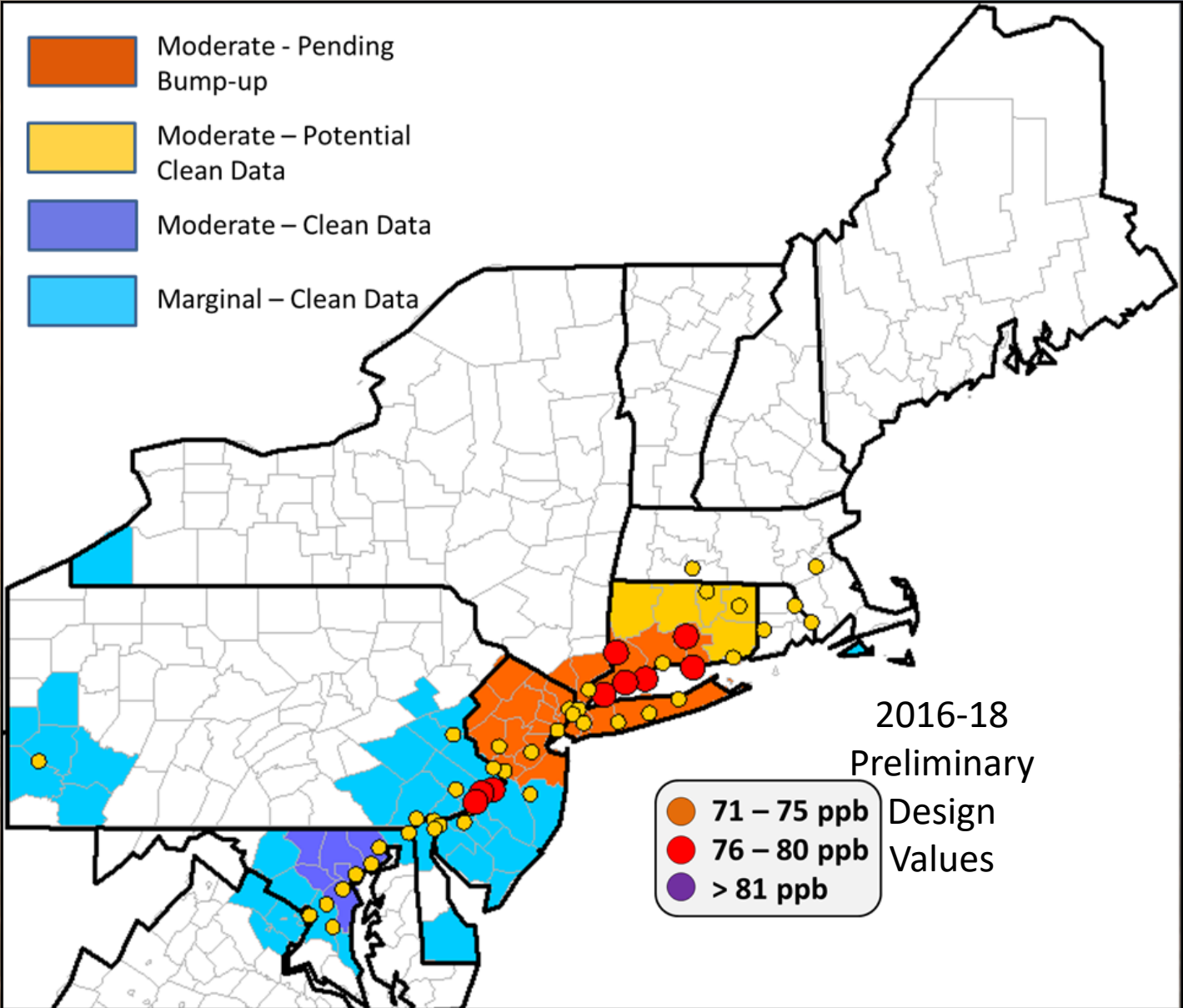


With 2016-18 Preliminary Design Values

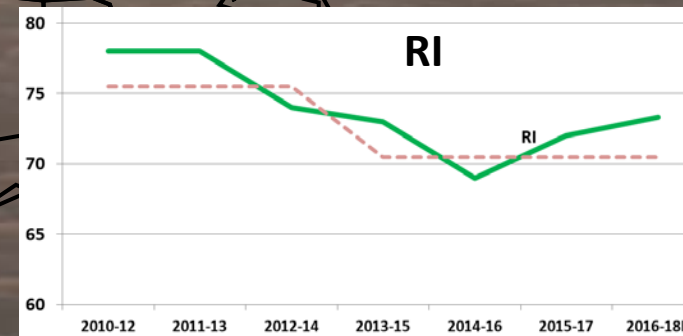
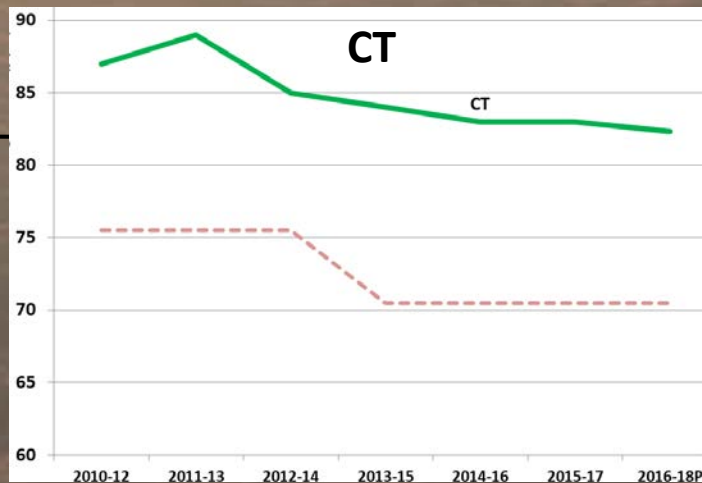
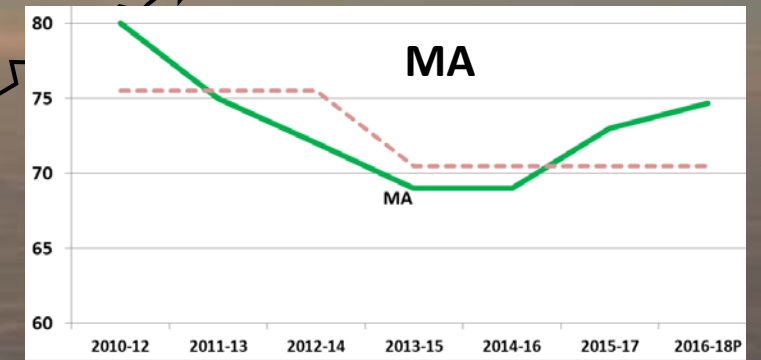
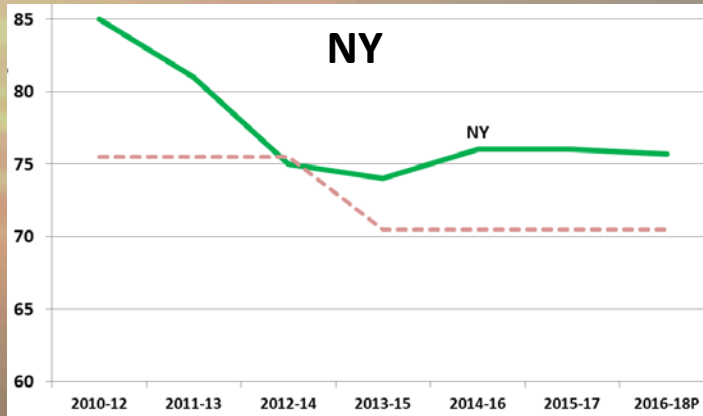
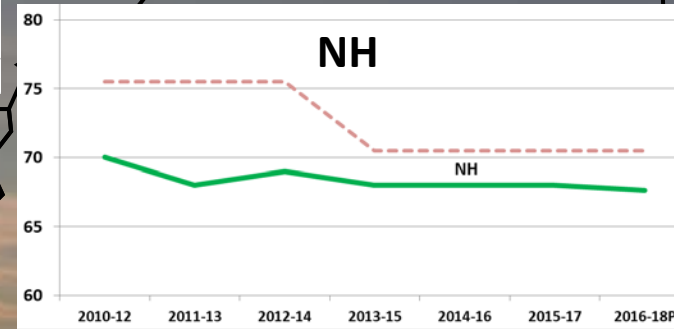
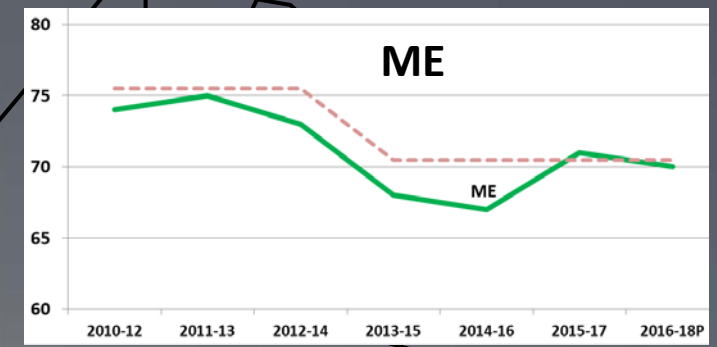
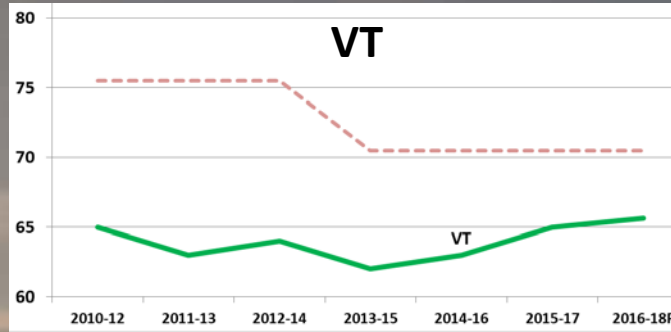


Note: Attainment is due by April of 2021 and 2024, effectively including data only through 2020 and 2023.

Nonattainment Areas – 2008 Ozone NAAQS

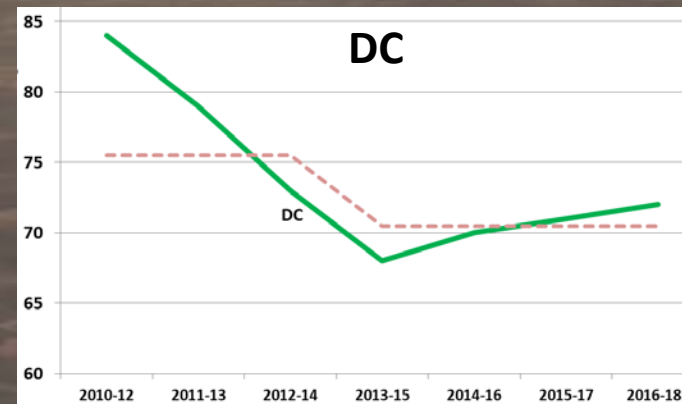
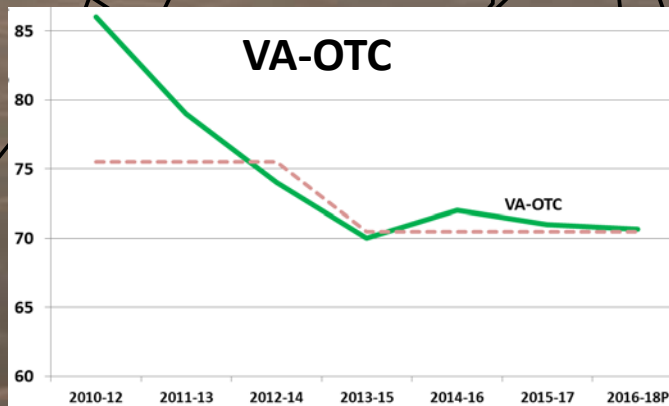
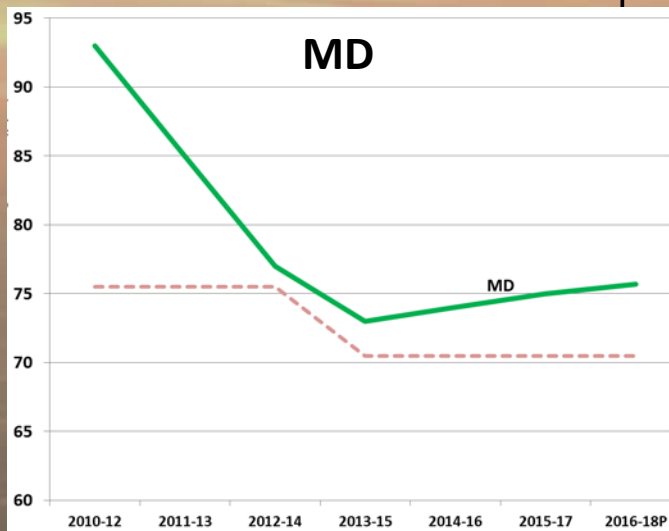
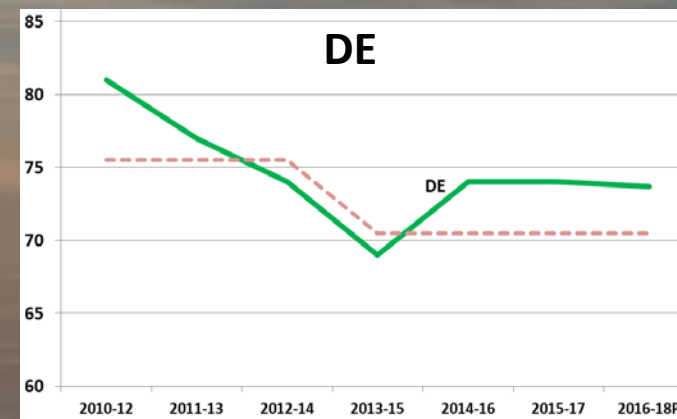
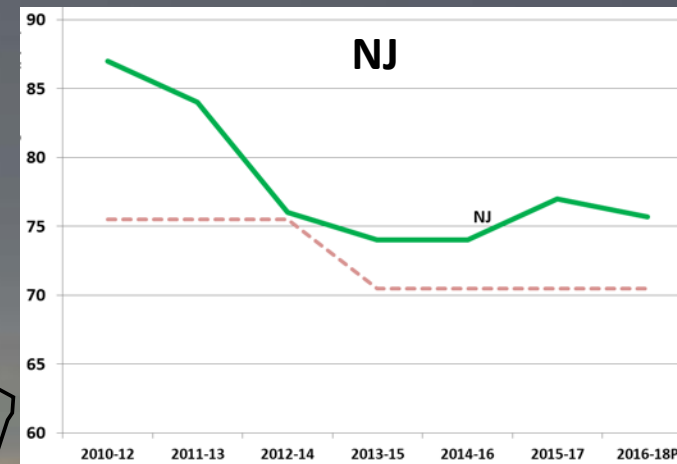
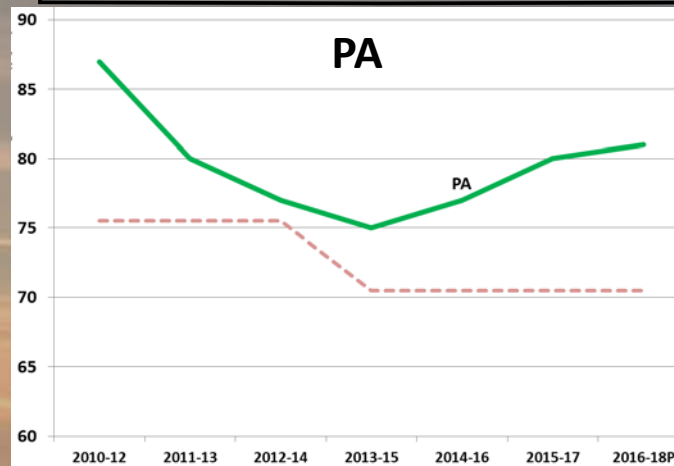
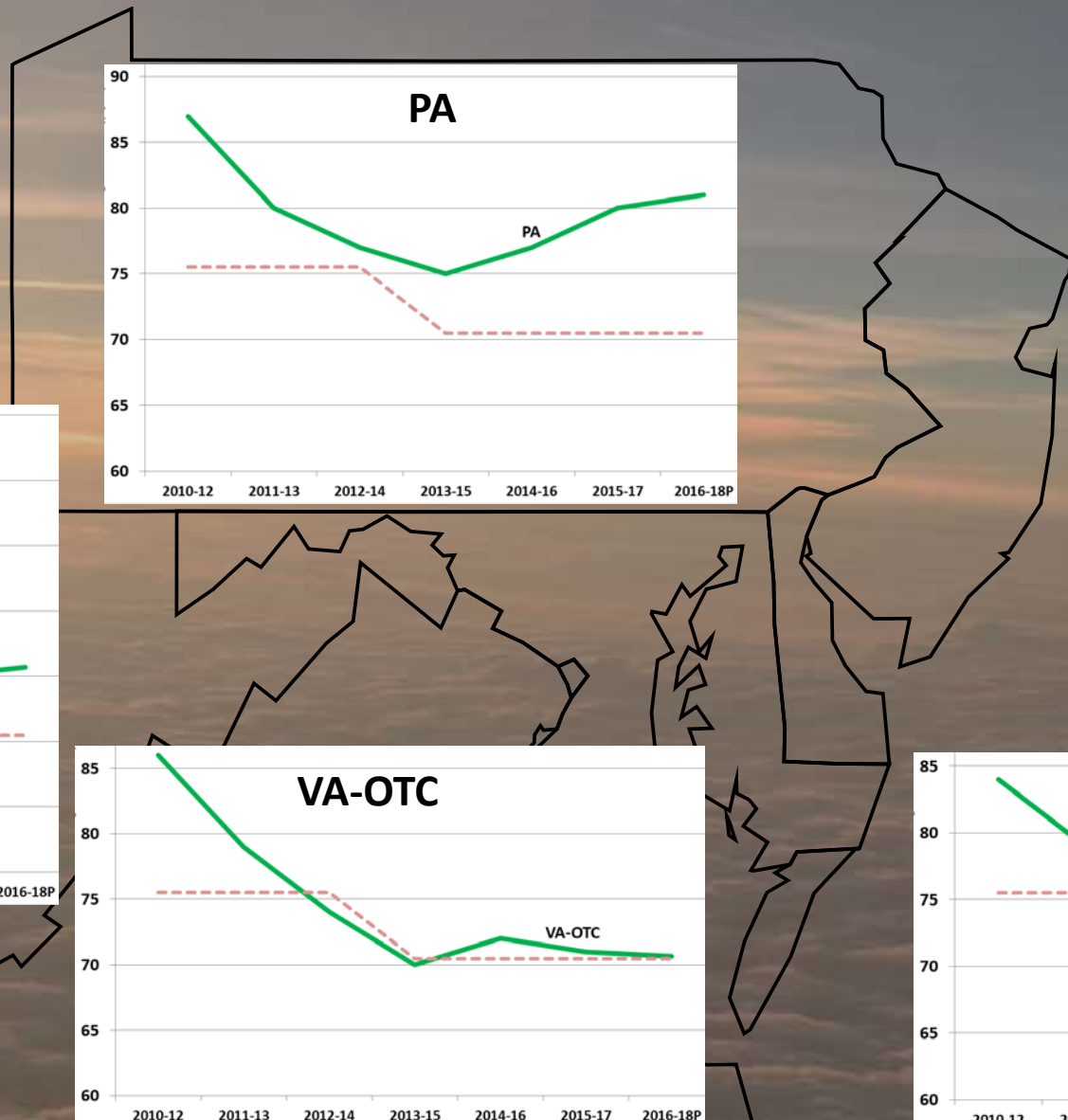


Trends



2016-18 Design Values are Preliminary

Trends

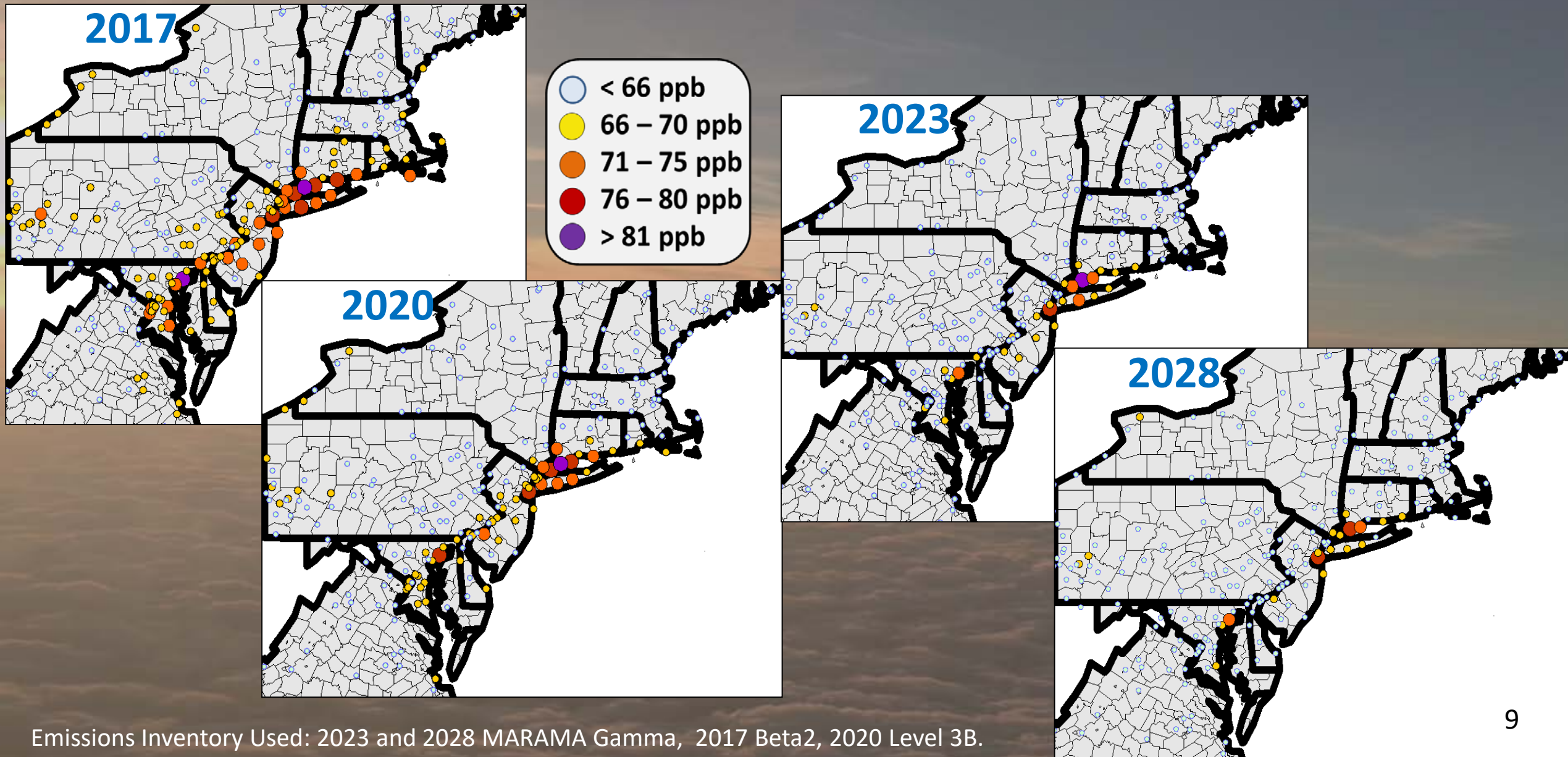


2016-18 Design Values are Preliminary

An aerial photograph of a vast, textured landscape, possibly a desert or a large-scale agricultural field, under a dramatic sunset sky. The sun is on the left, casting a bright glow and long, soft shadows across the terrain. The sky transitions from a deep orange near the horizon to a pale blue at the top. The ground below is covered in a dense, repeating pattern of small, rounded mounds or hills, creating a textured, undulating surface.

Ozone Modeling Completed

OTC 2011 Platform Ozone Modeling Results (CMAQ)



Emissions Inventory Used: 2023 and 2028 MARAMA Gamma, 2017 Beta2, 2020 Level 3B.

OTC and MANE-VU BenMap Papers

Benefits Mapping and Analysis Program (BenMAP) Community Edition (CE) program application.

1. Ozone Rollback studies consider recent monitoring data and the benefits associated with artificially reducing values over three thresholds to those thresholds (70, 65 and 40ppb).
2. MANE-VU Ask Modeling study considers the modeled changes in 2028 PM_{2.5} and ozone that could result from full implementation of the MANE-VU Ask.

Modeled incident rates are documented in the papers and are consistent with the approach used by EPA.

BenMap Studies

Rollback Studies

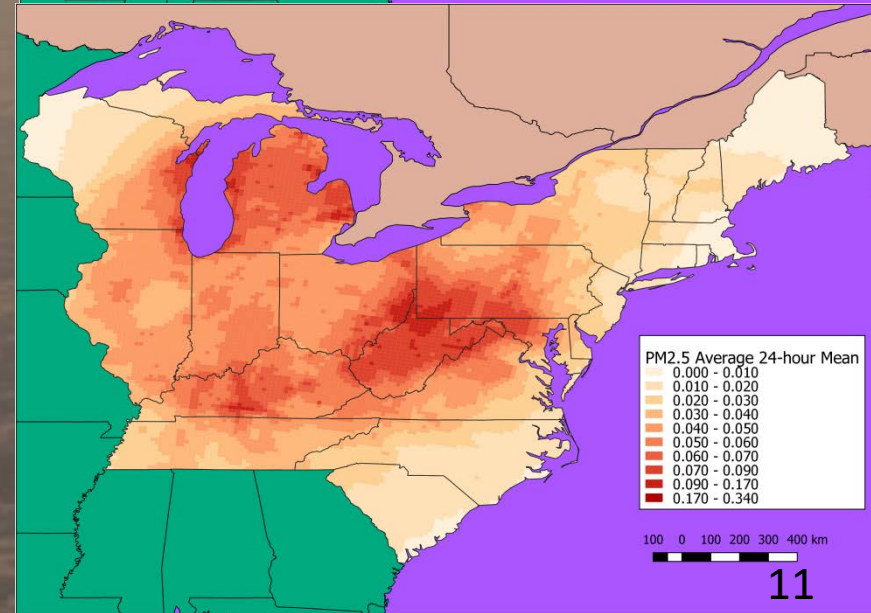
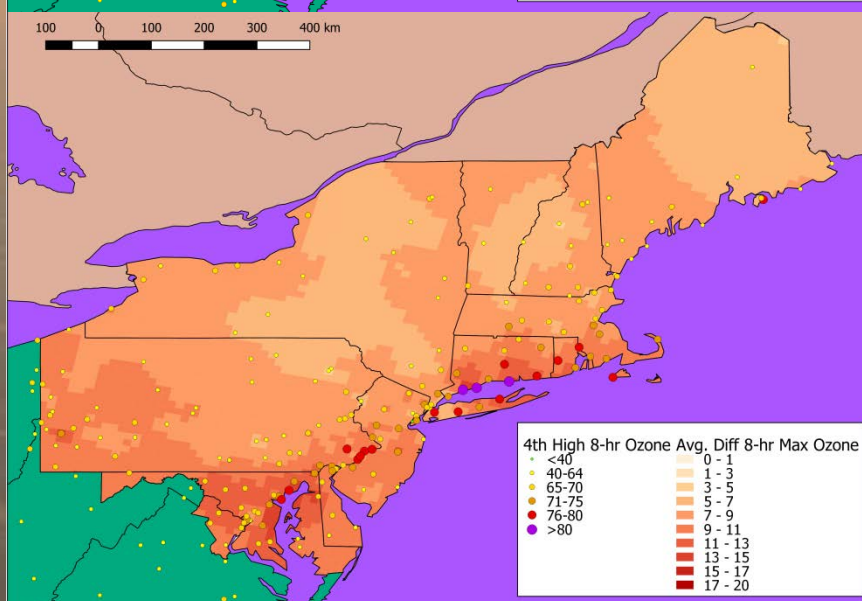
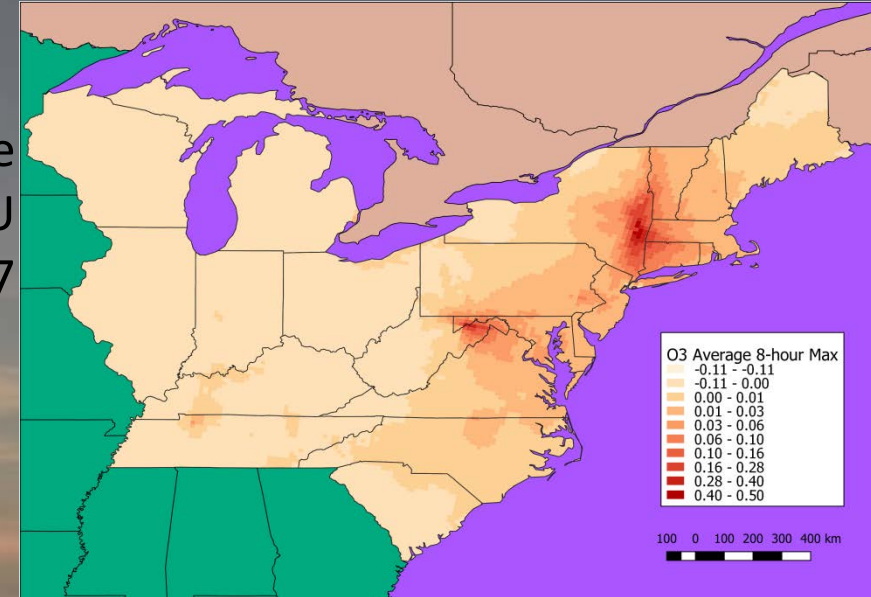
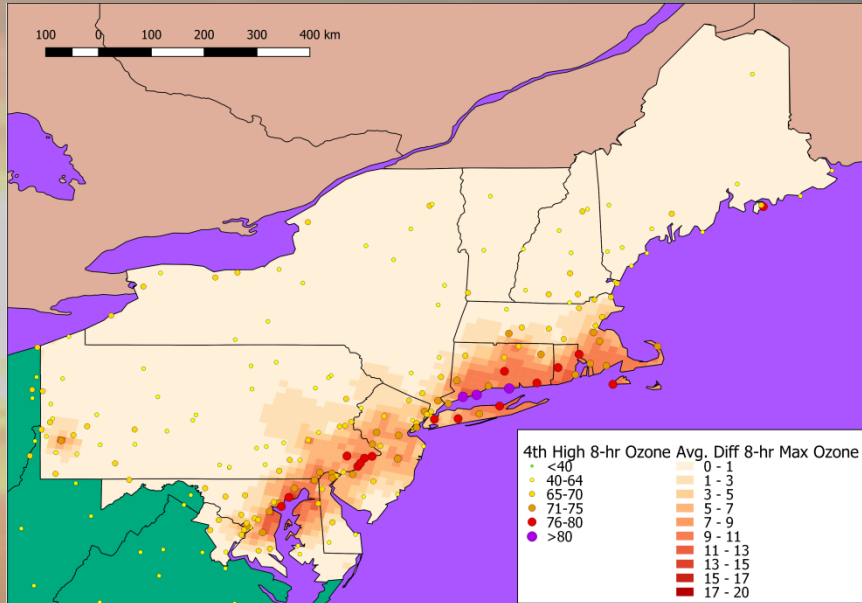
MANE-VU Ask

Ozone Rollback
to 70ppb for
2017

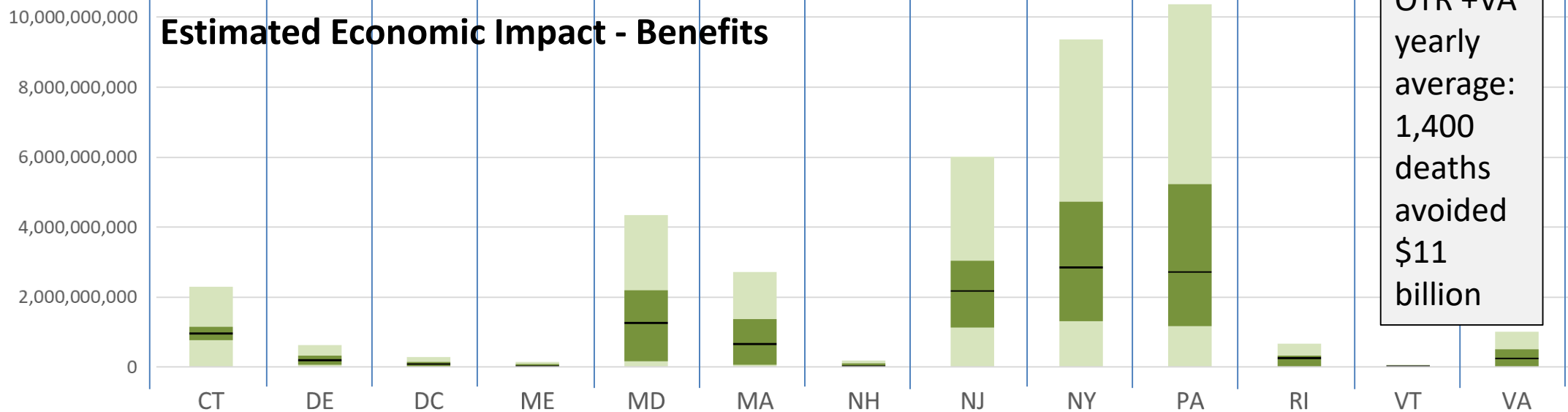
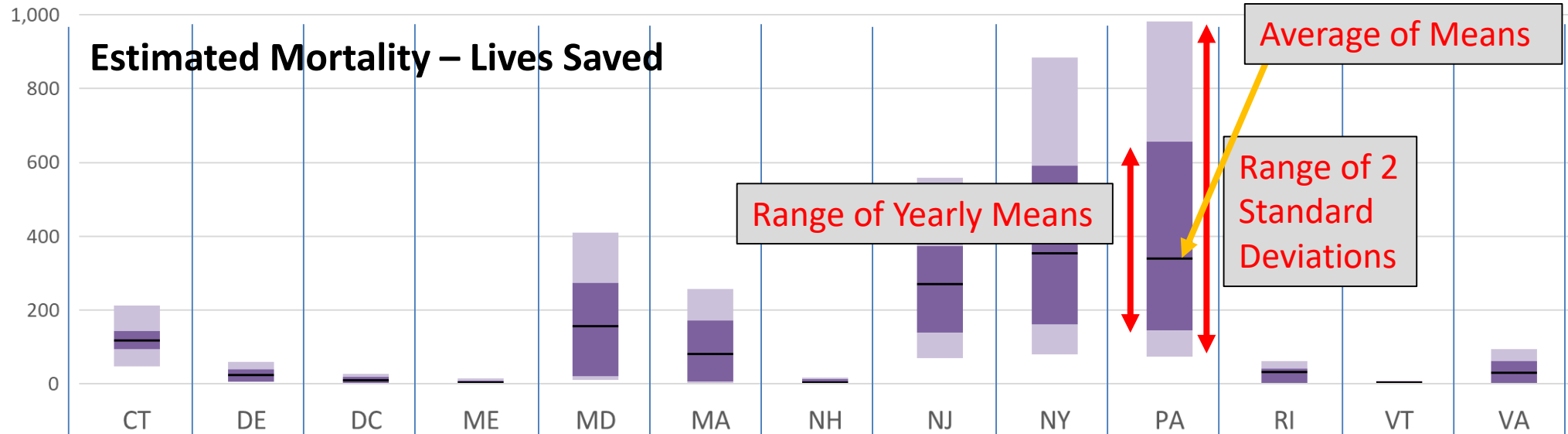
Ozone change
due to MANE-VU
Ask for 2017

Ozone Rollback
to 40ppb for
2017

PM_{2.5} change
due to MANE-VU
Ask for 2017

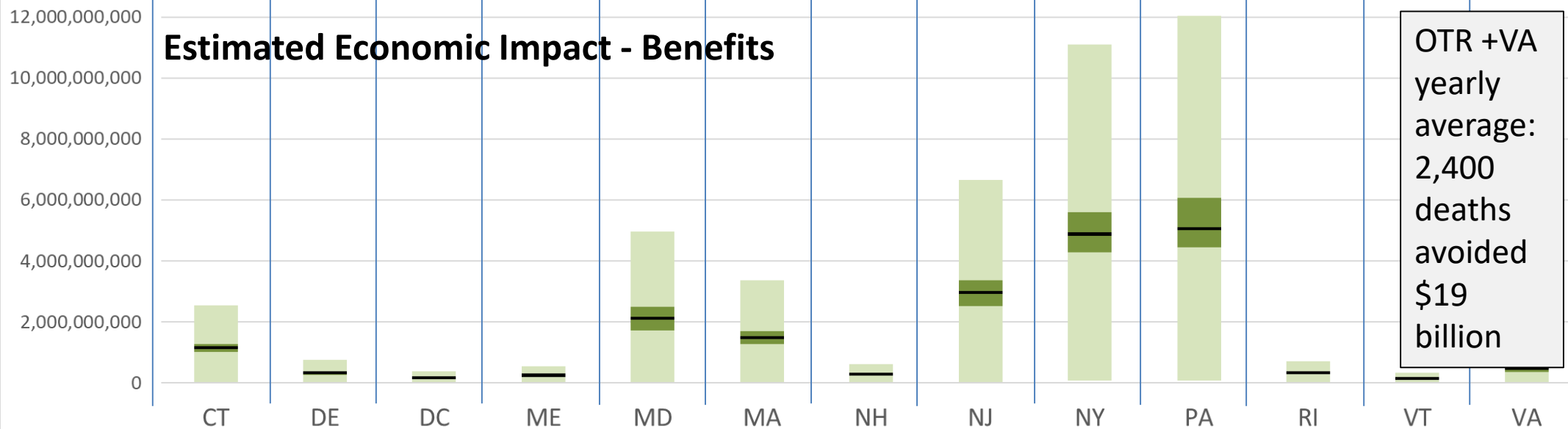
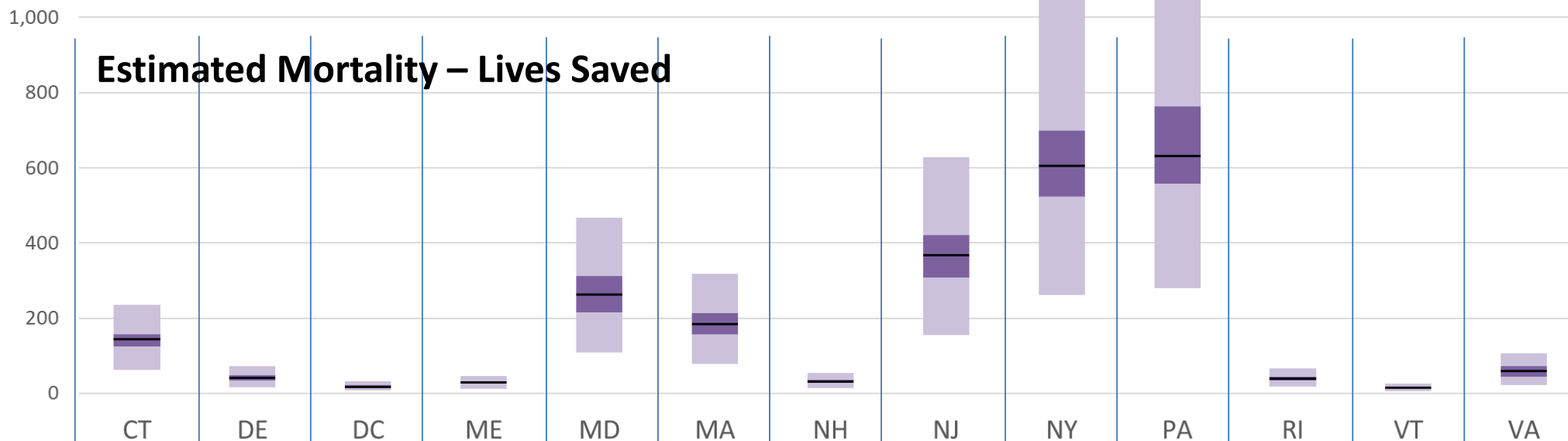


70 ppb Rollback Benefits



7 Years Modeled 2011-17

40 ppb Rollback Benefits



OTR +VA
yearly
average:
2,400
deaths
avoided
\$19
billion

7 Years
Modeled
2011-17

MANE-VU Ask Benefits

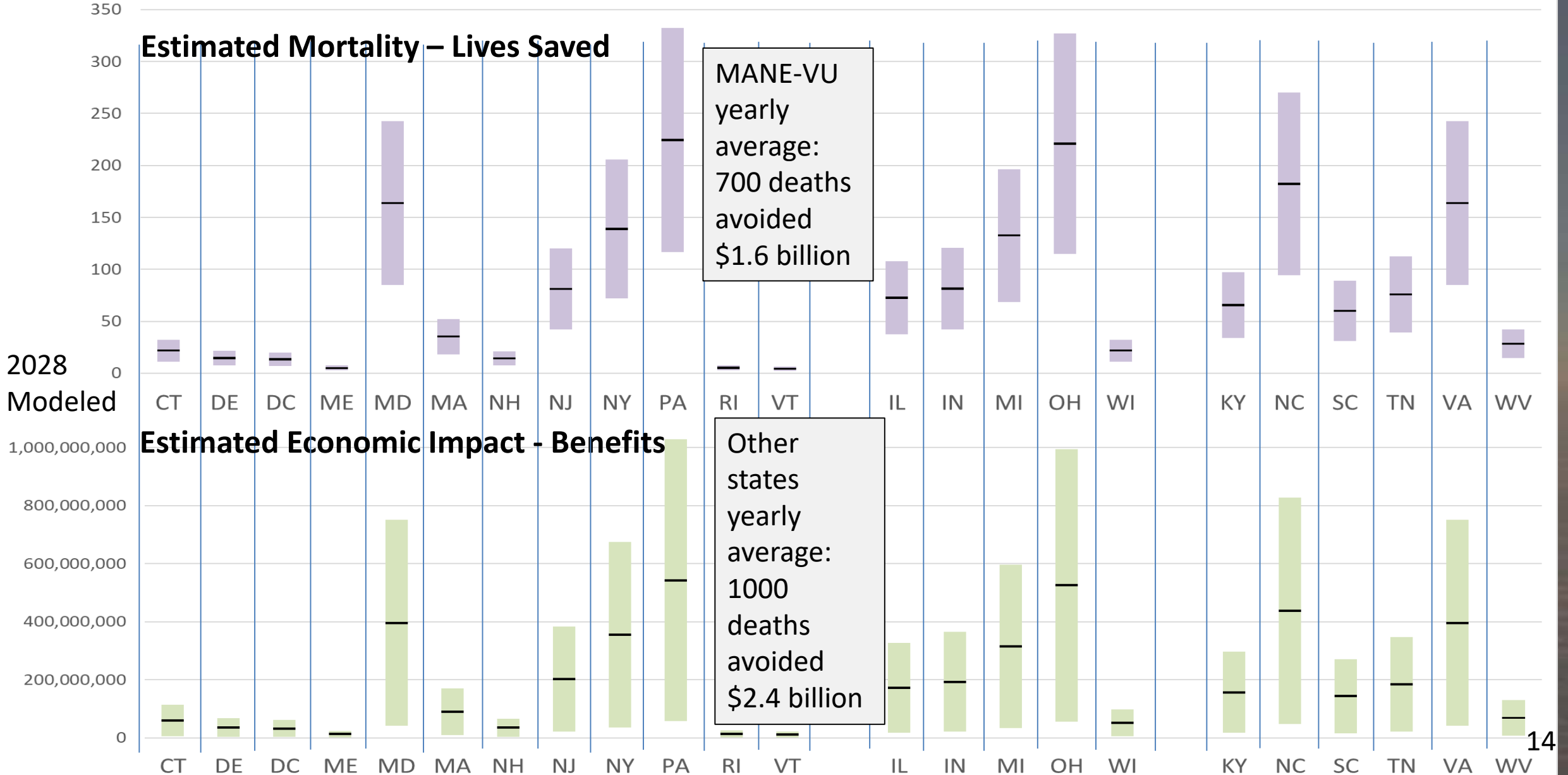
Estimated Mortality – Lives Saved

MANE-VU
yearly
average:
700 deaths
avoided
\$1.6 billion

Estimated Economic Impact - Benefits

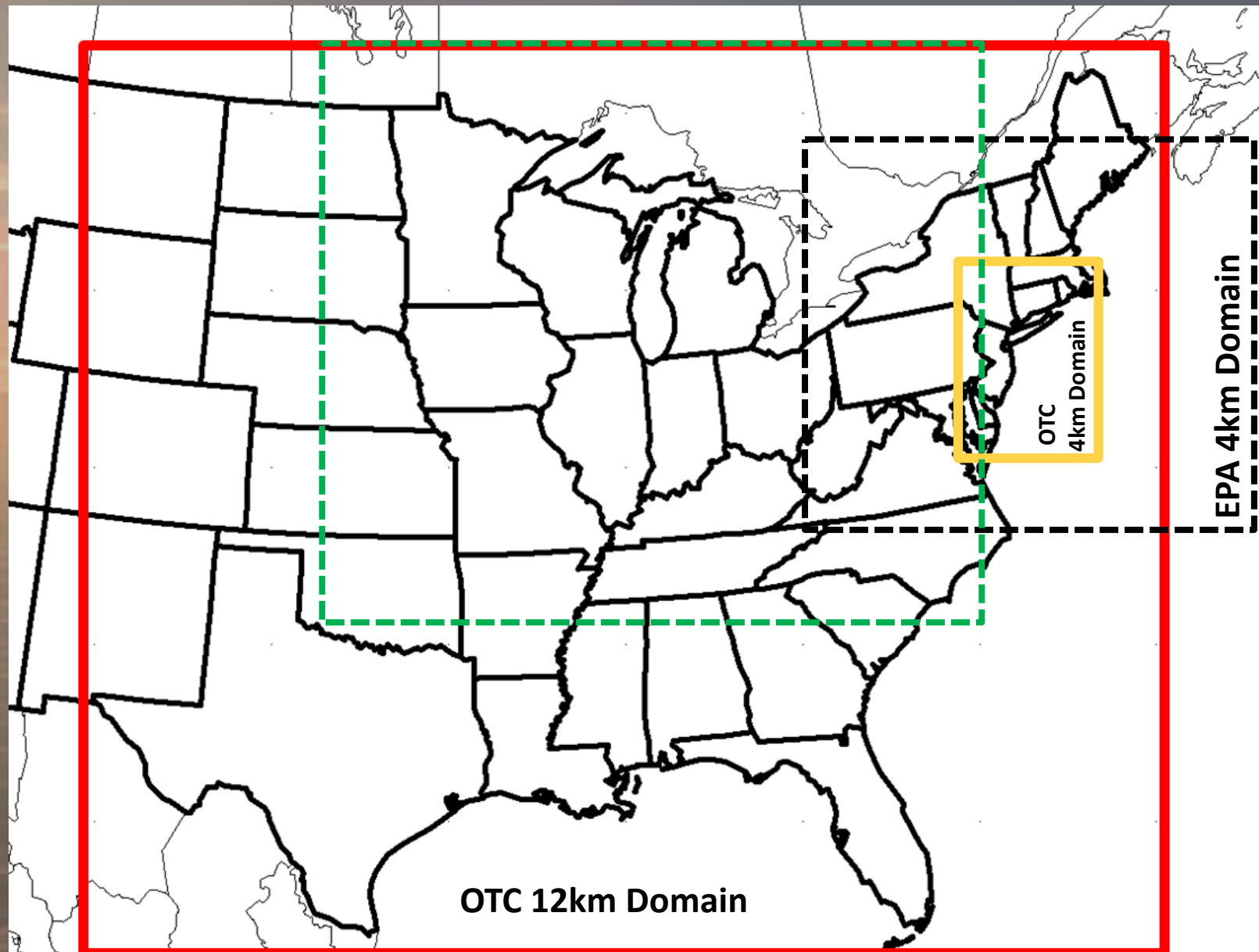
Other
states
yearly
average:
1000
deaths
avoided
\$2.4 billion

2028
Modeled



New 2016 Based Platform Development

Proposed Modeling Domains



MARAMA's Inventory Activities

Funded through July	Proposing funding via amendment	New MANE VU Grant	
✓	✓	✓	Continue coordination
			•ERTAC EGU / NE Emission Leads / Committee coordination
✓	✓	✓	2016 Growth & Control tool
	✓	✓	2020 projected inventory
	✓	✓	Control case projections: beyond "on the books"
	✓	✓	ERTAC EGU expanded capabilities
			•scope expanded capabilities - including code on cloud, additional funding would be required to implement, probably next grant
			•Lead and document creation of v16.1
	✓	✓	Training
			•ERTAC EGU / BenMAP / EMF
		✓	Inventory improvements
			•CMV / mobile sources
	✓	✓	Develop strategy inventories - some possible examples
			•Nonroad inventory modeling & control strategies
			•Impact of RGGI on emission inventory
		✓	Other projects will be scoped

ERTAC EGU Leadership

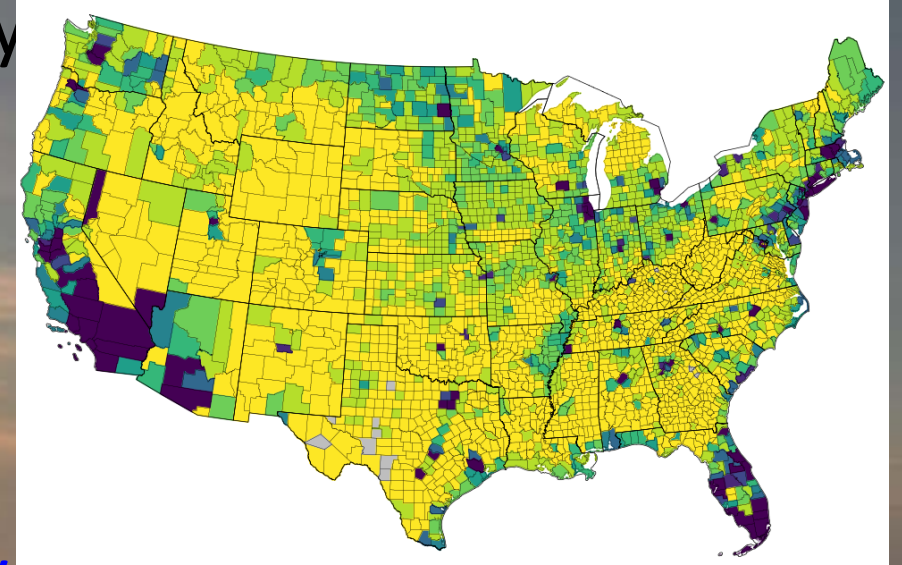
- Runs with new inputs from CONUSv16.0 complete
 - Current version: v16.0/beta
 - Projections: 2020, 2023, 2028
 - CSAPR-compliant, meet state assurance levels
 - Minor updates to v16.0 expected for 2016 v1
 - SE growth factors will be revised
- Focus on training through the summer
- Expect to develop v16.1 by Fall 2019
 - State outreach
 - Updated growth factors (all)
 - Updated shutdowns, controls



<http://www.vnf.com/207218>

2016 Inventory Collaborative Update

- 2016 beta platform released in March, ready for modeling
- Fully-updated 2016 v1 w/complete 2023 & 2028 projected emissions Summer 2019
- wiki to collaborate: EPA/RPOs/States

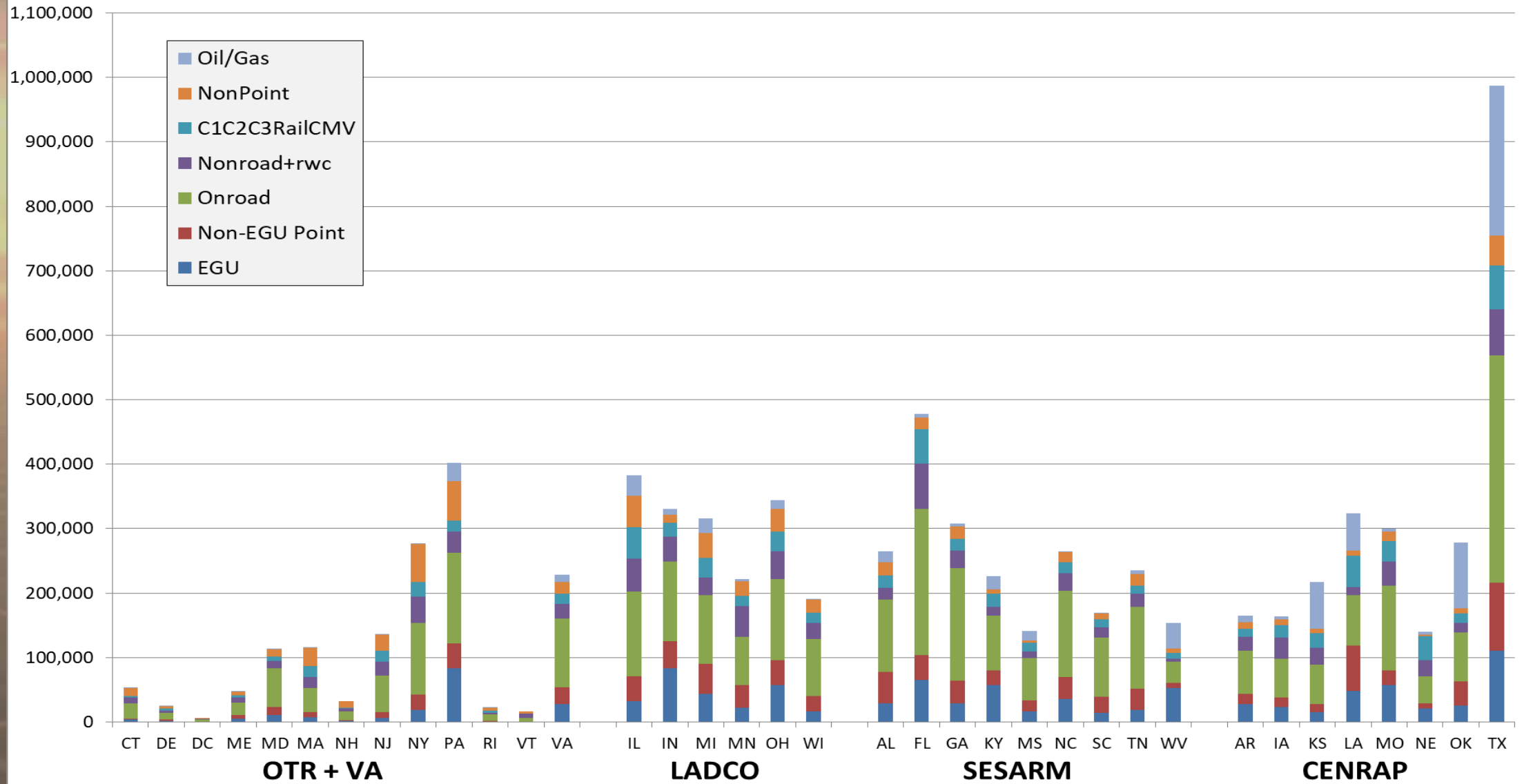


<http://views.cira.colostate.edu/wiki/wiki/9169>

- MARAMA's roles:
 - Co-leading EGU, onroad workgroups; participating in CMV, oil & gas growth workgroup
 - Collaborating with EPA to build growth & control factors
 - Preparing growth & control factors for the MARAMA modeling region

2016 Base Case NOx Emissions – EPA Beta

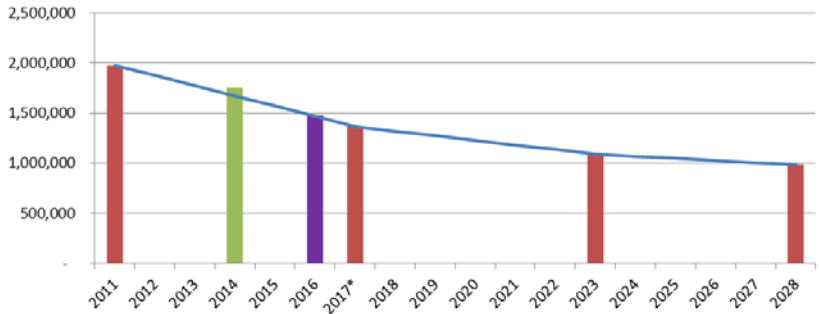
EPA 2016 Beta NOx Emission Inventory by Sector



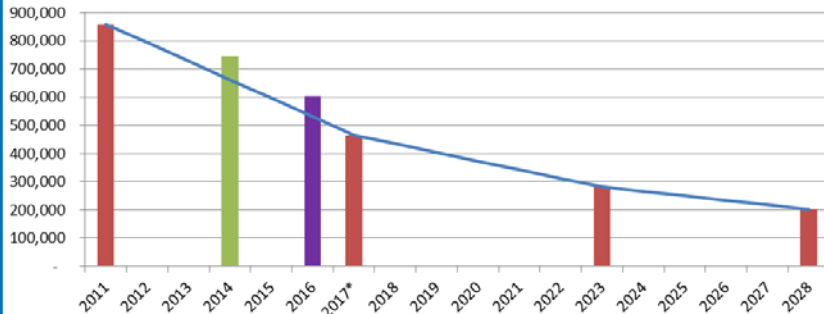
NOx - EPA 2016 Beta vs MARAMA 2017 Beta2

(Tons per year)

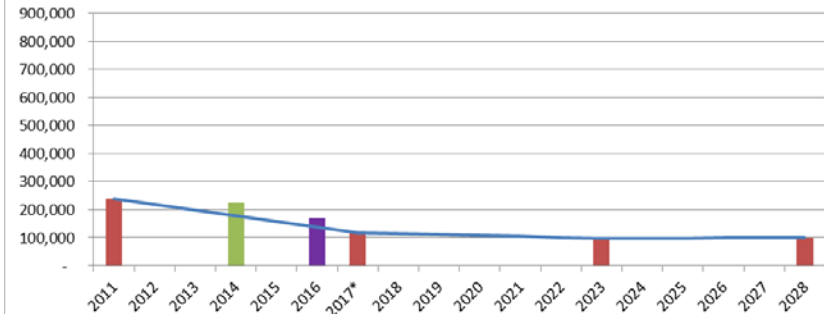
OTR+VA Total NOx Emissions



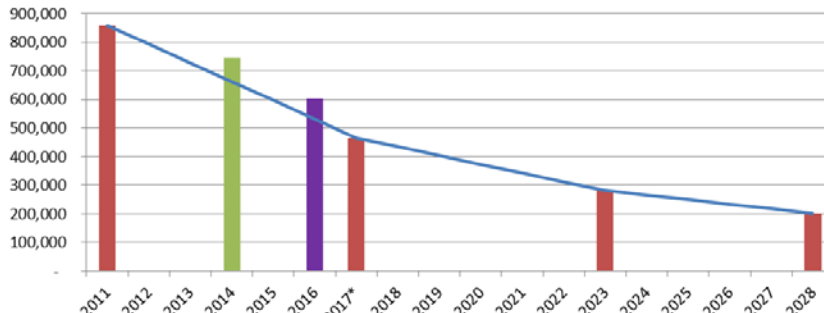
OTR+VA OnRoad NOx Emissions



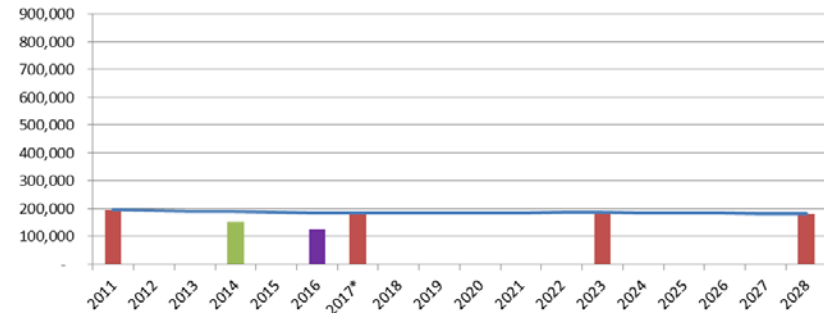
OTR+VA EGU NOx Emissions



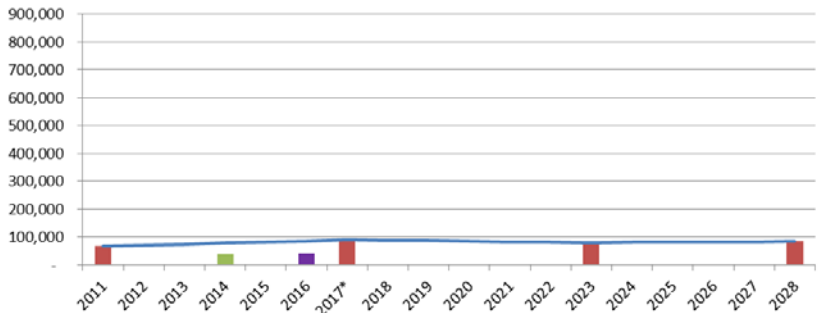
OTR+VA NonRoad NOx Emissions



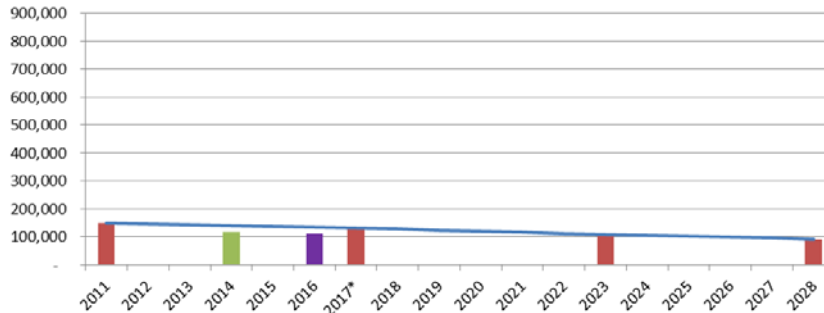
OTR+VA Non-EGU NOx Emissions



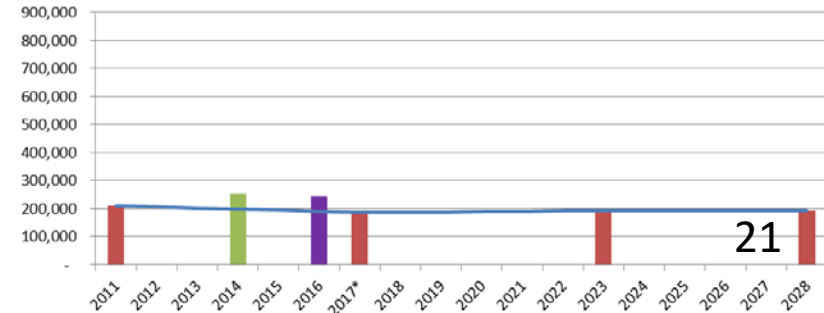
OTR+VA Oil&Gas NOx Emissions



OTR+VA C1C2C3RailCMV NOx Emissions

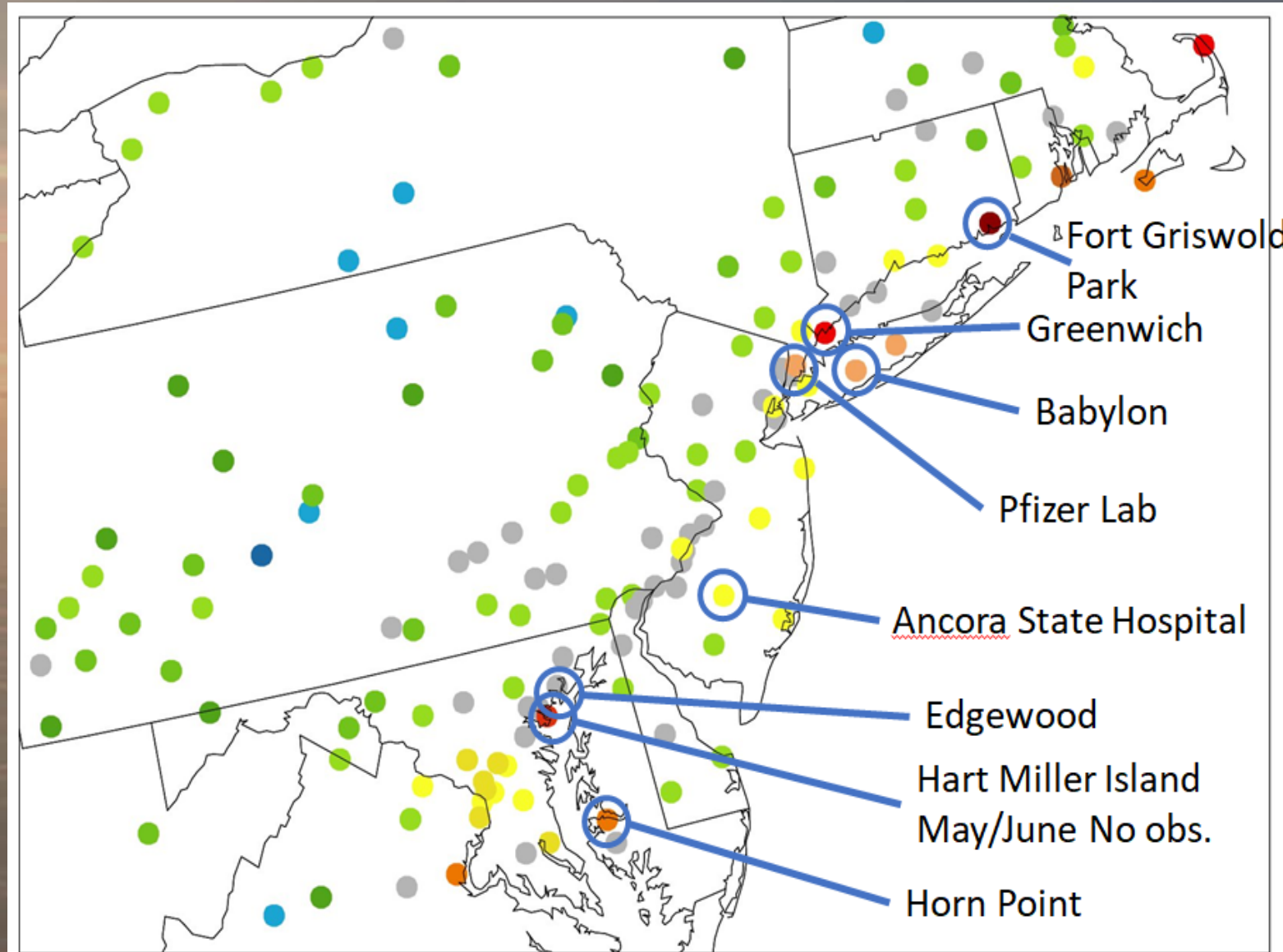


OTR+VA NonPoint NOx Emissions



2016 CMAQ Modeling Performance

with EPA 2016 Alpha Emissions



2016 Platform Performance Summary

- CMAQ5.2.1 run with 2016fd emissions with Old OTC Domain
- Overall, ozone underpredicted in May and June, and overpredicted in July and August
- Ozone overpredicted in the coastal areas and along the I-95 corridor in the OTR region

Tentatively Planned Modeling

- SIP required modeling
- Peak ozone day analyses
 - Peaking and load-following on HEDD
 - Gas pipeline compressors
- Heavy duty diesel standards
- Updated contribution modeling

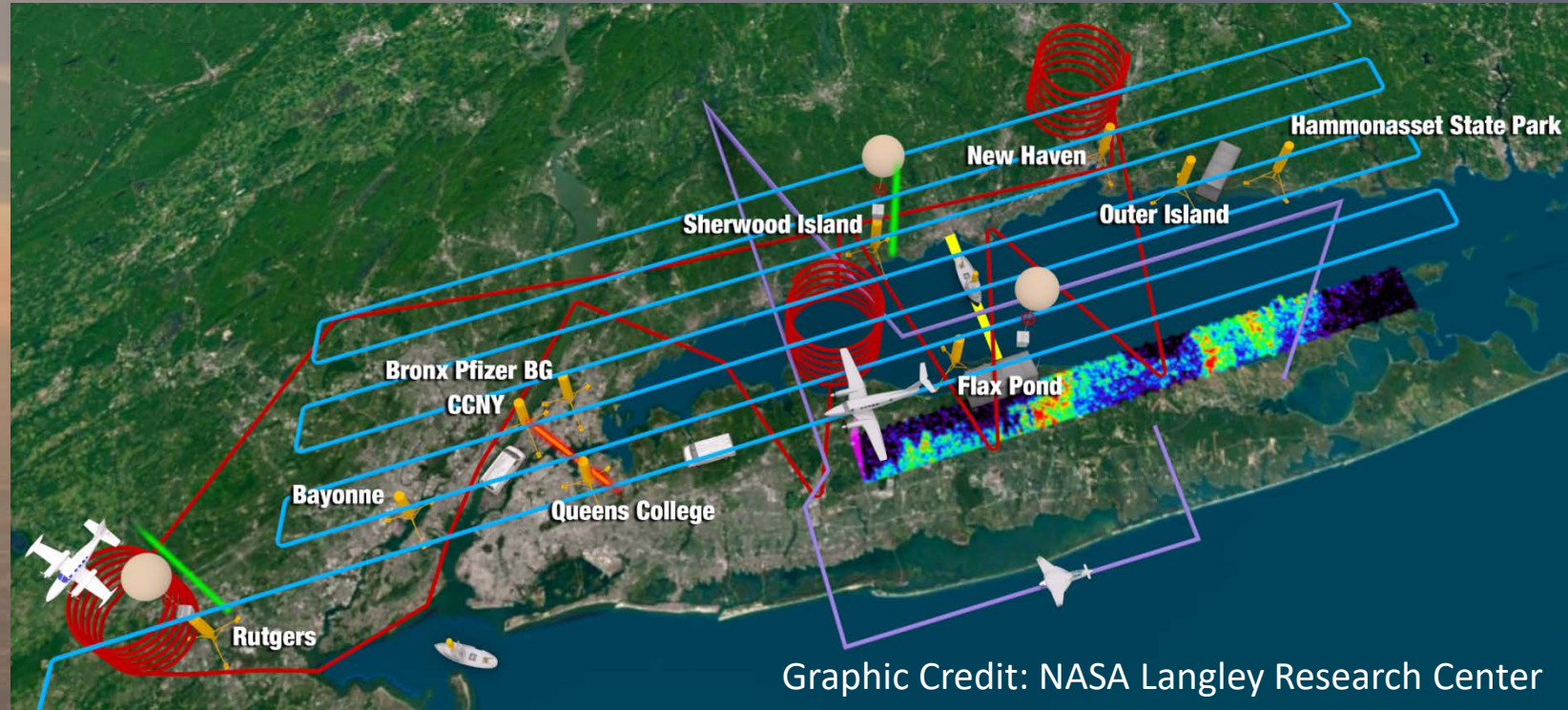
Regional Monitoring Intensives

The background image is an aerial photograph of a vast, flat landscape, likely a coastal plain or a large agricultural field. The terrain is covered in a dense, textured pattern of small, rounded mounds or patches, possibly vegetation or soil. The sky is a mix of soft, hazy colors, ranging from pale blue to light orange and yellow, suggesting a sunrise or sunset. A bright sun is visible on the left side of the frame, creating a strong glow and casting long, soft shadows across the landscape. The overall atmosphere is serene and expansive.

LISTOS – Long Island Sound Tropospheric Ozone Study

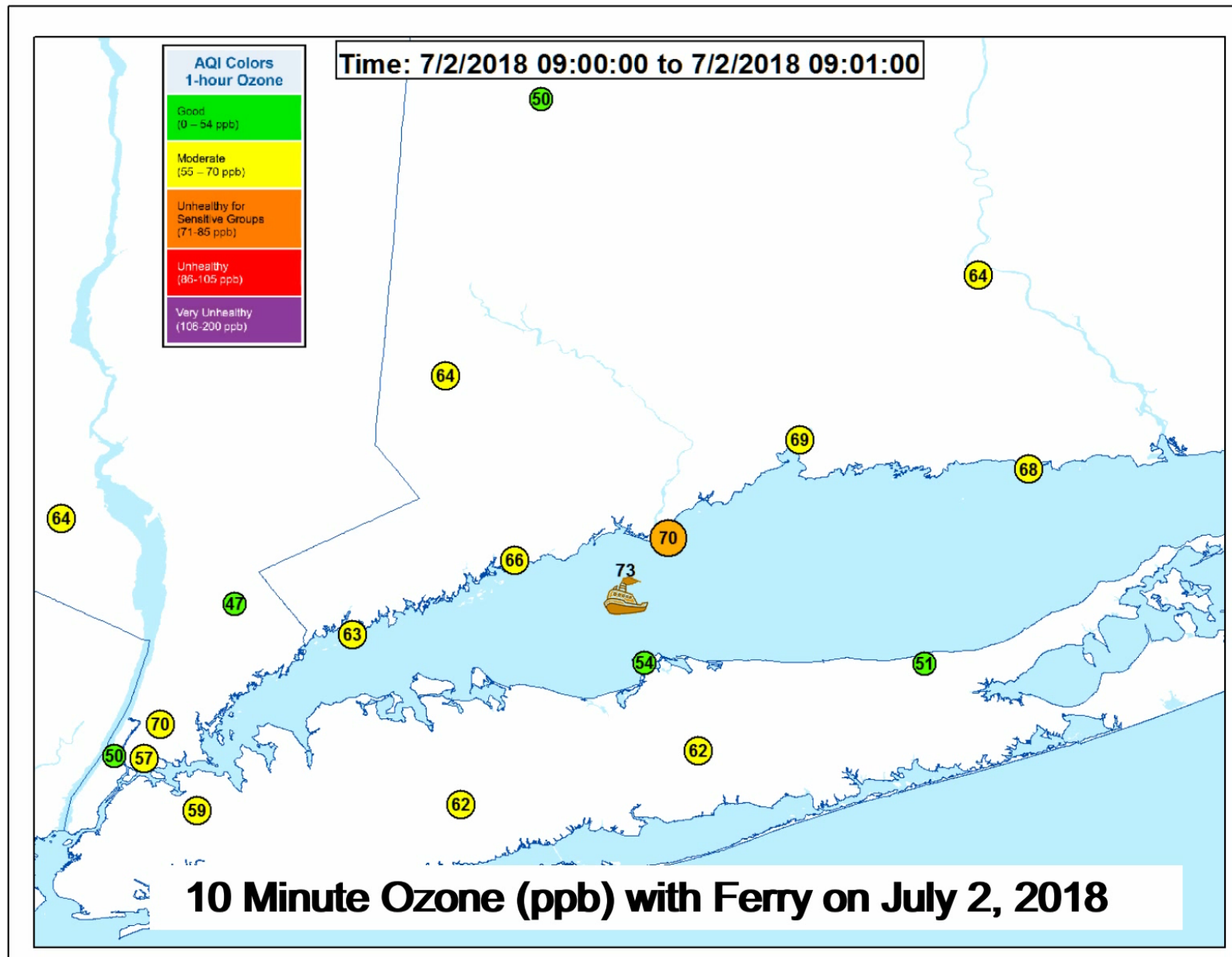
Forecasting summer events around Long Island Sound is a challenging exercise, due to many factors:

- Land/water interface poorly modeled due to 12 km grid resolution;
 - Meteorological parameters over water not well characterized;
 - Ozone precursors not well characterized temporally in NEI inventory, especially NO_2 emissions during ozone events;
 - Frequent wildfire smoke plumes enhancing ozone production.
-
- NASA, UMD and Stony Brook flights;
 - Pandora NO_2 measurements;
 - Vertical O_3 profiles from ozonesondes;
 - Speciated VOC measurements;
 - Wind profiler and ozone/aerosol LIDAR images;
 - NO_2 Tropospheric column measurements from satellite (TROPOMI, OMI);
 - Boat-based pollutant measurements (ozone and NO_2).



Thanks to: LISTOS, NESCAUM, NYDEC, MEDEP and CT DEEP!

July 2, 2018 Bridgeport to Port Jefferson Ferry Animation



Courtesy of LISTOS and Michael Geigert (CT DEEP)

OWLETS – Chesapeake Bay Area

Ozone lidar | UAV (Drone) Operations | Ozonesondes | Pandora | Satellite: TEMPO / GEOCAPE



OWLETS-2 (2018) was a follow-on study to better understand the behavior of ozone and related trace gases across the water land transition zone in the upper portion of the Chesapeake Bay.



OWLETS (2017) was an investigation into the significant land-water gradients in coastal regions that can occur due to differences in surface deposition, boundary layer height, and cloud coverage.



UMBC
GSFC O₃ Lidar



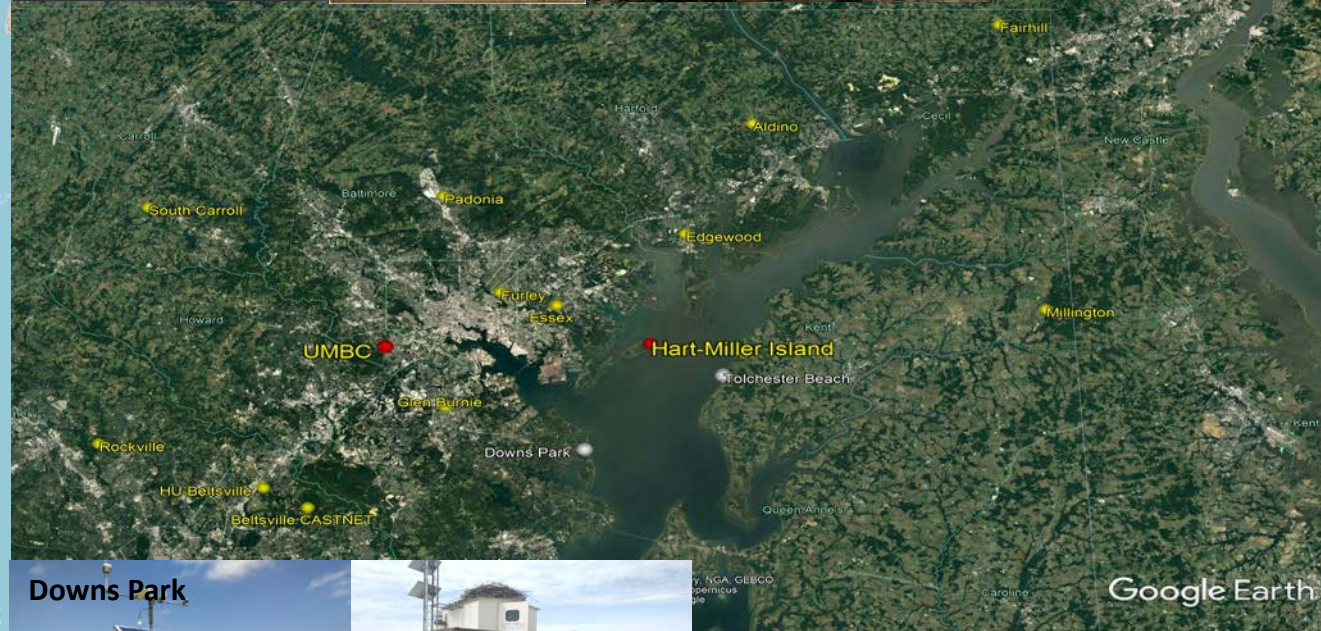
HU-Beltsville
Ozonesondes



Hart-Miller Island
LaRC O₃ + Much More



UMD Aircraft
Altoft Data



Downs Park



Tolchester Beach



Courtesy of MDE and OWLETS

Contact Information

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