OTC Modeling Committee Update

OTC/MANEVU Fall Stakeholders Meeting

October 2, 2024

OTC Modeling Committee

Chairs, Kevin Civerolo and Eric Zalewsky, NYS DEC
Committee Lead, Alexandra Karambelas, OTC/NESCAUM



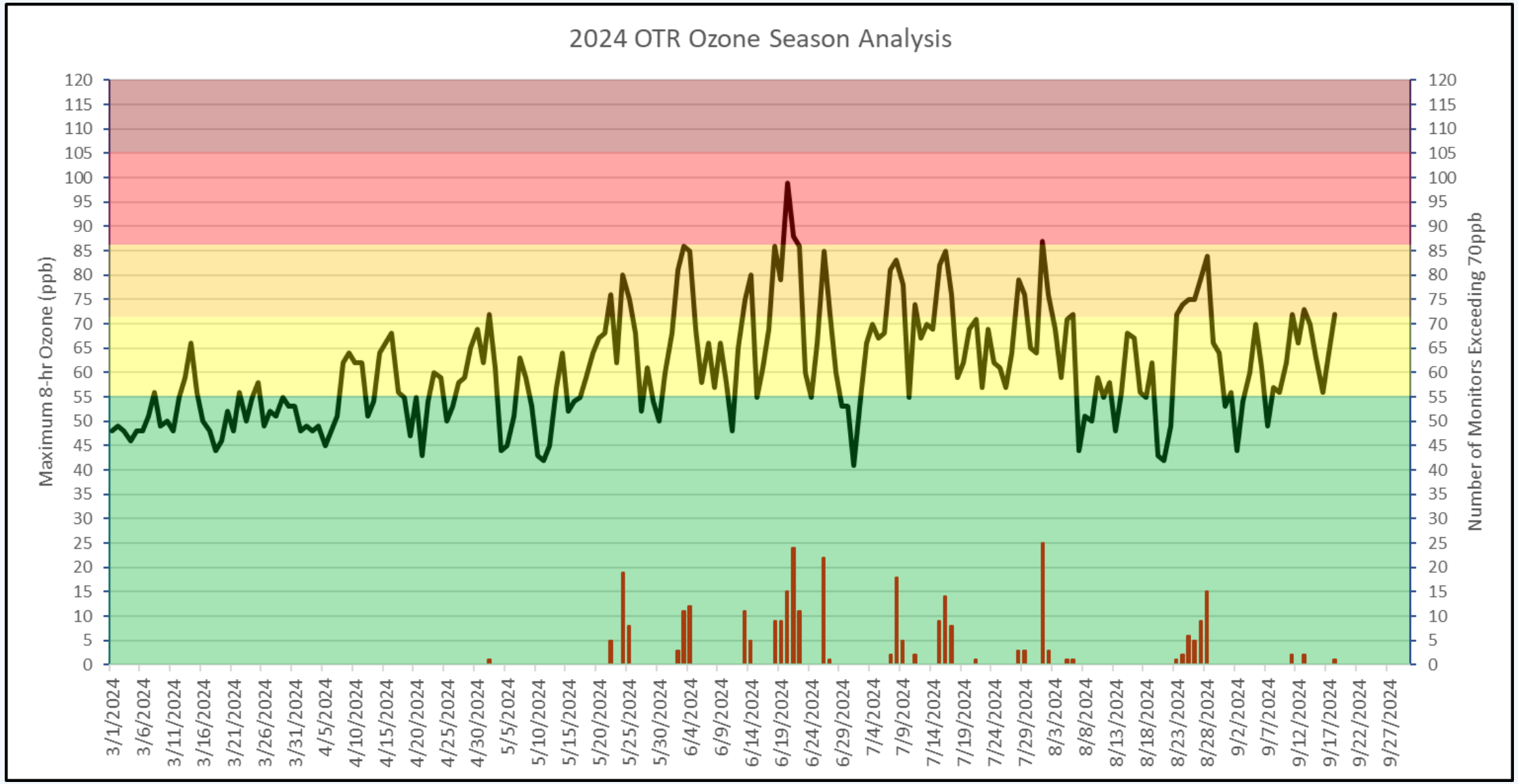


OZONE TRANSPORT COMMISSION

Accomplishments

- New co-chair – Eric Zalewsky
- Modeling Committee Action Plan available
- Tracking 2024 OTR O_3 levels and preliminary attainment status
- Transitioning from 2016 modeling platform to 2022

2024 OTR Summary

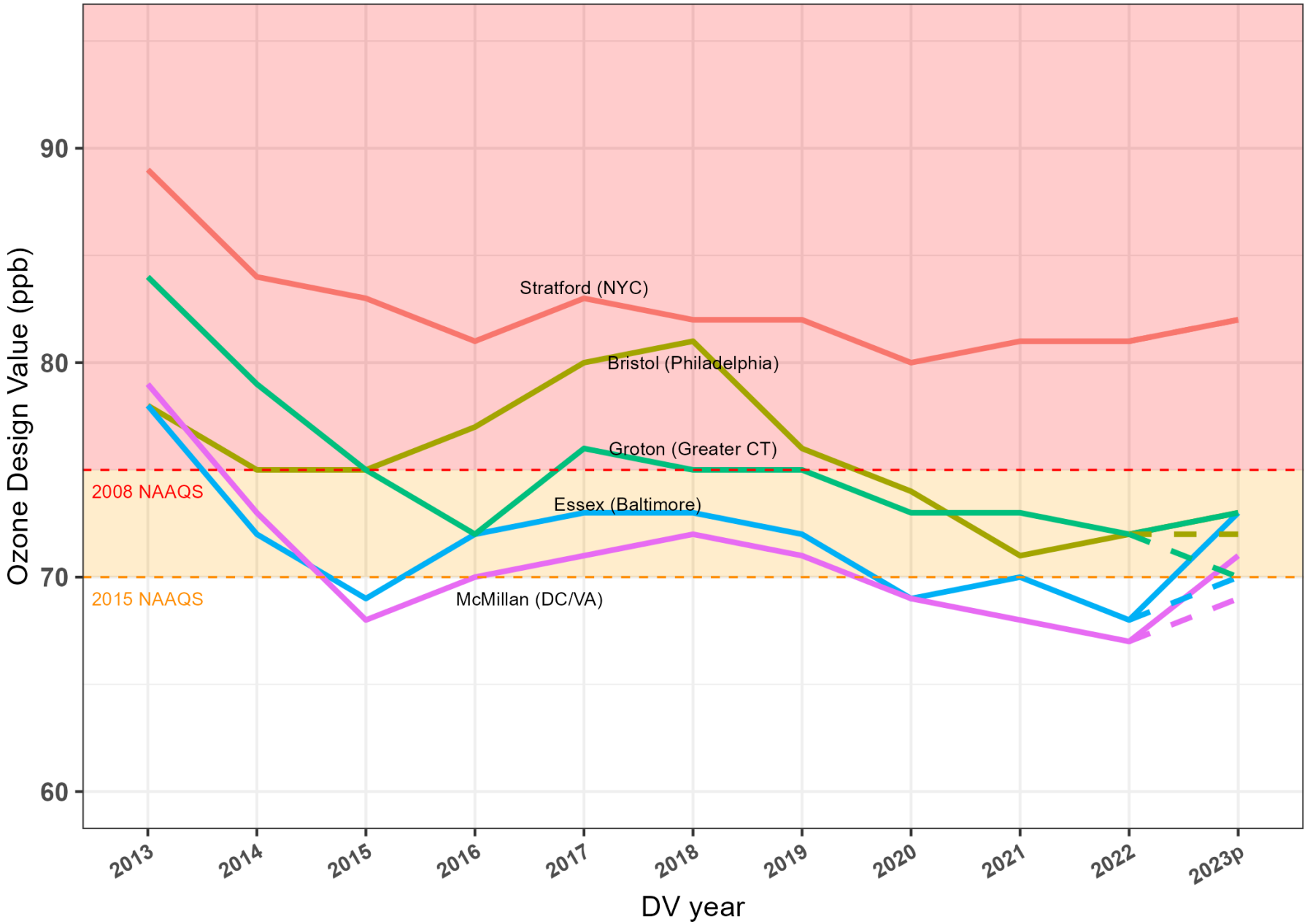


Data prepared by Marcus Chase (NH DES)

Preliminary 2022-24 Design Values (ppb)

Monitors w/22-24 DV in Violation of 2015 NAAQS			Preliminary (ppb)				
Agency	Site	AQS Code	22-24 DV	Max	2nd High	3rd High	4th High
CT	Greenwich	90010017	79	85	81	80	79
CT	Danbury	90011123	76	87	79	78	78
CT	Stratford	90013007	80	81	81	79	78
CT	Westport	90019003	80	87	86	85	82
CT	East Hartford	90031003	72	99	76	75	74
CT	Middletown	90079007	74	96	81	75	74
CT	New Haven (Criscuolo Park) (	90090027	72	88	81	78	77
CT	Madison	90099002	76	82	80	75	74
NJ	Lawrence (Rider University)	340210005	71	80	80	76	76
NJ	East Brunswick (Rutgers Uni	340230011	71	81	81	77	72
NY	NYC (Queens College) (comb	360810124	71	74	70	69	69
NY	East Farmingdale (Babylon)	361030002	72	80	71	70	69
NY	Old Field (Flax Pond)	361030044	72	79	72	72	70
NY	White Plains	361192004	71	83	77	76	75
PA	Bristol	420170012	72	85	82	80	76
RI	South Kingstown (East Matu	440090008	71	84	73	70	68

Time Series of Ozone Design Values (ppb)

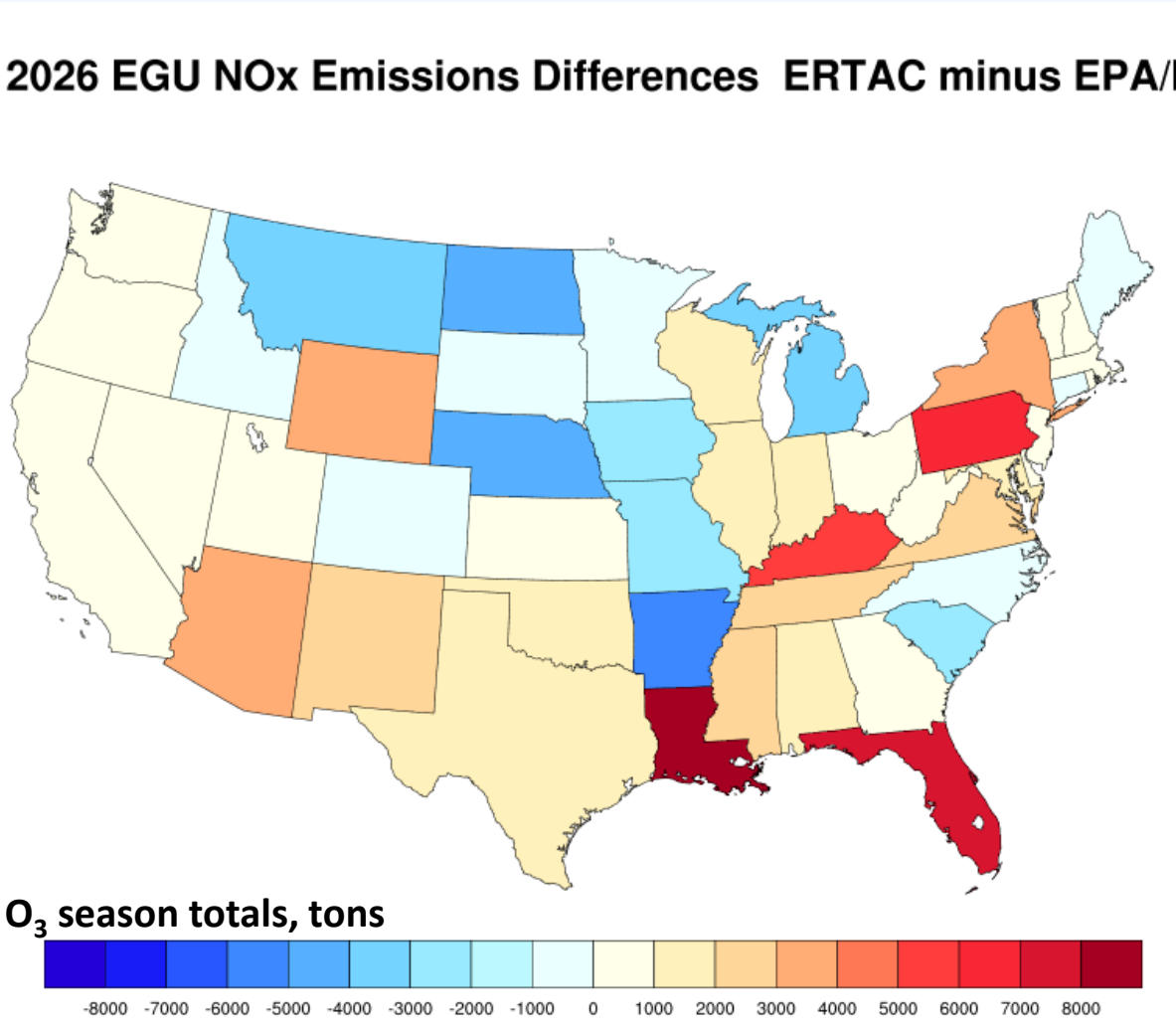


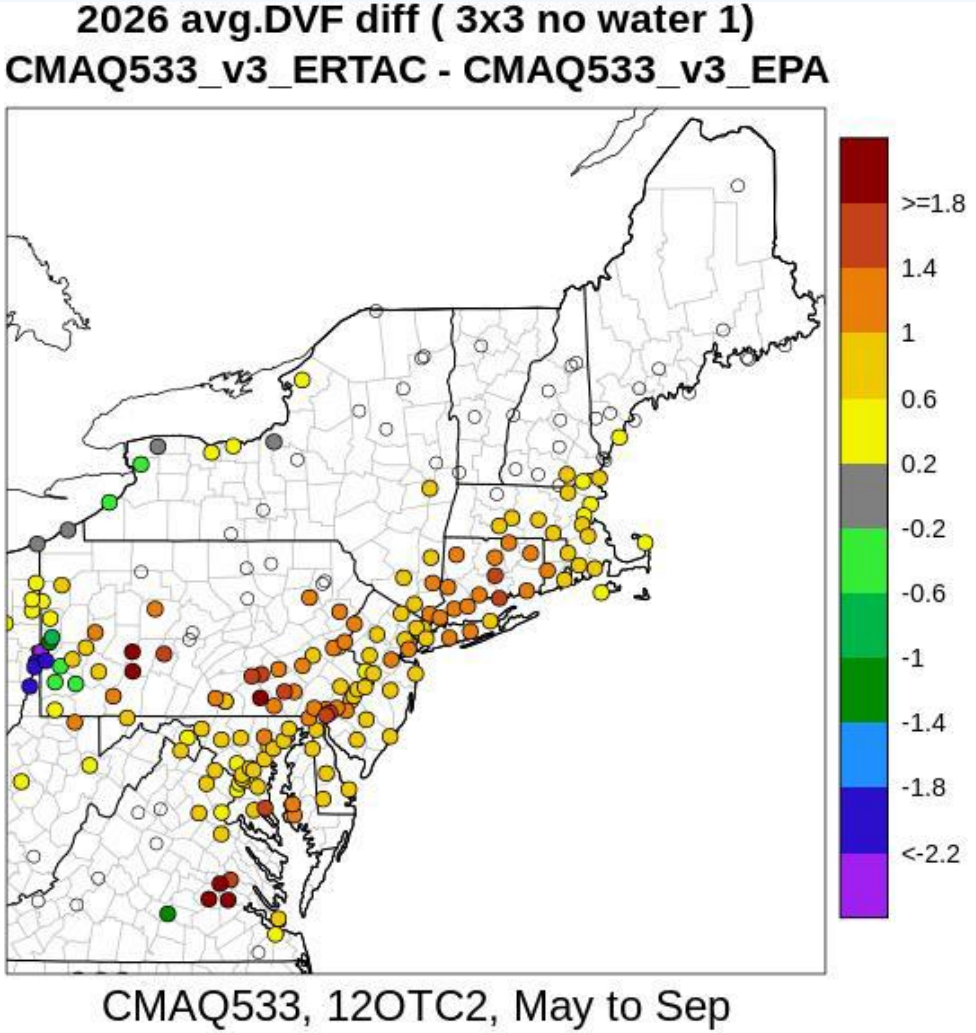
Stratford (NYC)
Bristol (Philadelphia)
Groton (Greater CT)
Essex (Baltimore)
McMillan (DC/VA)

Ongoing Initiatives

- Work with EPA, states, MJOs on next regional modeling platform – 2022 base year, with analytic years 2026, 2032, 2038
    - 2022v1 underwent state/MJO review in April
    - 2022v1 to be released September/October, analytic years later in 2024
    - 2022v2 to be released in 2025, including base and analytic years
    - Initial AQ modeling to focus on base year evaluation and 2026
- Comparisons of two EGU power production tools – ERTAC and IPM
- Collaborate with SAS Committee to design episodic modeling scenarios
    - Whole home electrification – revising emission factors and model re-run
    - ICI wood boilers – initial modeling results
- Comparison of 2023 observed and modeled projected O_3
- Local and regional impacts on O_3 in LISTOS region
- In process of retrieving 4km 2016 CONUS WRF from EPA for distribution upon request

ERTAC vs IPM Projections





- ERTAC NOx emissions are greater than those from IPM, leading to higher 2026 DVFs for ozone

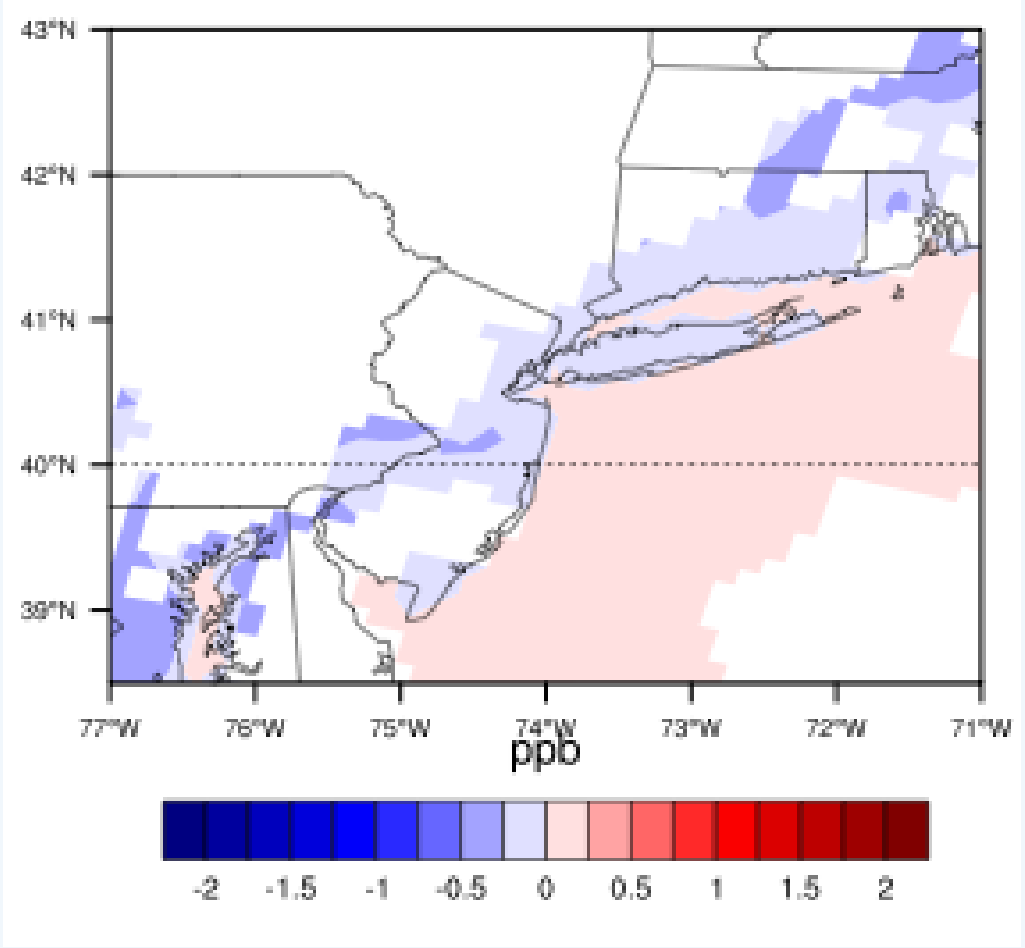
Whole Home Electrification

- Changed electricity demand with current fuel mix was applied per state
- Electricity demand decreased 4-10% in summer (increased cooling efficiency), and mostly increased in winter (fossil fuel space heating replaced by electric heat pumps)
    - The exception in winter is the southern OTR, where more efficient heat pumps would replace electric resistance space heating
- Water heating spread evenly throughout the year
- Air quality modeling findings:
    - MDA8 O_3 decreased by about 0.5 ppb on high (>60 ppb) O_3 days, with isolated O_3 increases near NYC due to reduced NOx titration
    - Wintertime $PM_{2.5}$ decreased as much as 1 $\mu g/m^3$ regionally, and >1 $\mu g/m^3$ in NYC – reduced nitrate accounts for a substantial portion of the $PM_{2.5}$ decrease

ICI Wood Boiler Screening Modeling

- Test case to see domain-wide impact from ICI Wood Boilers
  - Zeroed out known SCCs containing ICI Wood Boilers. SCCs determined in collaboration with NESCAUM, MARAMA, OTC SAS.
- Modeled July-August 2023 with CMAQ 2016v2 emissions platform
- ICI Wood Boiler impacts on MDA8 O_3 greater than 60 ppb are generally less than 1 ppb; 0.7+ ppb in parts of ME, NH, MD, and MA

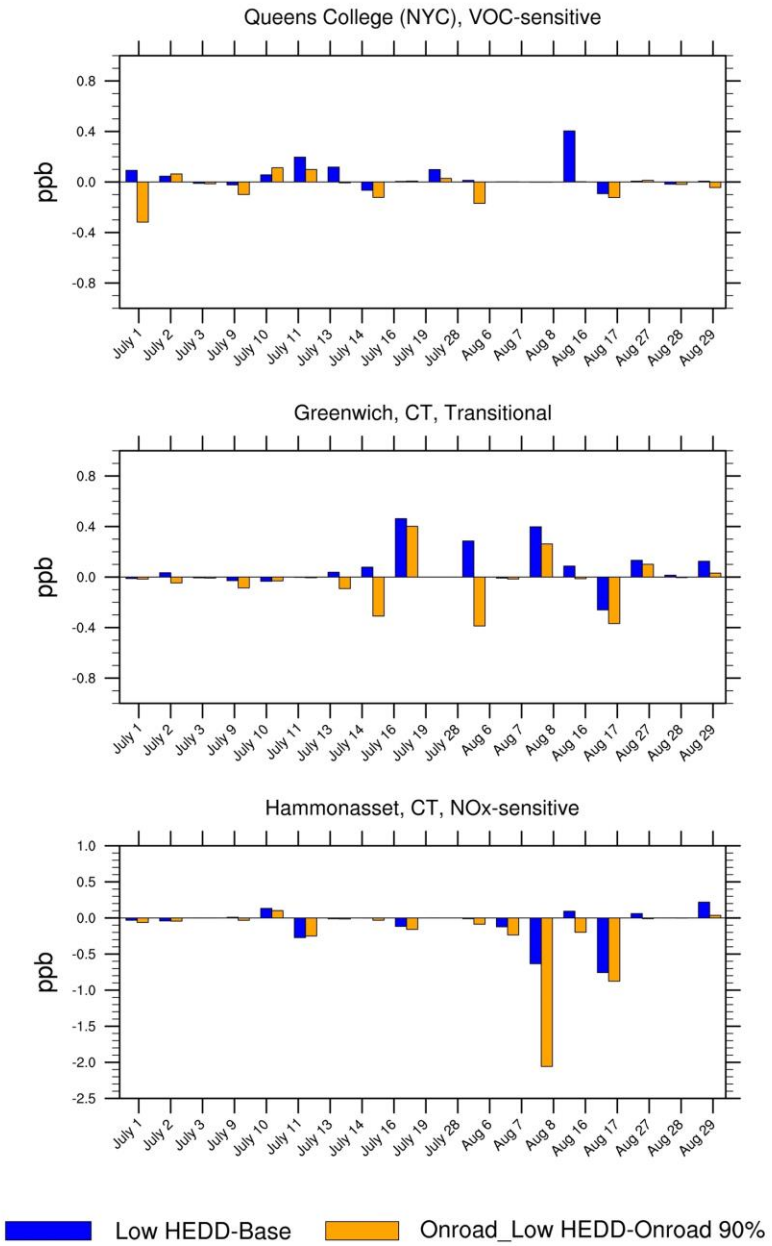
July 2023 ICI Wood Boiler Impact when MDA8 > 60 ppb



2023 Observed vs Projected Ozone

- CMAQ 2023 O_3 projected from 2016 base year
- 190 monitors in the OTR/VA
- 141 sites: more observed than projected exceedances
- 5 sites: more projected than observed exceedances (coastal sites in CT, MA, and RI)
- Wildfire smoke had obvious impacts on observed O_3 in 2023
- OTC modeling has shown that modeled O_3 projections are generally more optimistic than observed O_3 in recent years

Local and Regional Impacts on Ozone in LISTOS Region



- Karambelas et al., publication at *Journal of Air and Waste Management Association*, co-authors include Paul Miller, Jeff Underhill (NH), Eric Zalewsky (NY), and Joseph Jakuta (DC)
- Transition to more NOx-sensitive with 90% reduction in onroad emissions, leading to more net benefits in reducing localized sources like HEDD EGUs

Karambelas et al., *Ozone sensitivity to high energy demand day electricity and onroad emissions during LISTOS,* JA&WMA

Thank you!

Model Committee Chairs

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Emissions Inventory Lead

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O_3 Season Updates

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