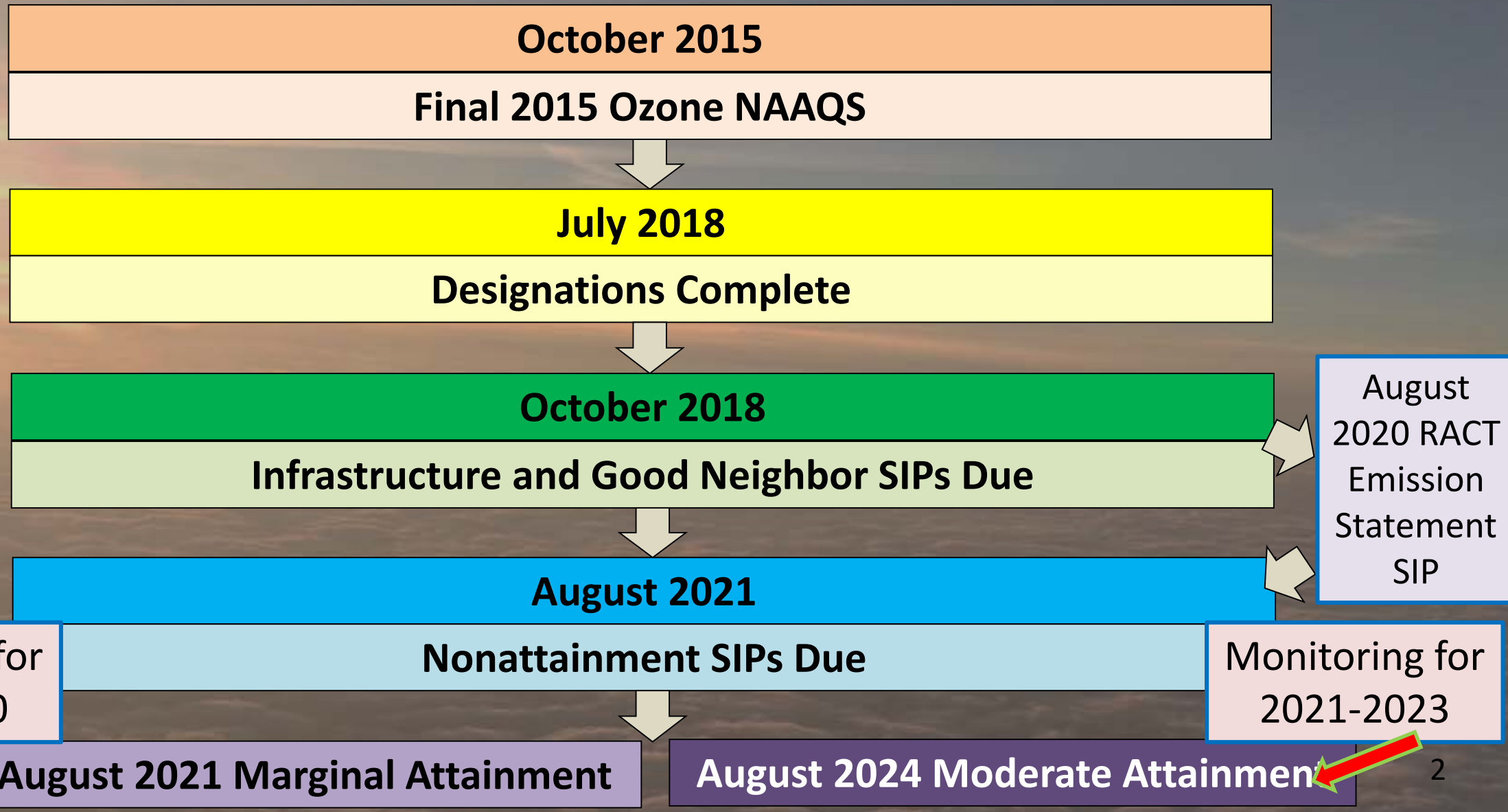
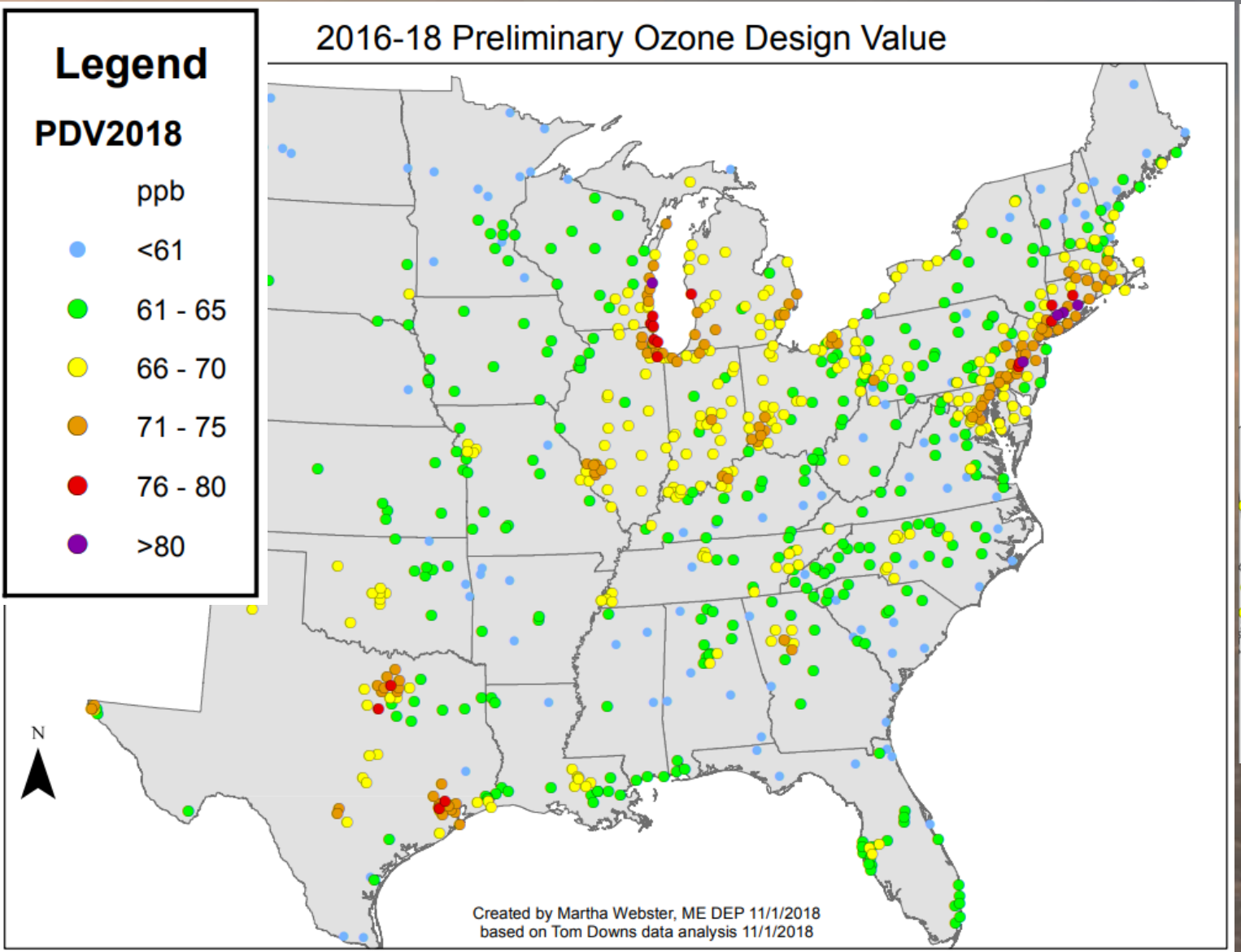
OTC Modeling Committee Update

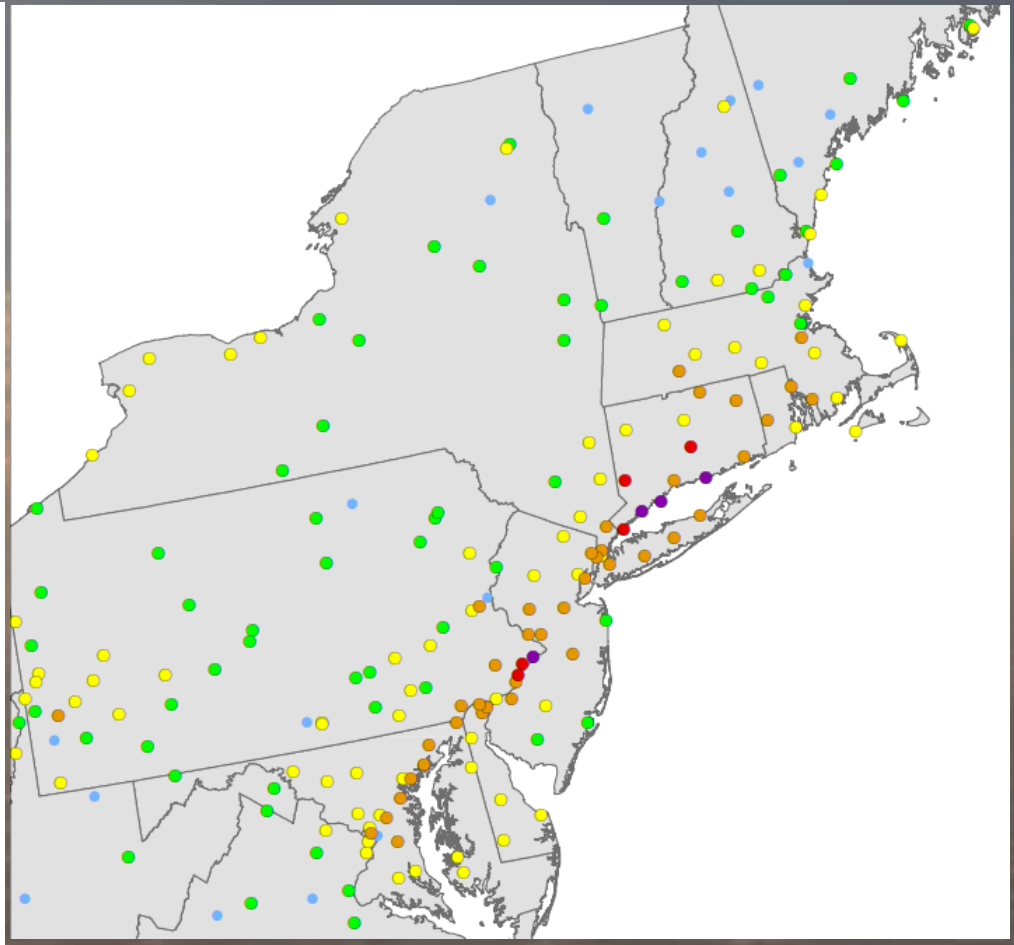
April 11, 2019

2015 Ozone NAAQS Planning Timeline



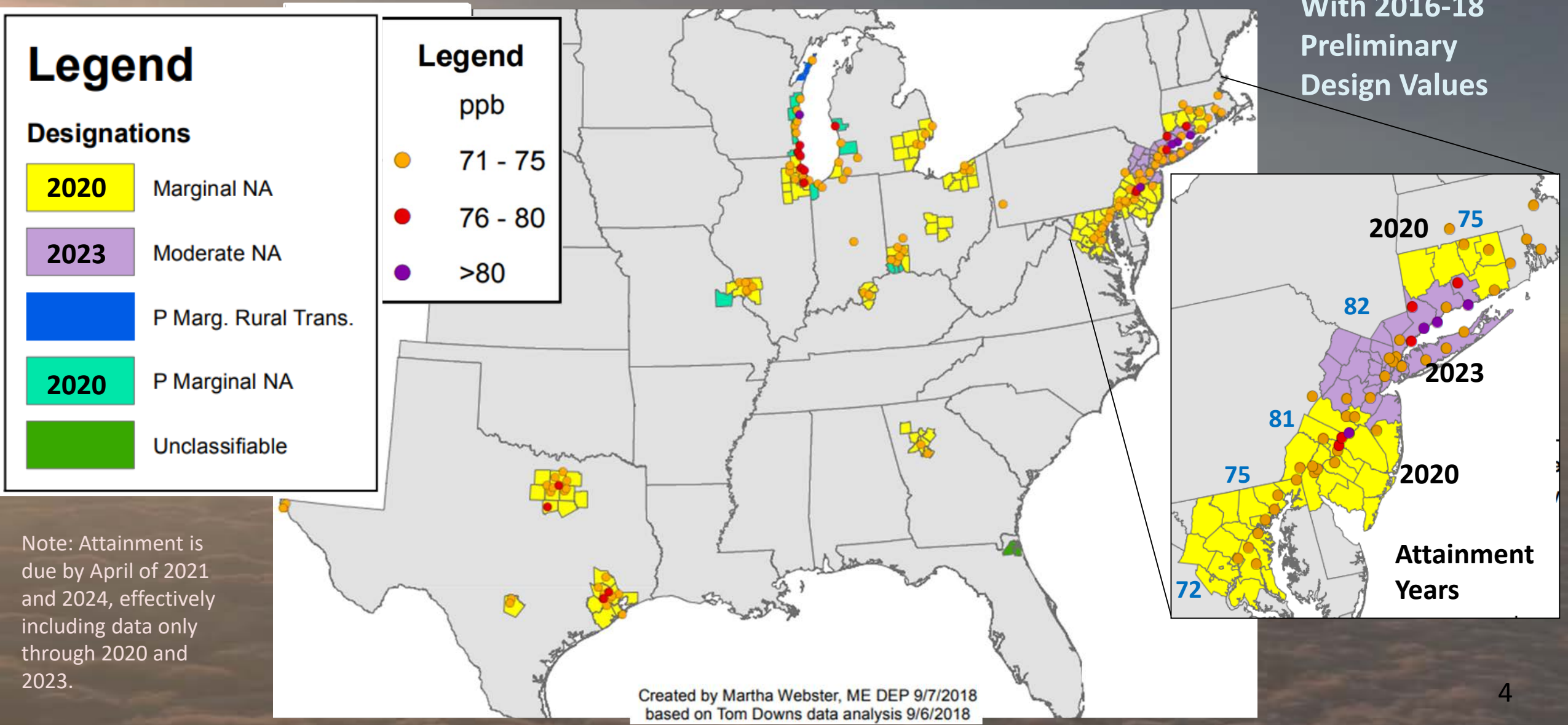
2016-2018 Preliminary Design Values





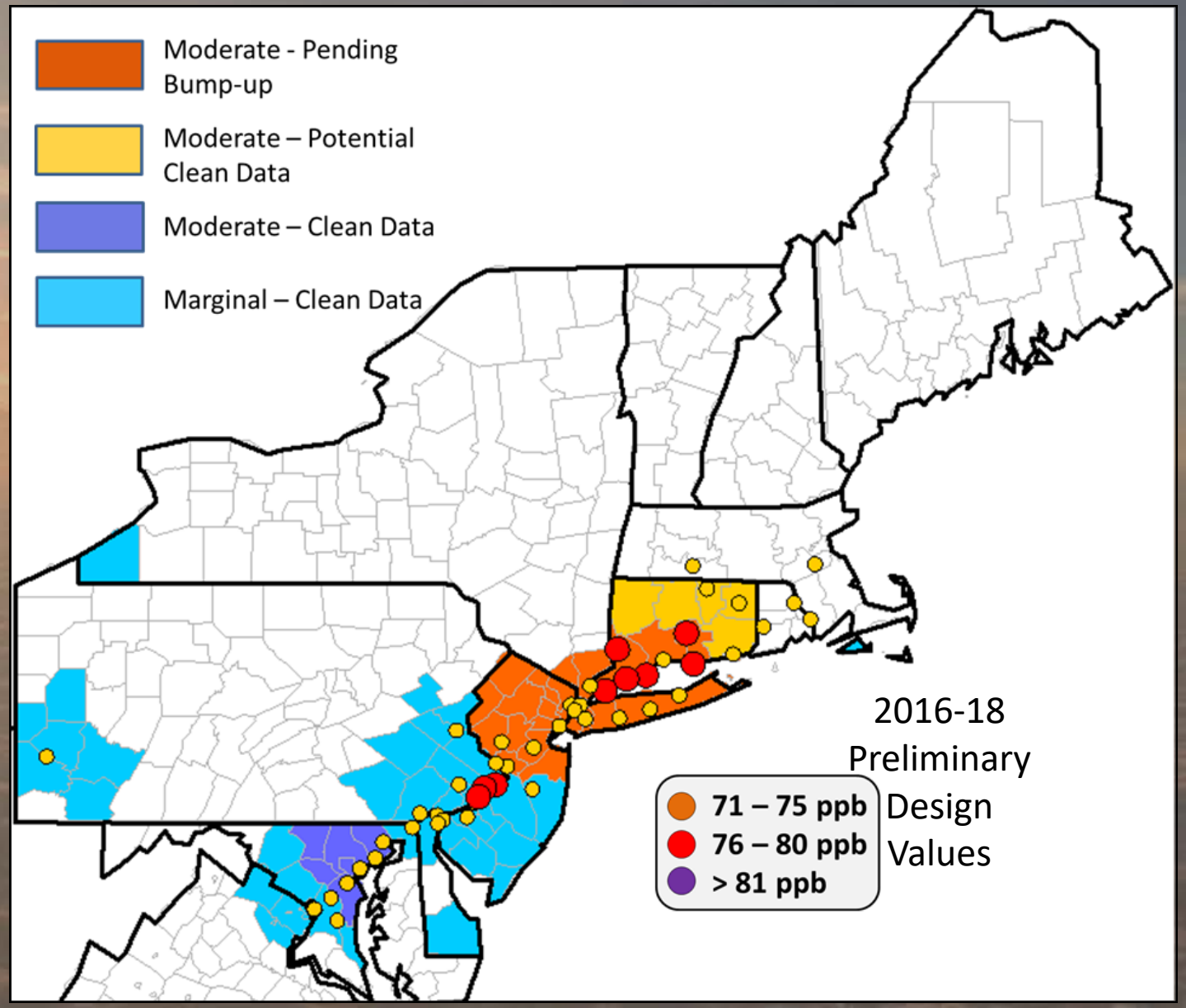
2015 8-Hour Ozone NAAQS Designations

With 2016-18 Preliminary Design Values

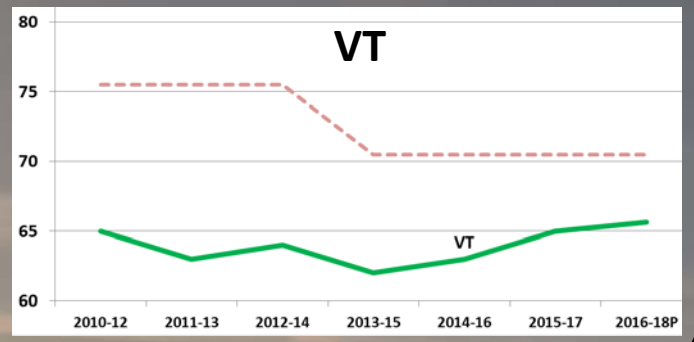


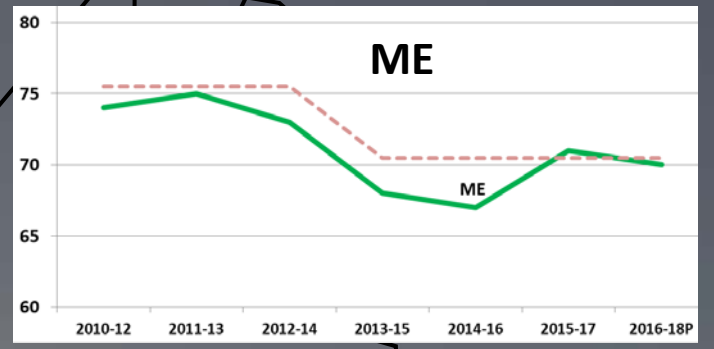
Note: Attainment is due by April of 2021 and 2024, effectively including data only through 2020 and 2023.

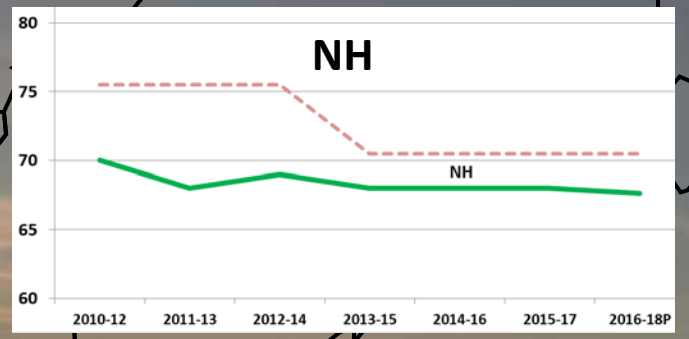
Nonattainment Areas – 2008 Ozone NAAQS

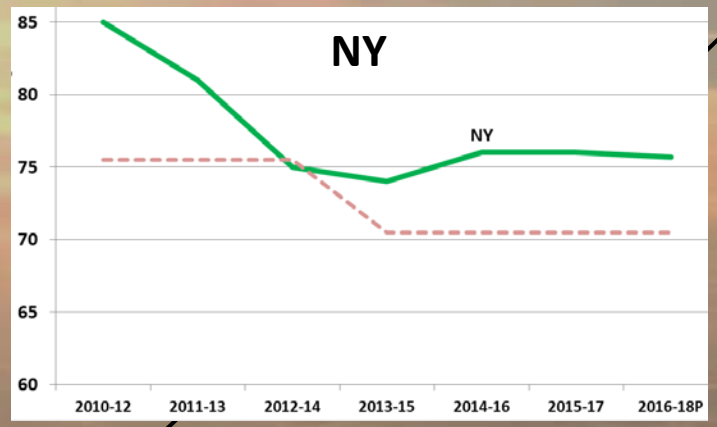


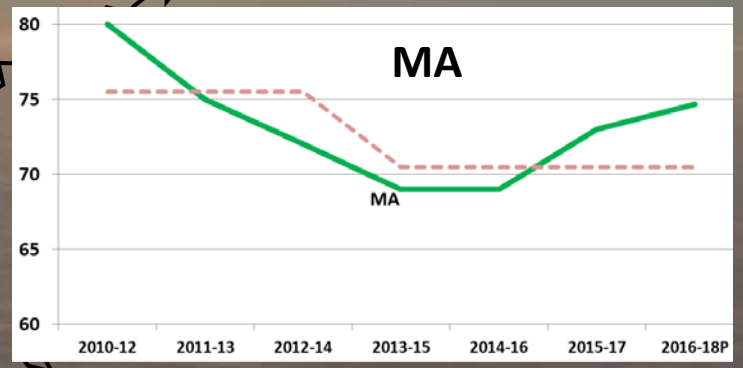
Trends

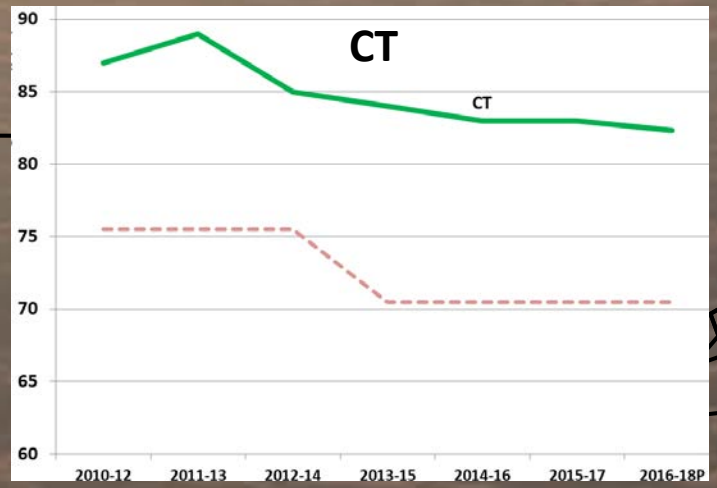


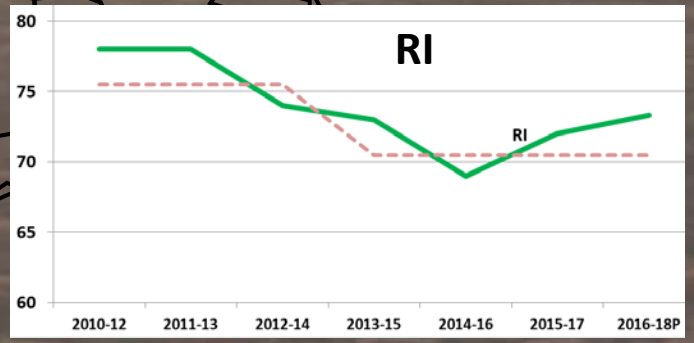






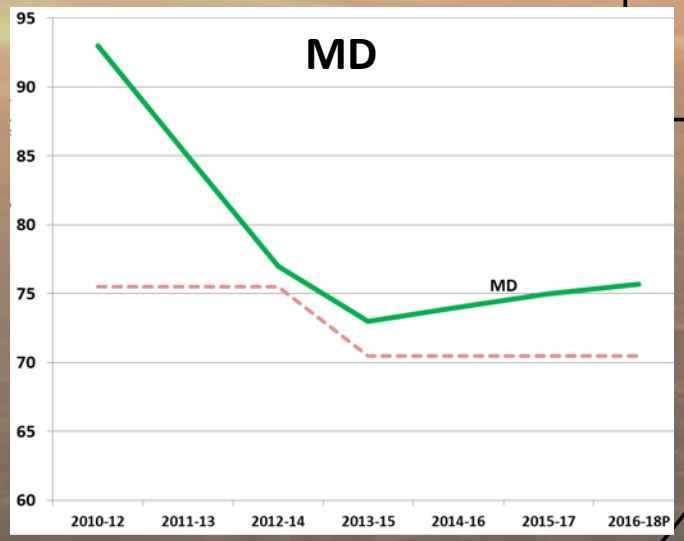


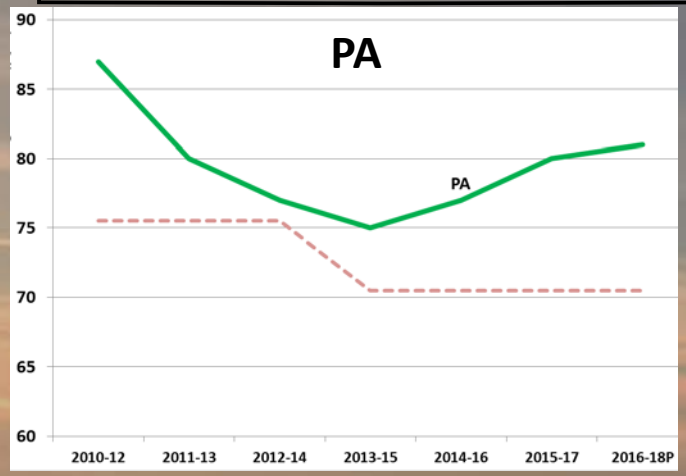


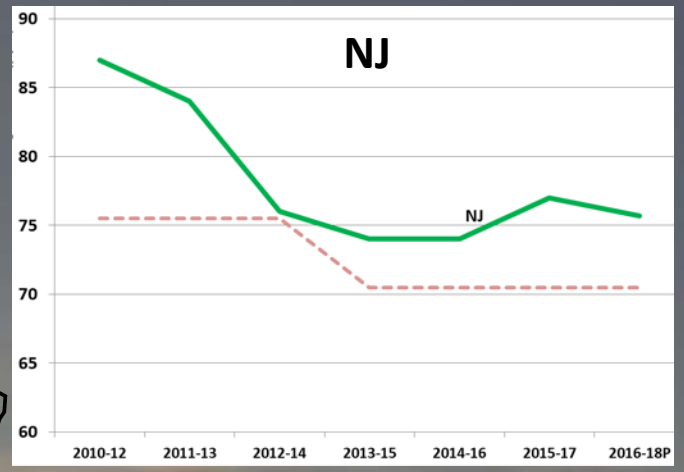


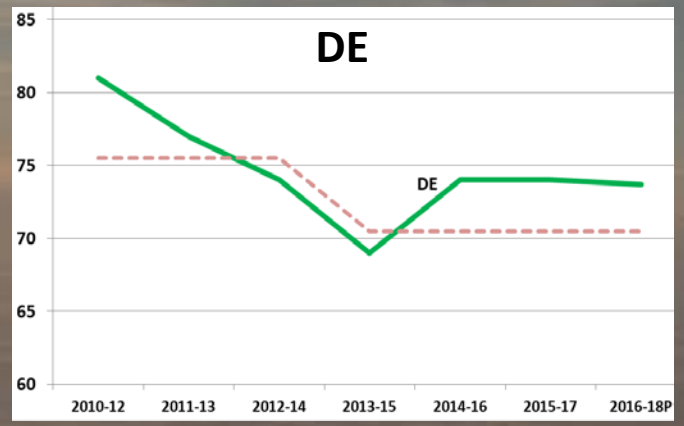
2016-18 Design Values are Preliminary

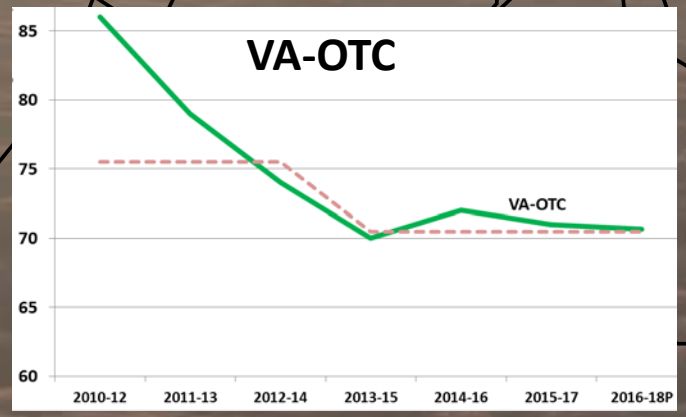
Trends

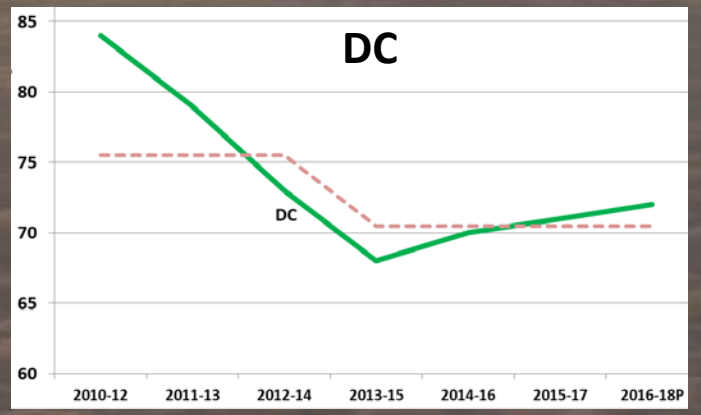








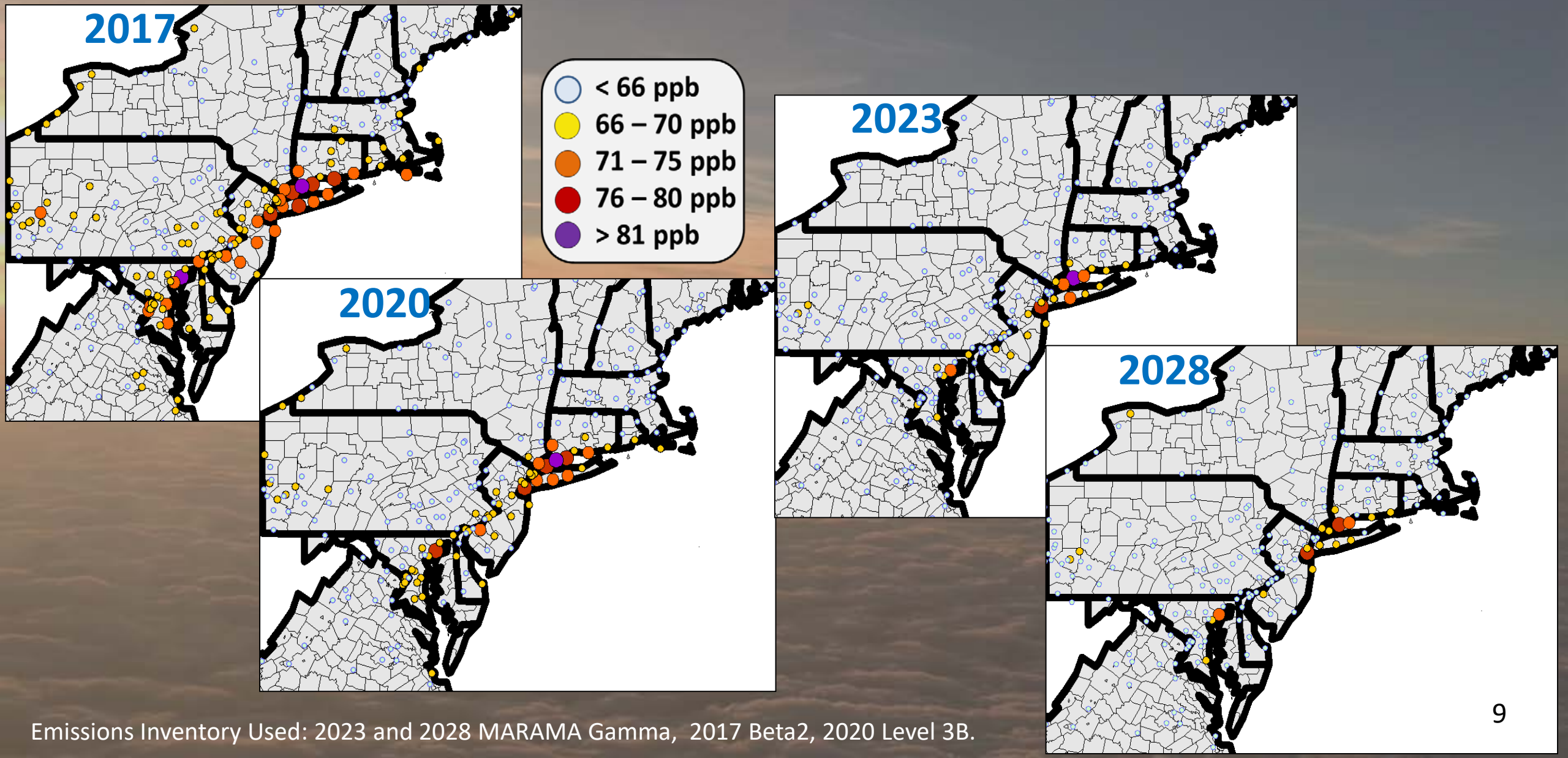




2016-18 Design Values are Preliminary

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

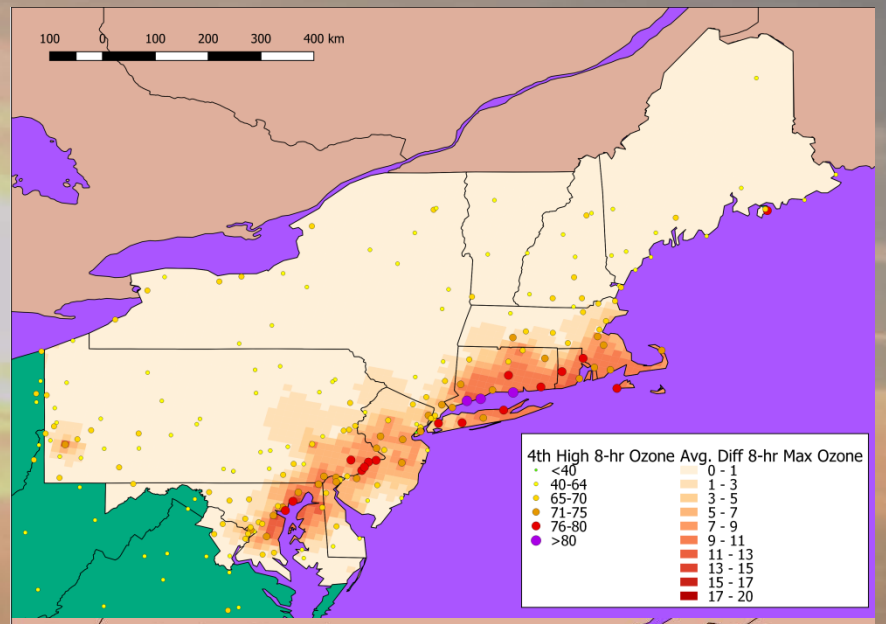
Benefits Mapping and Analysis Program (BenMAP) Community Edition (CE) program application.

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.

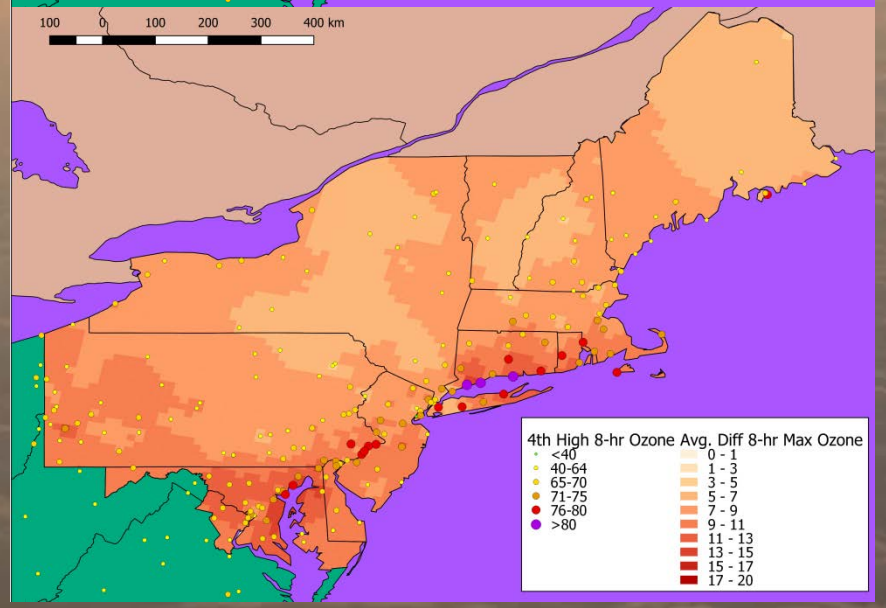
Modeled incident rates are documented in the papers and are consistent with the approach used by EPA.

BenMap Studies

Rollback Studies

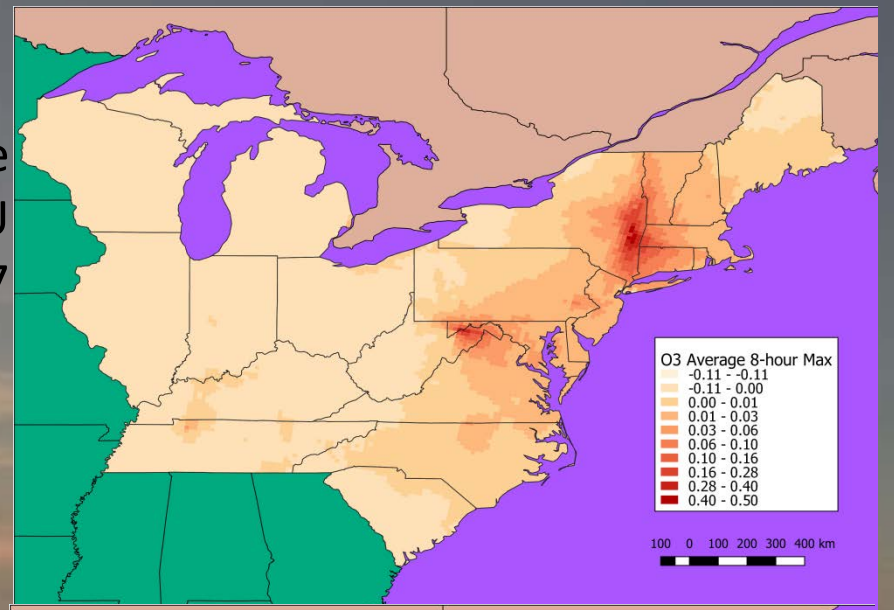


Ozone Rollback to 70ppb for 2017

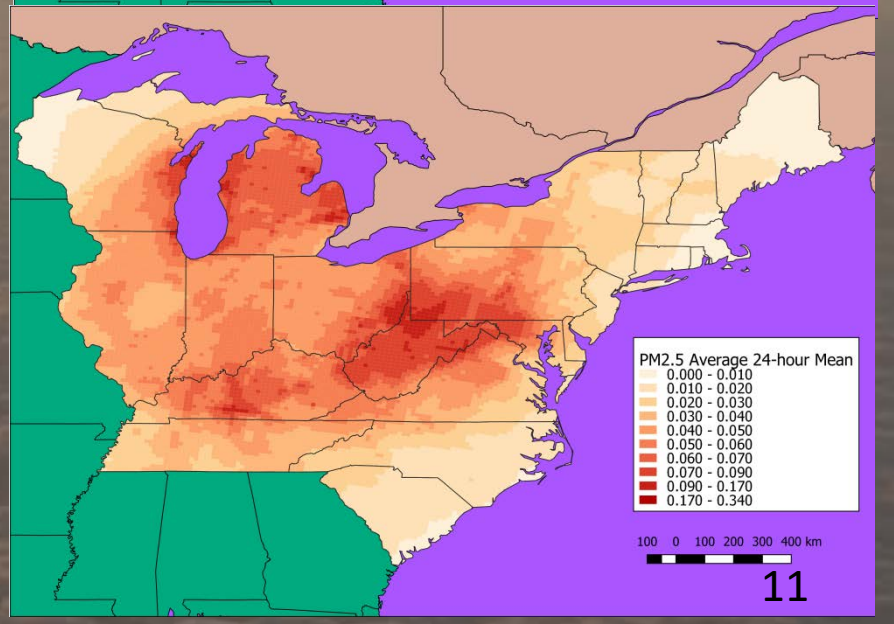


Ozone Rollback to 40ppb for 2017

MANE-VU Ask

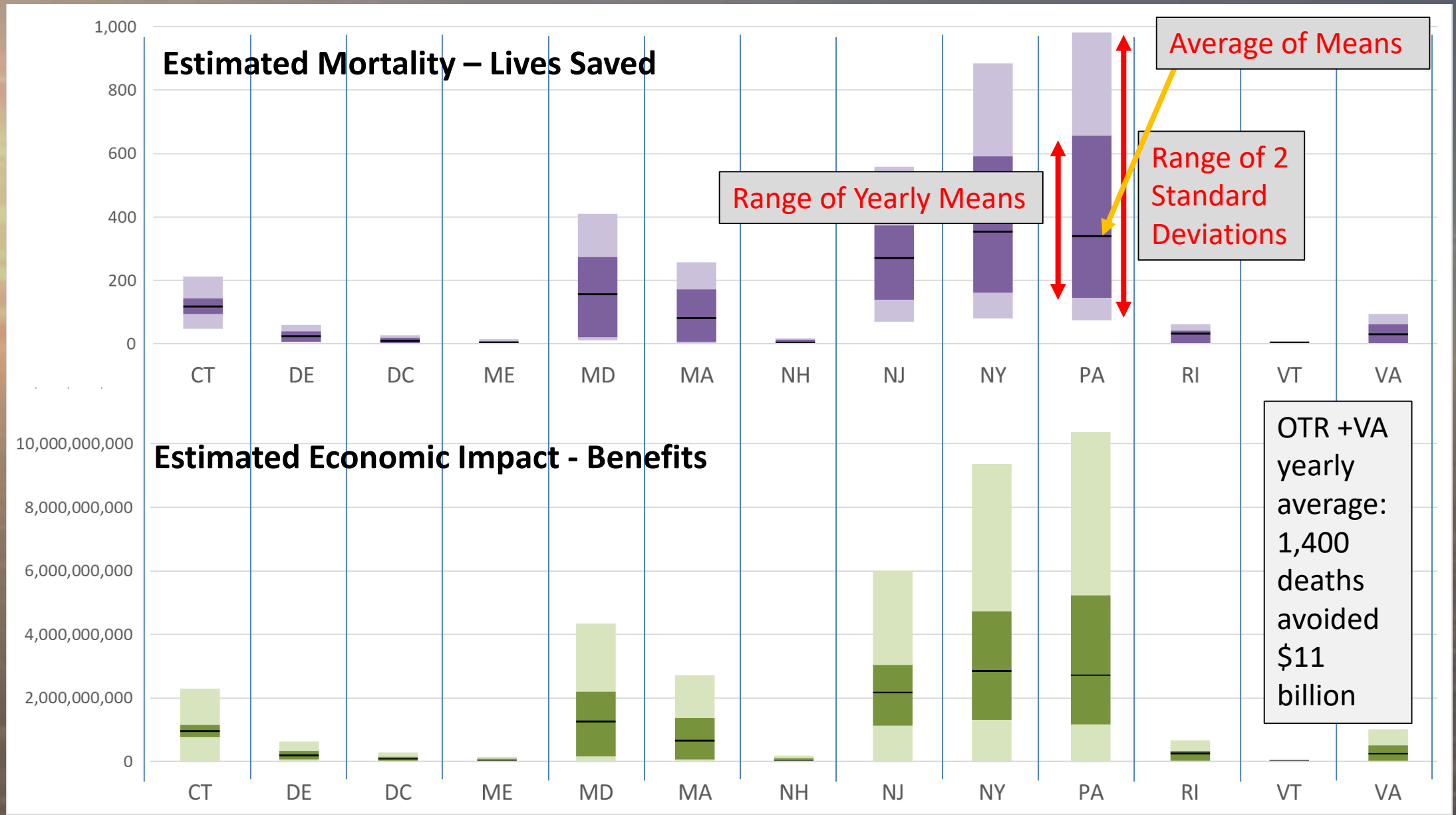


Ozone change due to MANE-VU Ask for 2017



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

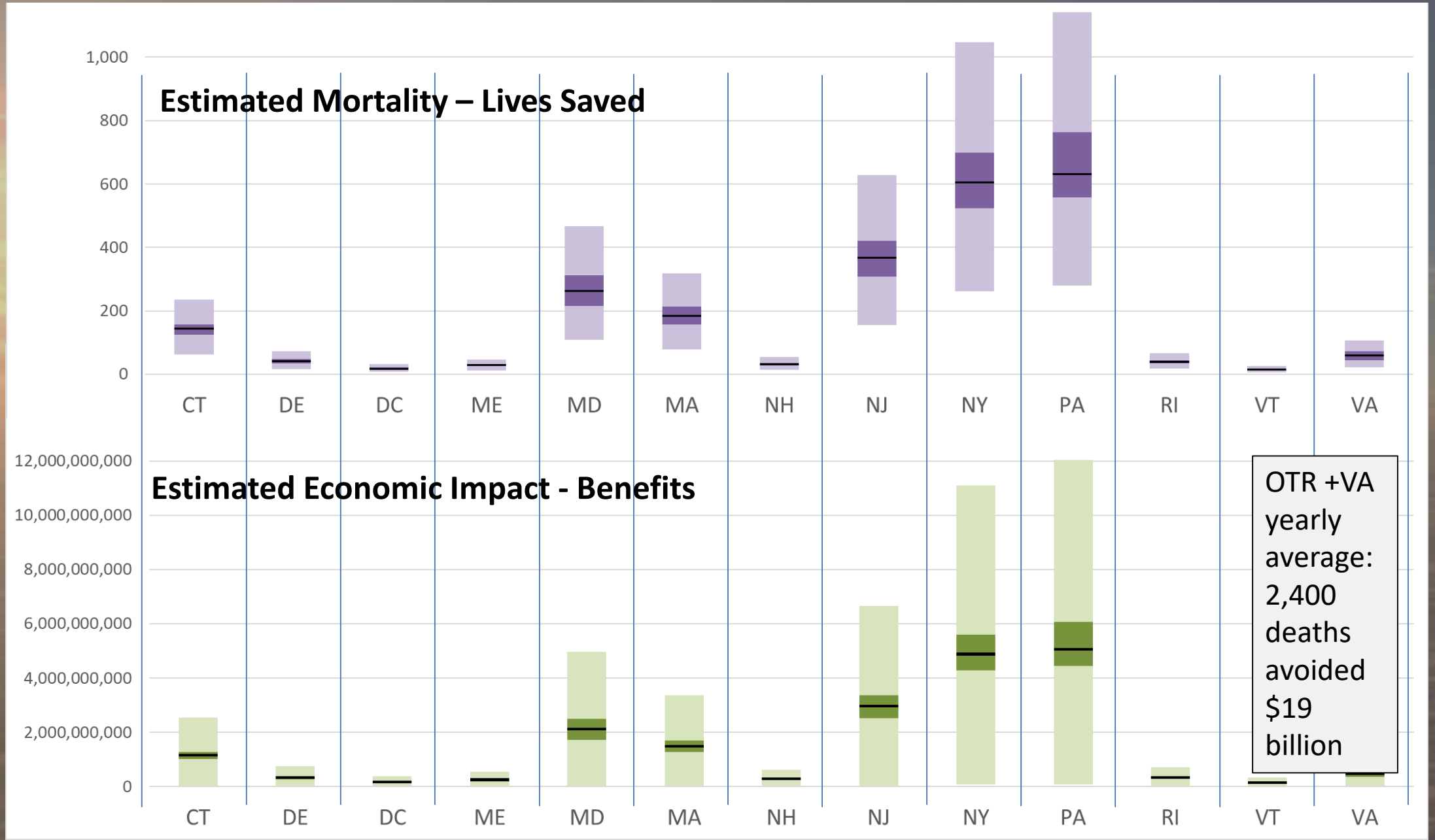
70 ppb Rollback Benefits



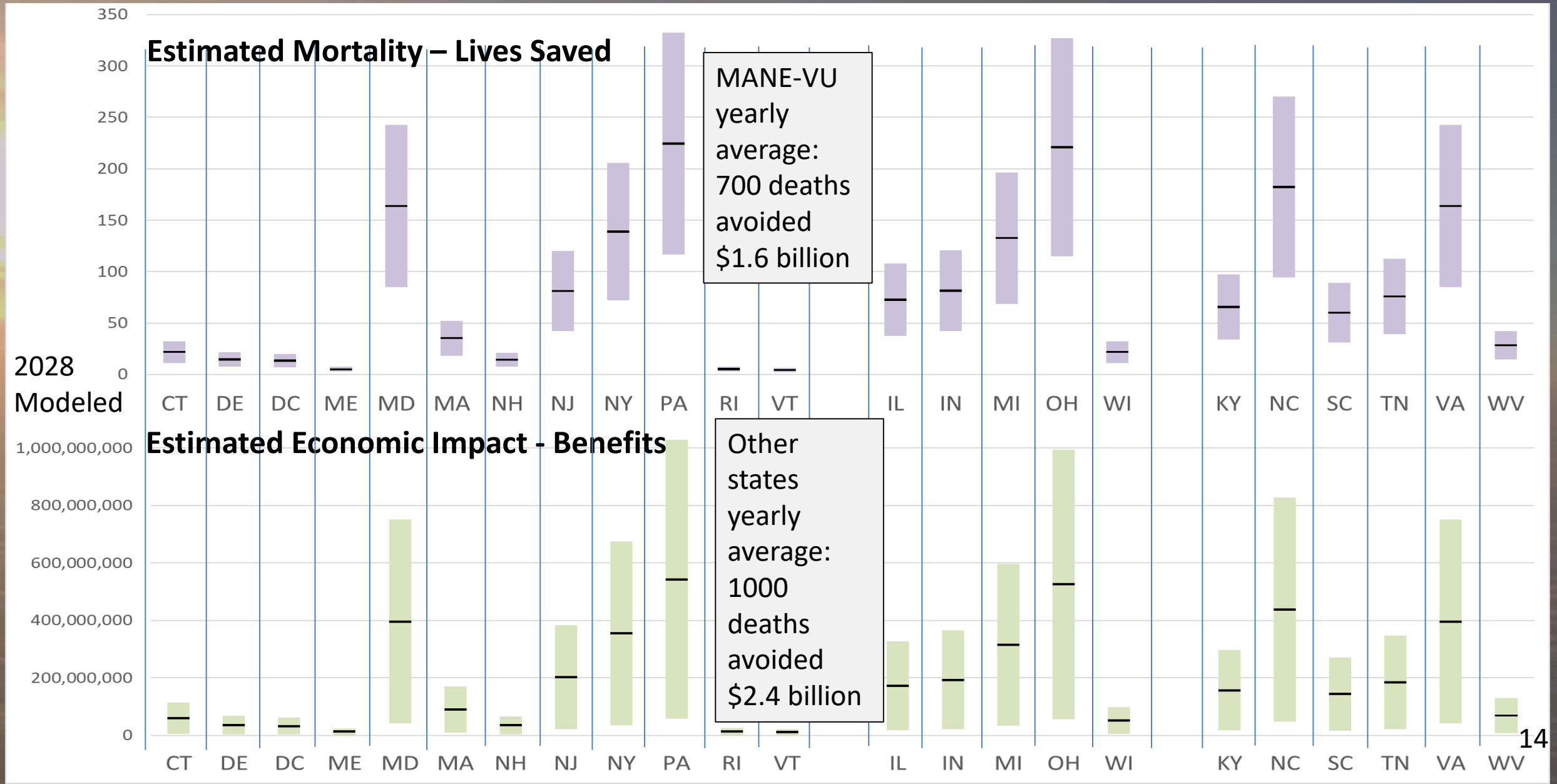
7 Years Modeled 2011-17

40 ppb Rollback Benefits

7 Years Modeled 2011-17

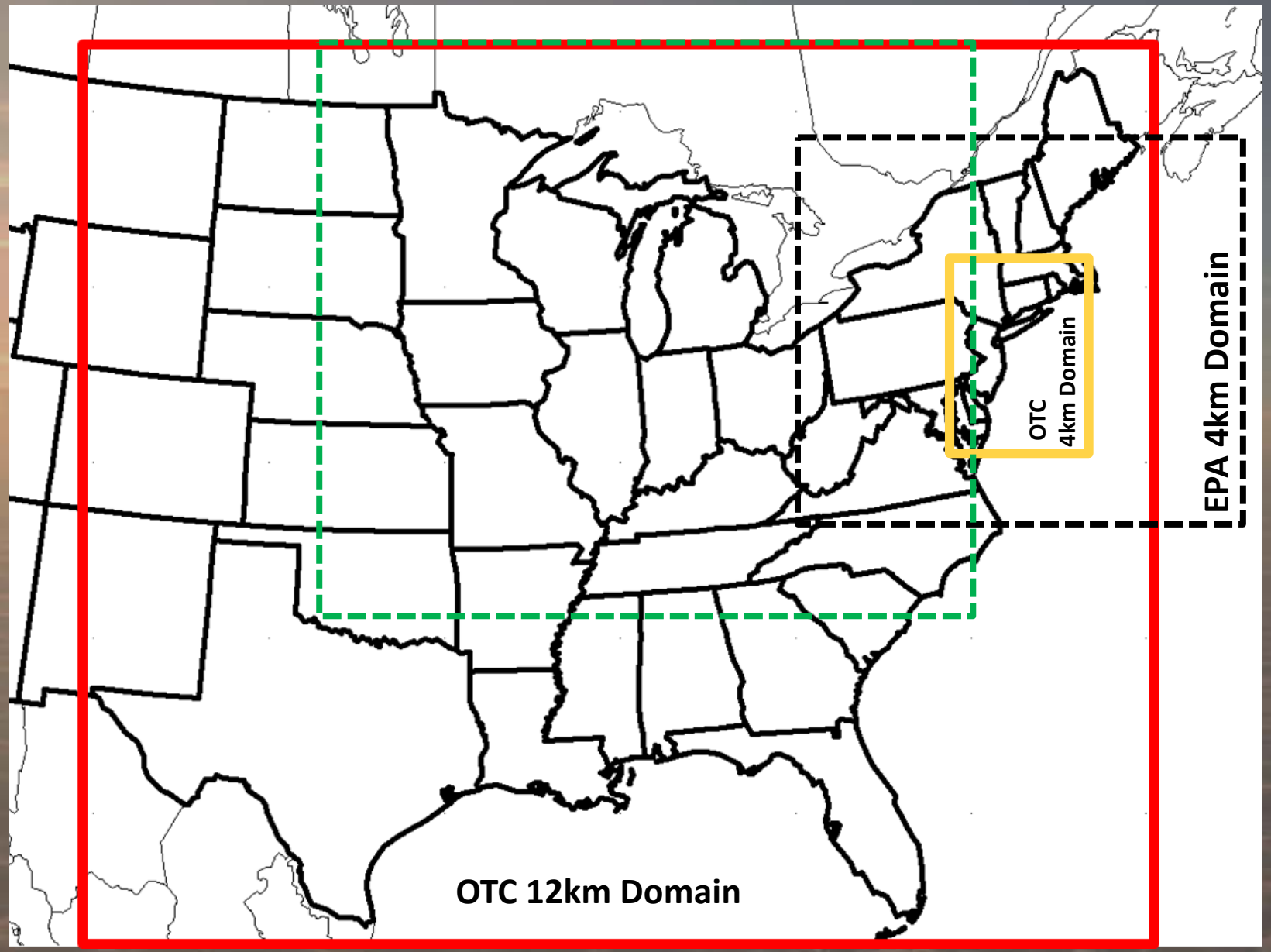


MANE-VU Ask Benefits



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

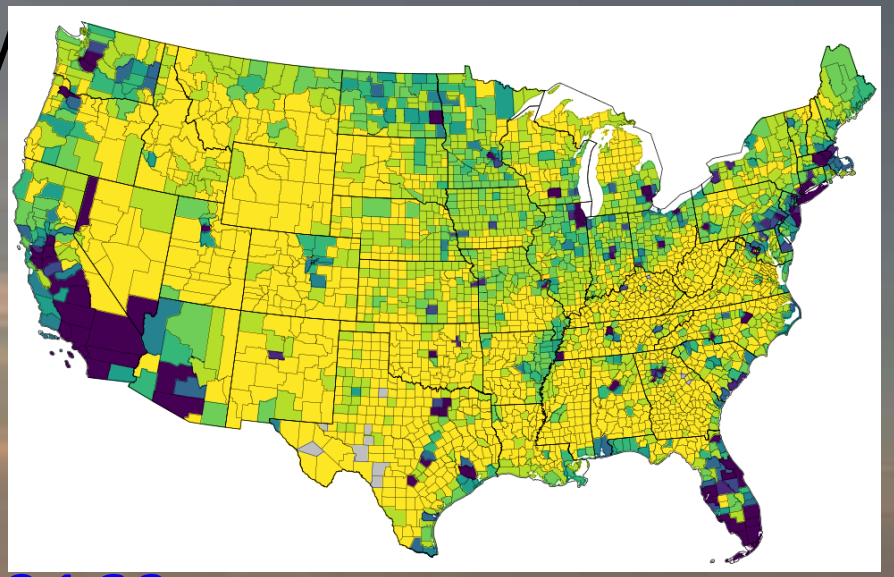
ERTAC EGU Leadership

- 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

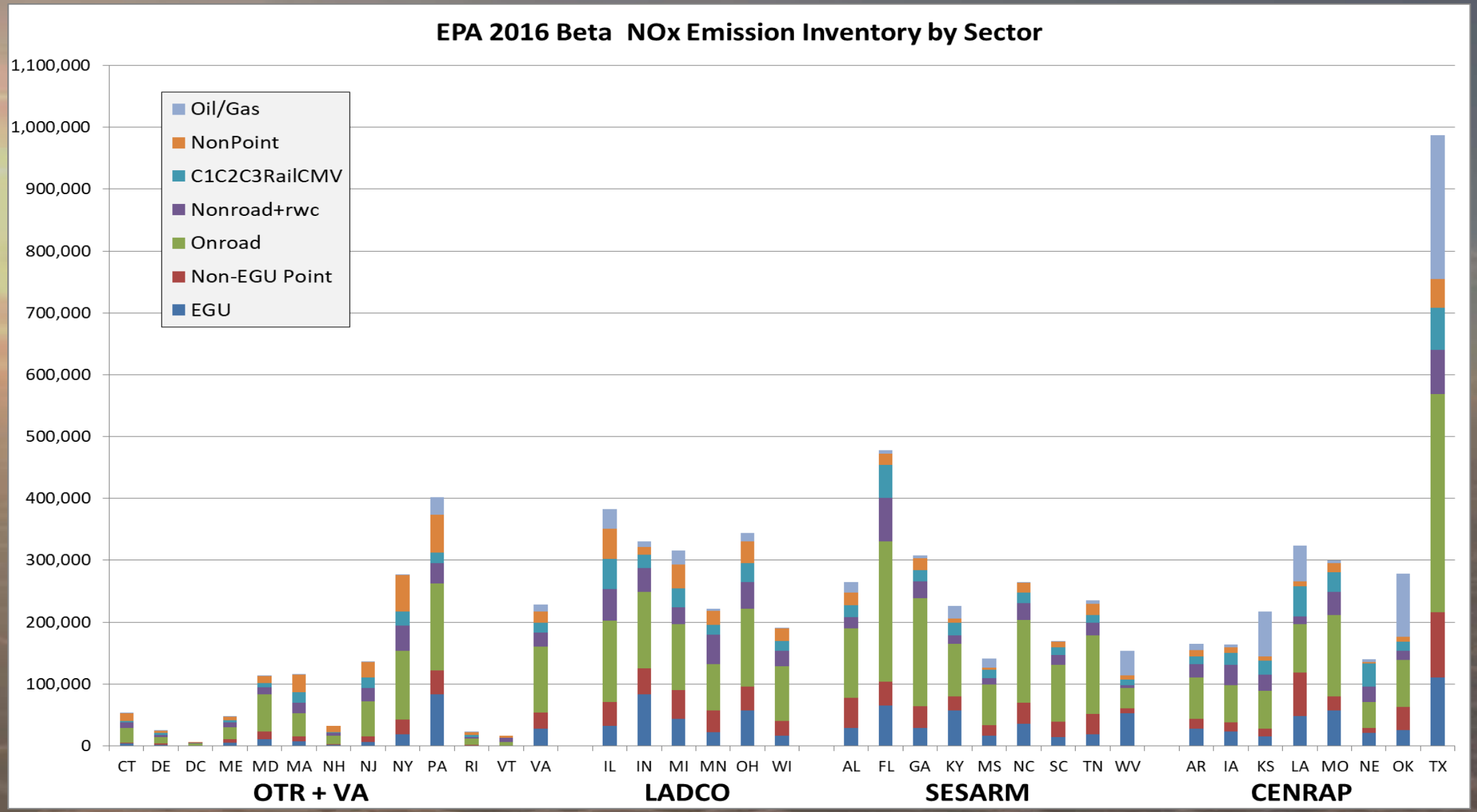
- 2016 beta platform released in March, ready for modeling
- Fully-updated 2016 v1 w/complete 2023 & 2028 projected emissions Summer 2019
- wiki to collaborate: EPA/RPOs/States



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

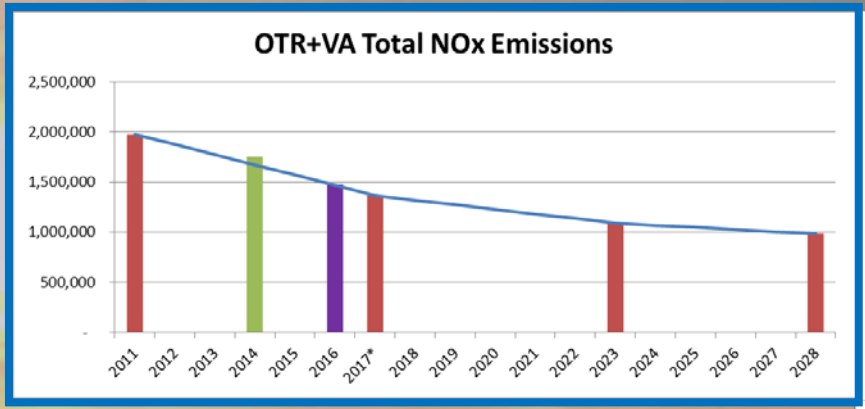
- MARAMA's roles:
  - Co-leading EGU, onroad workgroups; participating in CMV, oil & gas growth workgroup
  - Collaborating with EPA to build growth & control factors
  - Preparing growth & control factors for the MARAMA modeling region

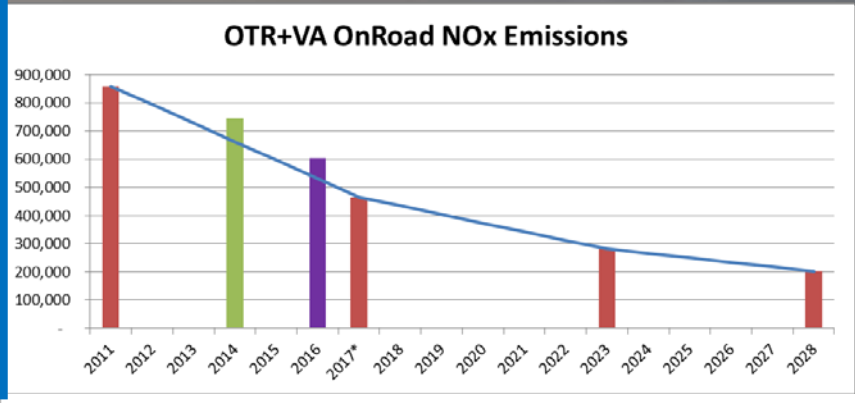
2016 Base Case NOx Emissions – EPA Beta

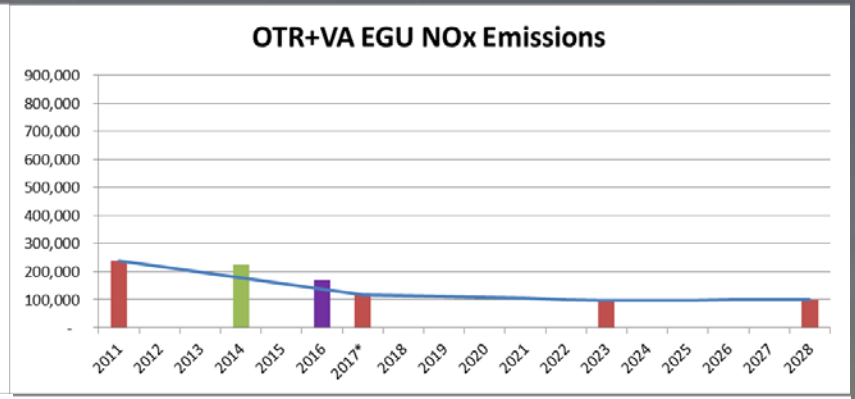


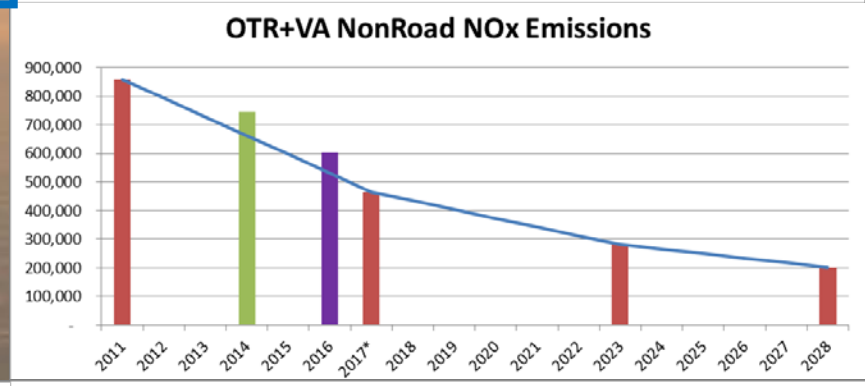
NOx - EPA 2016 Beta vs MARAMA 2017 Beta2

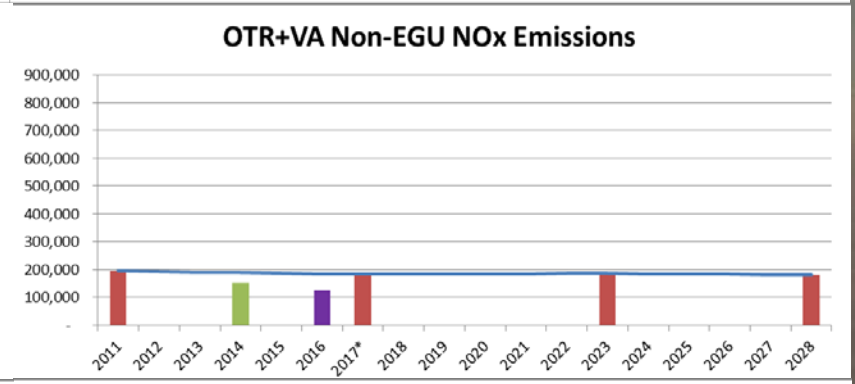
(Tons per year)

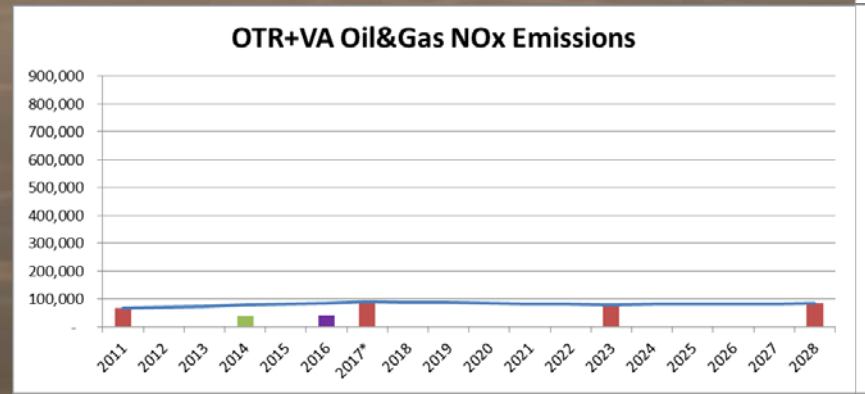


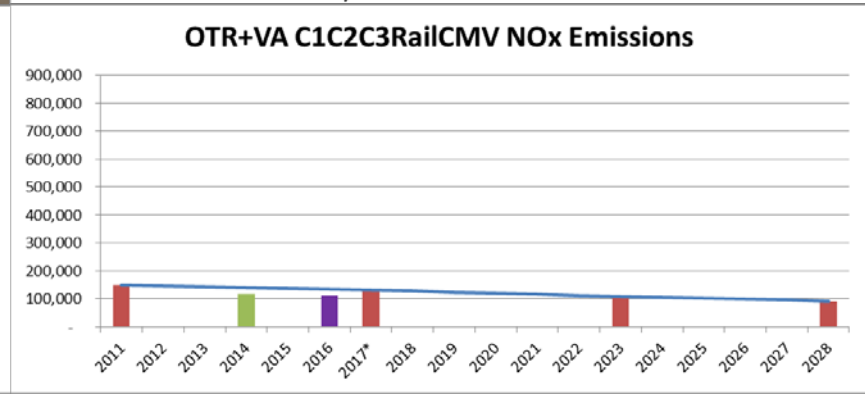


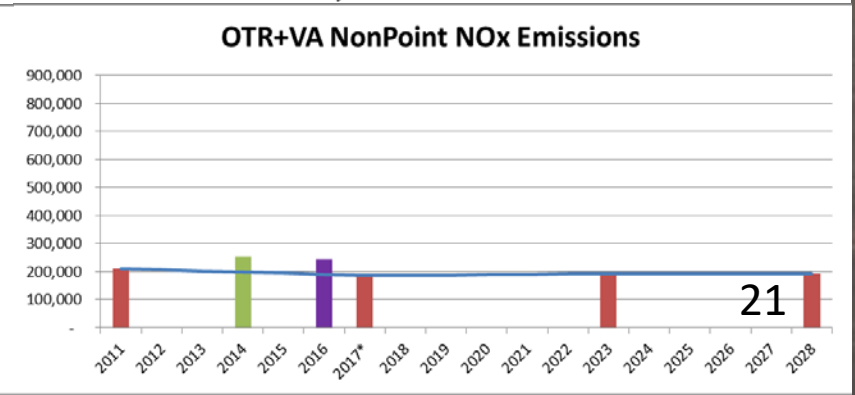






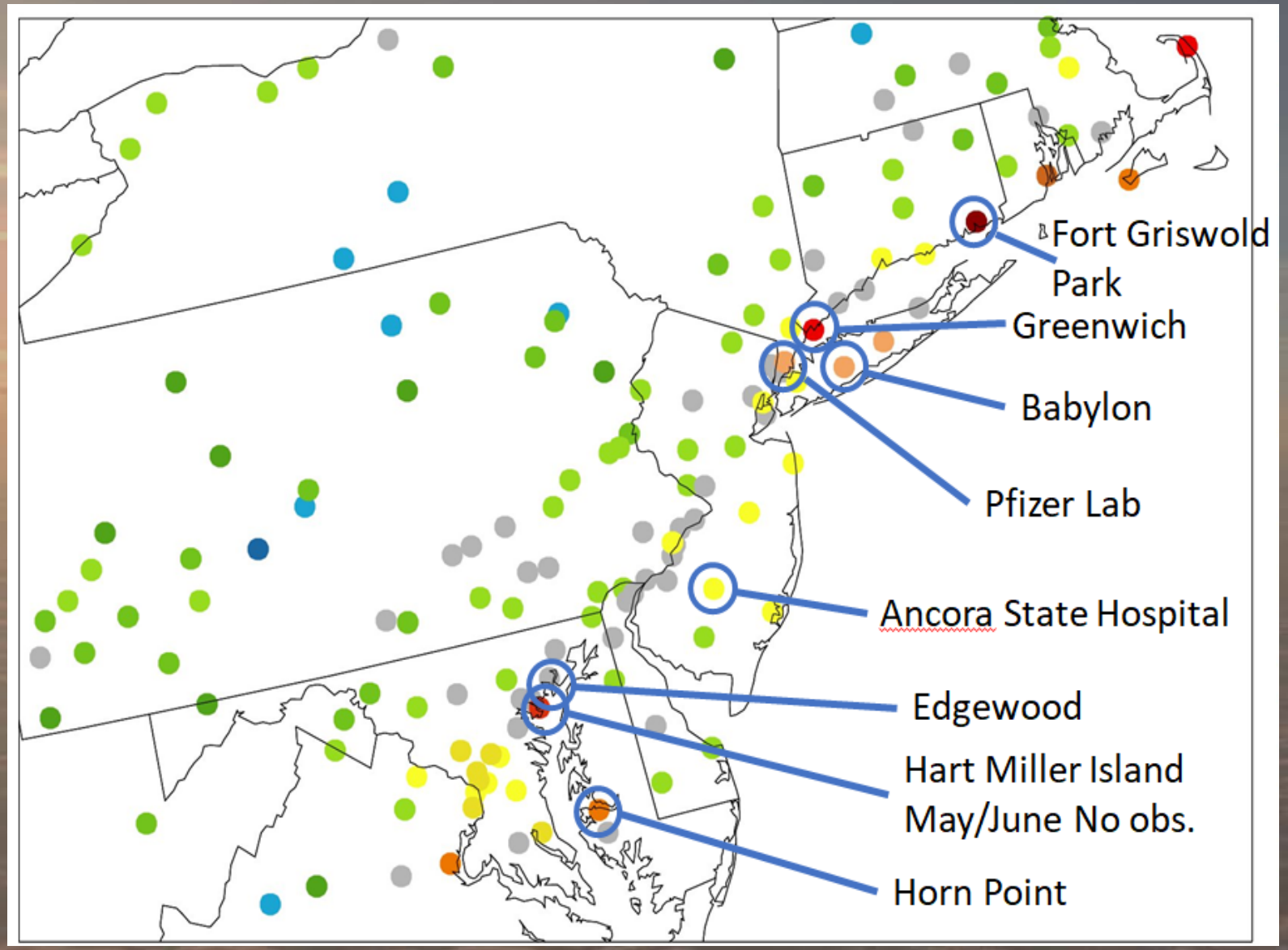






2016 CMAQ Modeling Performance

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

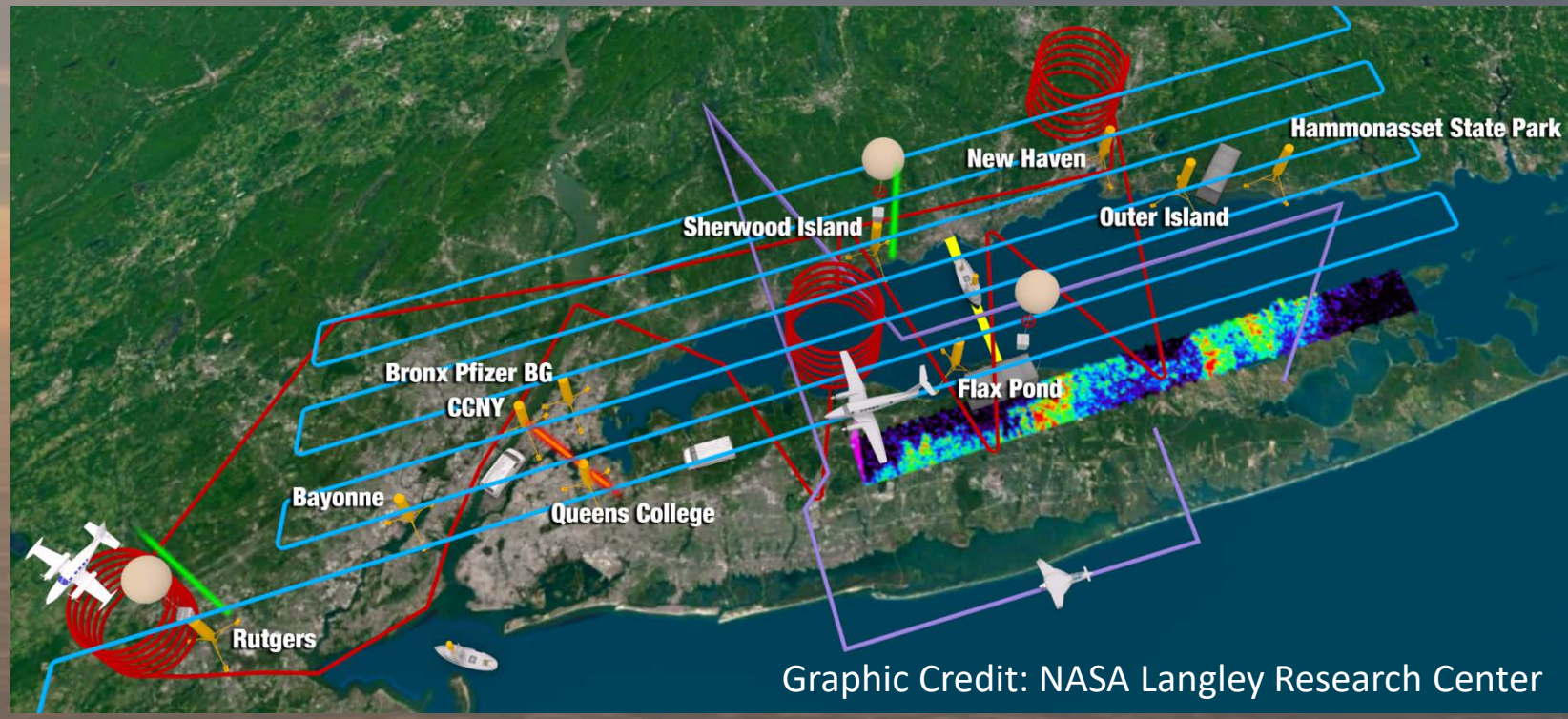
- SIP required modeling
- Peak ozone day analyses
  - Peaking and load-following on HEDD
  - Gas pipeline compressors
- Heavy duty diesel standards
- Updated contribution modeling

Regional Monitoring Intensives

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.

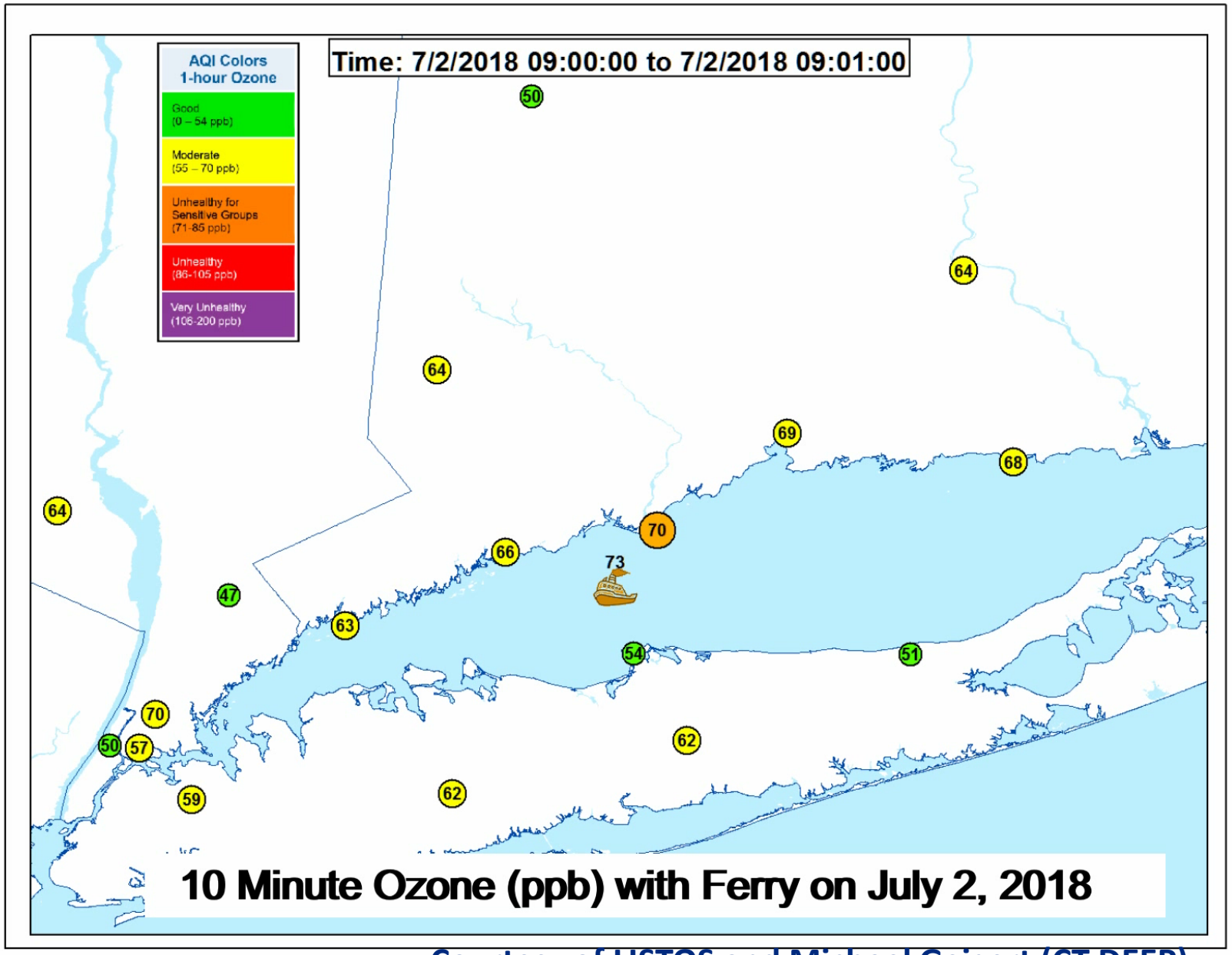


Graphic Credit: NASA Langley Research Center

- 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.

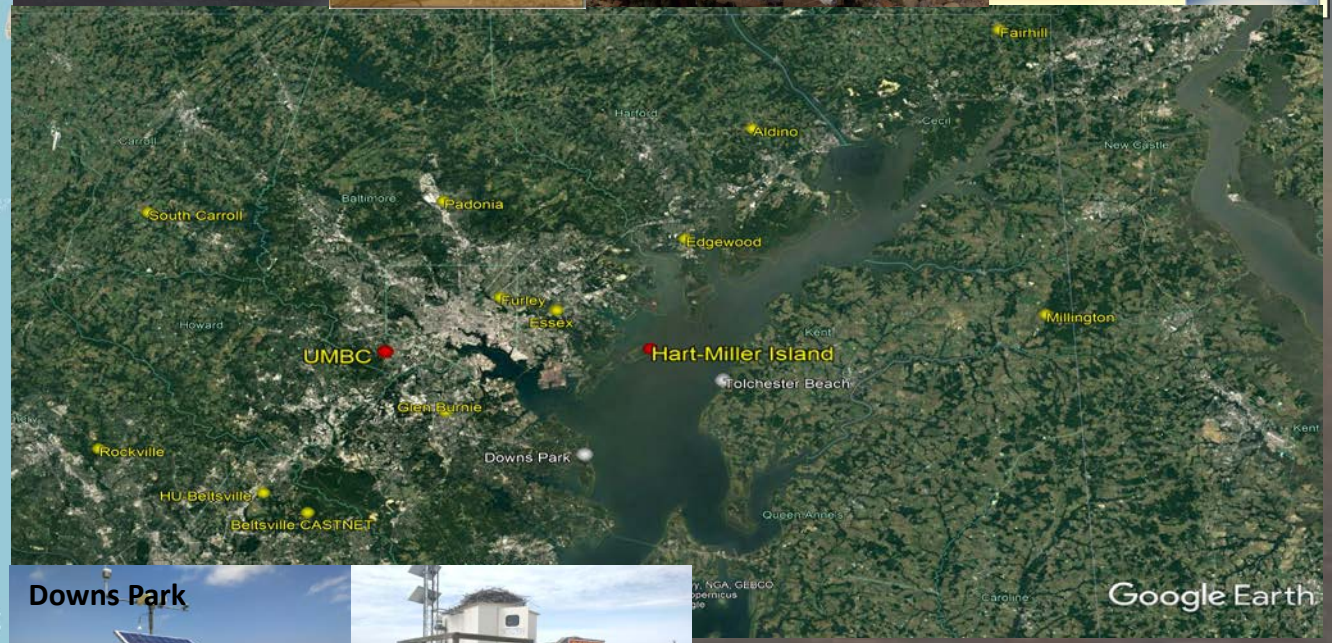
OWLETS (2017) was an investigation into the significant land-water gradients in coastal regions that can occur due to differences in surface deposition, boundary layer height, and cloud coverage .

UMBC GSFC O_3 Lidar

HU-Beltsville Ozonesondes

Hart-Miller Island LaRC O_3 + Much More

UMD Aircraft Aloft Data



Downs Park

Tolchester Beach

Courtesy of MDE and OWLETS

Contact Information

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