

**OTC /MANE-VU Committee Meeting**

**November 17, 2016**

**Washington DC**

**Ali Mirzakhali, P.E.  
Stationary and Area Source Committee**



**OZONE TRANSPORT COMMISSION**

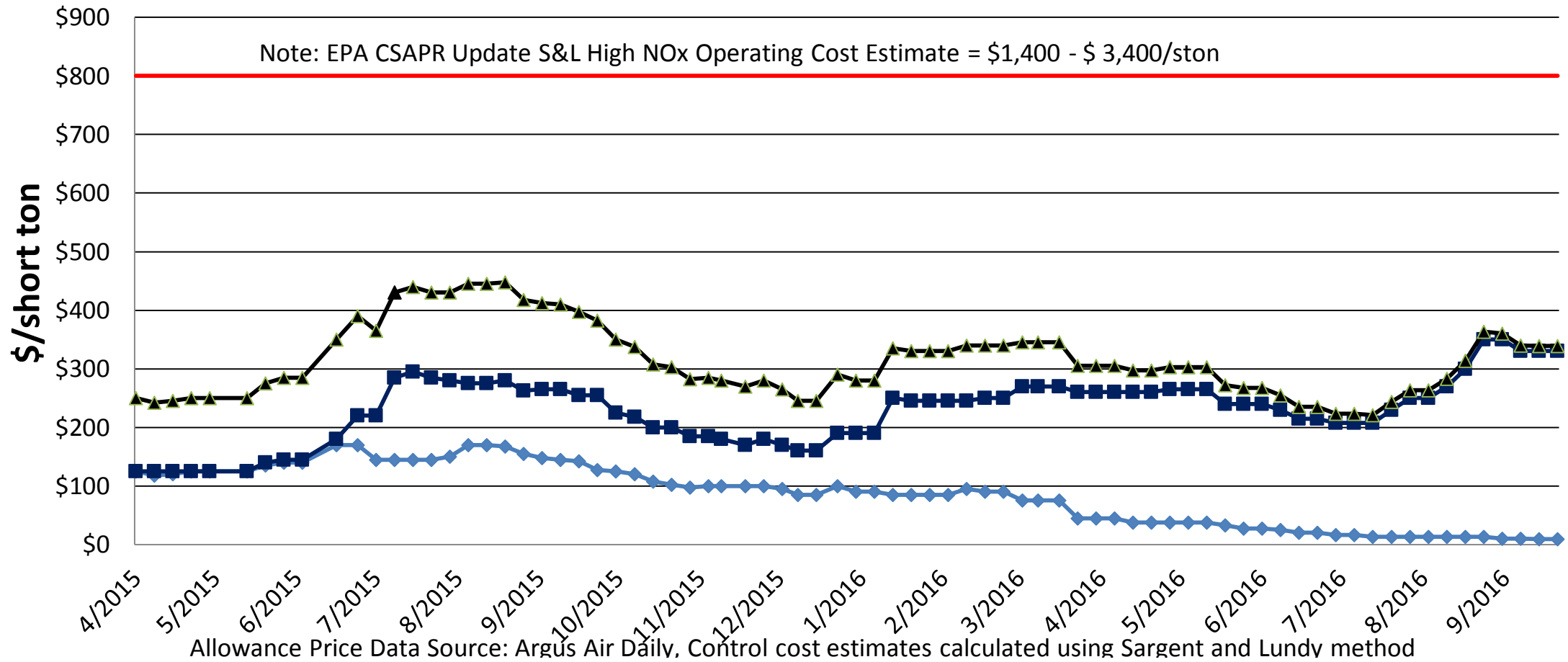
# Top 25 2016 Ozone Season CSAPR State NO<sub>x</sub> Emitters

State	Facility Name	Facility - Unit ID	Avg. NO <sub>x</sub> Rate (lb/MMBtu)	NO <sub>x</sub> (tons)	2017 Allocations	SCR?	Best Observed Rate (lb/mmBTU)	Year
LA	Ninemile Point	1403-4	0.394	3,918	662			
MO	New Madrid Power Plant	2167-2	0.457	3,832	695	Yes	0.094	2009
IN	Rockport	6166-MB2	0.195	3,444	2,153			
OH	W H Zimmer Generating Station	6019-1	0.199	3,239	1,063	Yes	0.056	2006
MO	New Madrid Power Plant	2167-1	0.709	3,000	681	Yes	0.090	2008
LA	Ninemile Point	1403-5	0.346	2,922	746			
TX	Oklunion Power Station	127-1	0.302	2,791	1,000			
AR	Independence	6641-1	0.273	2,686	980			
IN	Rockport	6166-MB1	0.197	2,578	2,229			
AR	Independence	6641-2	0.247	2,528	1,006			
AR	White Bluff	6009-1	0.356	2,460	1,084			
WV	Fort Martin Power Station	3943-1	0.293	2,416	590			
PA	Brunner Island, LLC	3140-3	0.401	2,414	452			
TX	Limestone	298-LM2	0.198	2,369	1,482			
IN	Cayuga	1001-2	0.296	2,320	723			
PA	Montour, LLC	3149-1	0.379	2,316	478	Yes	0.044	2003
MO	Thomas Hill Energy Center	2168-MB3	0.233	2,225	907	Yes	0.054	2009
PA	Montour, LLC	3149-2	0.233	2,225	432	Yes	0.047	2003
IA	Walter Scott Jr. Energy Center	1082-3	0.373	2,129	1,052			
PA	Cheswick	8226-1	0.196	2,128	310	Yes	0.060	2003
VA	Clover Power Station	7213-1	0.356	2,460	349			
WV	Harrison Power Station	3944-3	0.277	2,052	696	Yes	0.066	2005
MO	Thomas Hill Energy Center	2168-MB2	0.186	2,033	397	Yes	0.066	2009
PA	Bruce Mansfield	6094-3	0.185	2,009	656	Yes	0.074	2005
WV	Harrison Power Station	3944-2	0.241	2,004	648	Yes	0.067	2006

**Many Units with SCR Continue to Operate above the Best Observed Rate (BOR)**

# CSAPR Allowance Prices (4/17/15 - 10/7/16)

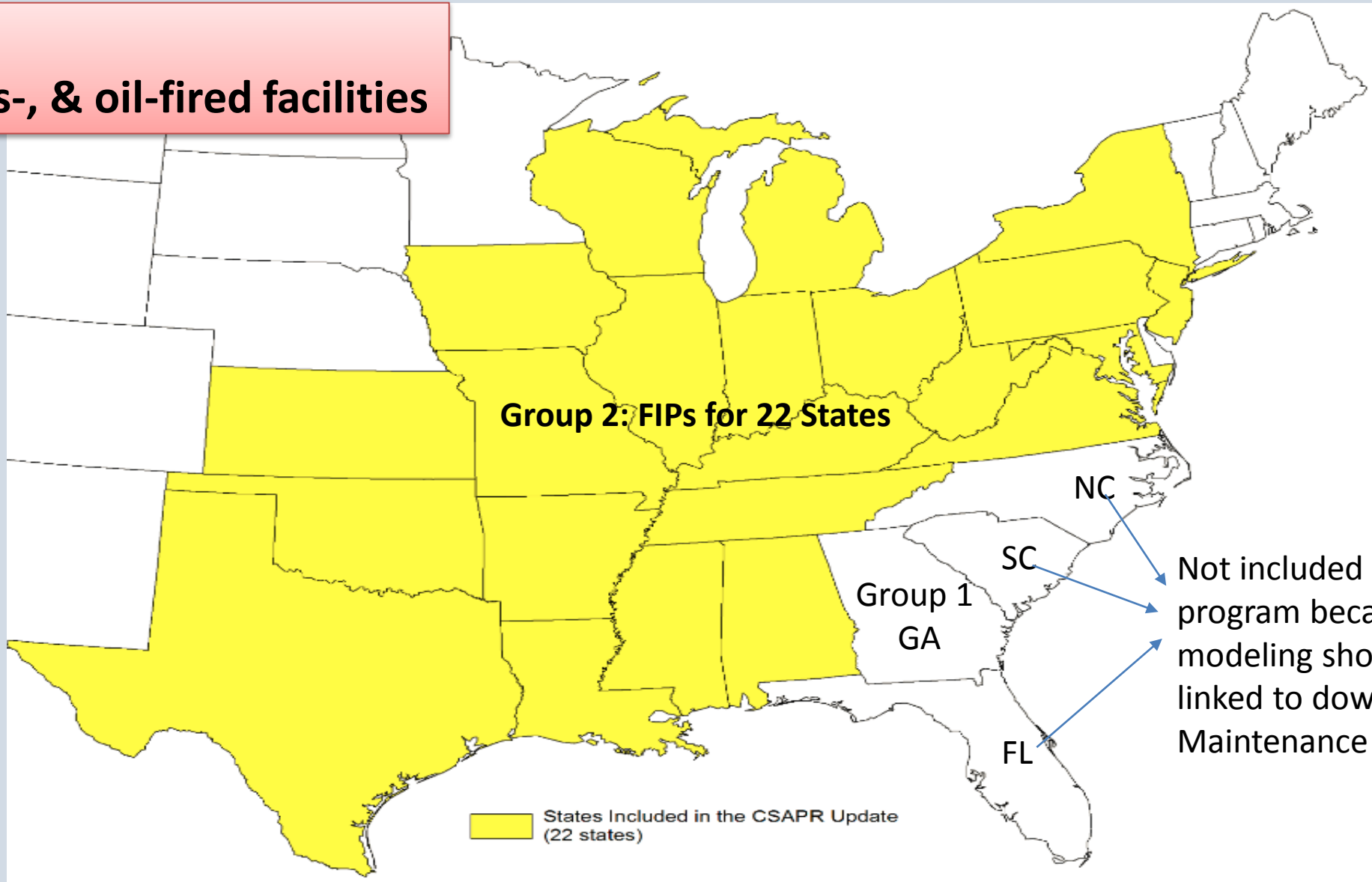
◆ Annual NOx    ■ Ozone Season NOx    — EPA S & L Low NOx Operating Cost Estimate    ▲ Annual NOx + Ozone Season NOx



**Still Cheaper to Buy Allowances than to Run Controls in most cases!**

# Final CSAPR Update for 2008 Ozone NAAQS - 9/7/2016

**2,875 EGUs**  
**886 coal-, gas-, & oil-fired facilities**



OS = Ozone season

# Final CSAPR Update for 2008 Ozone NAAQS (Cont'd)

Aligns compliance with July 2018 moderate attainment date for 2008 O<sub>3</sub> NAAQS

States can replace FIPs with approvable SIPs starting in 2018

One-time conversion of limited number of banked 2015 & 2016 NO<sub>x</sub> allowances

- Conversion limits banked NO<sub>x</sub> allowances to 99,700 tons

This Update + other current changes in EGU regulations

- 20% or ~80,000 ton OS NO<sub>x</sub> reduction in eastern US in 2017 relative to 2015;
- Total economic benefits = \$880 million/year (in 2011\$) mostly from health care.

**OTC → EPA: Update helps meet “Good Neighbor” obligations but still only a partial remedy**

# High Electricity Demand Days (HEDD)

## **Committee Charge:**

### Demand and Emergency Generator Information

- Estimate emissions from demand response generation units used on HEDDs;
- Collaborate with other OTC Committees to analyze and better understand the air quality impacts;
- Recommend potential control strategies to the Commission.

## **Workgroup Progress:**

- ✓ Ongoing Work: Data Acquisition and Analysis;
- ✓ Work Products Delivered: Draft Whitepaper; Draft Recommendations;



# HEDD Workgroup Update

## Three separate but related HEDD analyses on:

- a) NO<sub>x</sub> contributions from peaking and other EGU types in OTR on HEDDs
- b) NO<sub>x</sub> reductions achieved if all these units controlled more effectively

### 1. Smaller EGUs not in CAMD ( <25 MW)

- Annual emissions and locations known & in the modeling inventory but not temporally allocated properly

**Completed Last Spring**

### 2. Back-up Generators (BUGs)

- Estimated total emissions for each ISO (ISO-NE, NY-ISO, PJM)
- Apportioned daily emissions to hours of day and to county level
- Assigned emissions to model episode days

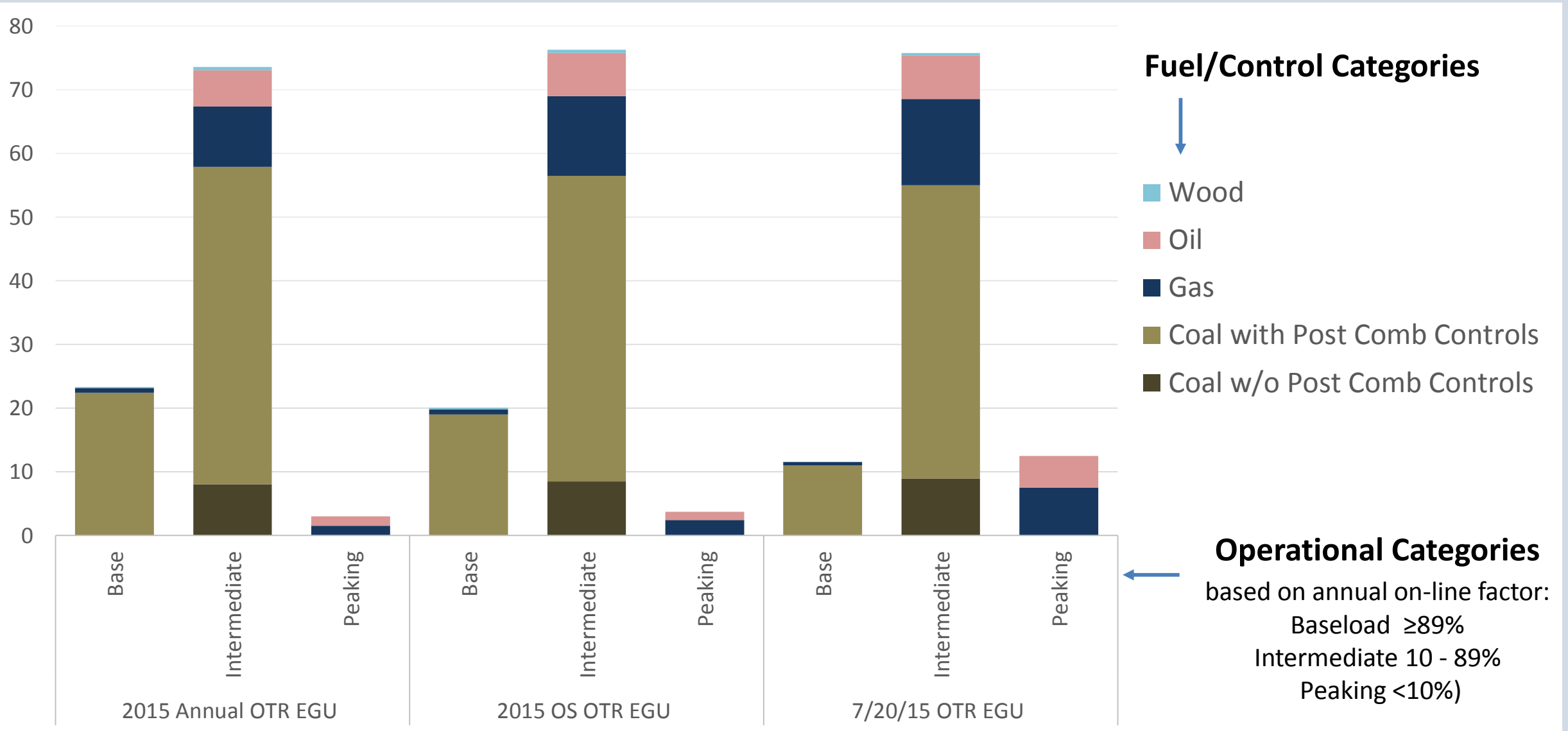
### 3. Peaking Units EGUs in CAMD ( >25 MW)

- Operate <10% over 3 years and <20% annually
- Hourly emissions and locations known & in modeling inventory

**Completed This Fall**

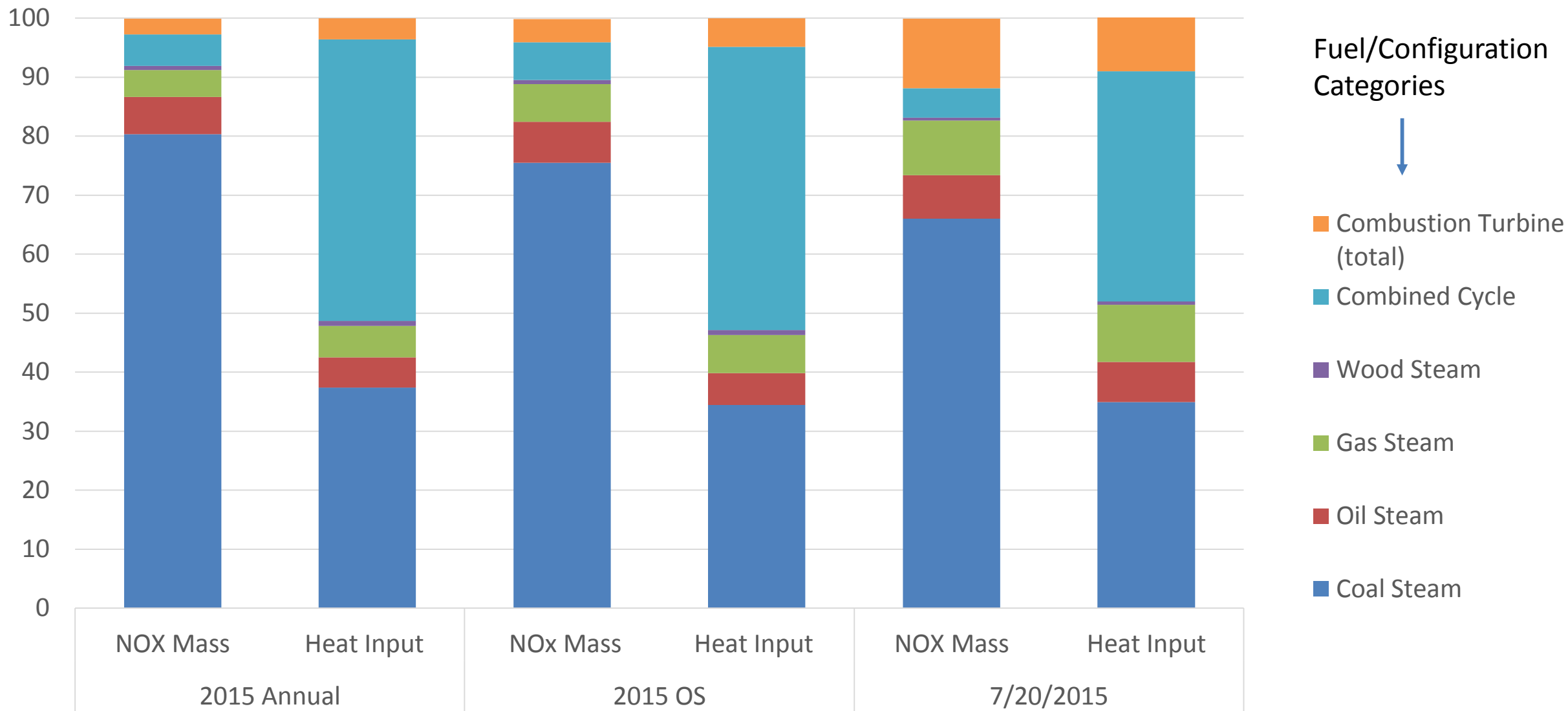


# EGU Category, % Contribution to NO<sub>x</sub> Mass, 2015





# EGU Category, % Contribution to NO<sub>x</sub>, 2015



# EGU Control Optimization Analysis

**July 20, 2015 Episode Day *in the OTR***

## Combustion Turbines

**What if CTs listed in AMPD as having no NO<sub>x</sub> controls used controls (e.g. water injection, low-NO<sub>x</sub> combustors) to meet “moderate RACT” levels of 42 ppm NO<sub>x</sub> for gas and 88 ppm NO<sub>x</sub> for oil?**

- Estimated 21 ton NO<sub>x</sub> reduction (34% reduction) for 7/20/15 in the OTR

## Coal Units

**What if all coal-fired EGUs with existing NO<sub>x</sub> controls operated at or near their best historic NO<sub>x</sub> rates?**

- NO<sub>x</sub> reduction potential for 7/20/15:
  - Coal units with SCR ~167 tons
  - Coal units with SNCR ~7 tons
- Adding controls to uncontrolled units provides an additional ~10 tons
- Total NO<sub>x</sub> reduction potential ~184 tons
  - ~32% of all fossil EGUs operating in OTR on 7/20/15

# Workgroup Summary & Conclusions

## Small EGUs

- Improved temporal profiles → 7-fold increase in peak day NO<sub>x</sub> compared to default profiles
- Increase in predicted peak day O<sub>3</sub> concentrations of up to 5 ppb with improved profiles

## BUGs

- ~22 - 91 tons per “event” of additional NO<sub>x</sub> in the Northeast if BUGs responded to a widespread demand event in an unlimited manner
- Increase in predicted event day O<sub>3</sub> concentrations of 1 ppb
- Review of state regulations → states are doing well in regulating these types of engines, i.e. true emergency use only, otherwise must be permitted and/or meet strict NO<sub>x</sub> limits

## Peaking Units

- Peaking units contributed ~6 - 34% of total OTR EGU NO<sub>x</sub> mass for the episode days analyzed
- Estimated NO<sub>x</sub> reduction potential in the OTR on 7/20/15:
  - 21 tons for combustion turbines
  - 184 tons for coal-fired EGUs

# Workgroup Recommendations

## Small EGUs

- ✓ Incorporate improved temporal profiles into photochemical modeling platforms - Complete

## BUGs

- Maintain and improve both:
  - State regulations pertaining to the use of stationary diesel engines
  - Enforcement efforts
- Conduct outreach and education regarding the proper use of such engines

## Peaking Units

- Where not done so already, adopt NO<sub>x</sub> RACT for gas and oil combustion turbines
- Pursue rulemaking or other mechanisms to ensure that all EGU types meet their best historic NO<sub>x</sub> rates at all times during the ozone season
- Pursue HEDD-based rules (e.g. New Jersey's HEDD Rule)

# Public Comments on HEDD White Paper

## Environmental Energy Alliance of New York

- Generally agreed with most of the analyses and recommendations**

- Made suggestions for Modeling work**

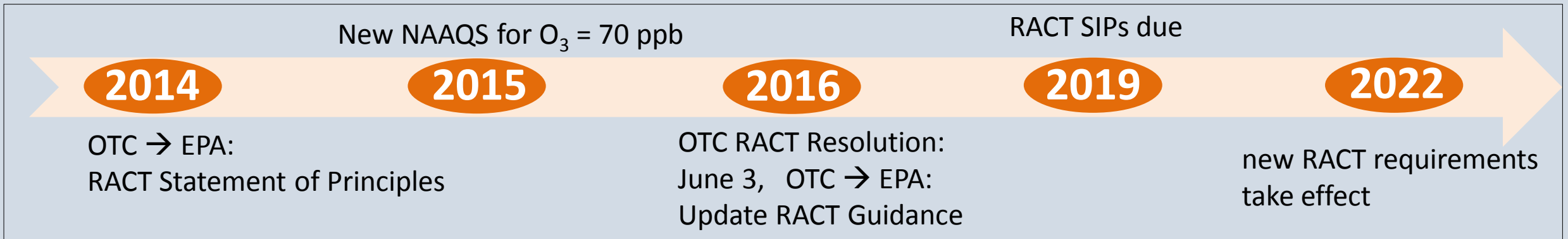
The workgroup recommends reviewing them for future analysis; some of them are already under consideration by the modeling committee, e.g. use of smaller grid sizes and refined emissions inventories, resolving complex land-sea interface transport, etc.

- Offered its own analyses and observations on NY state's changing emissions landscape and the efficacy of source controls in reducing ozone transport**

- Cautioned that RACT controls (for sources like combustion turbines) must pass the economic feasibility tests**

**Final Draft of White Paper - Posted on OTC website, after addressing Stakeholder Comments**

# RACT Workgroup



## Committee Charge:

For each OTR state, develop list of emission rates and ranges determined to be RACT for significant NO<sub>x</sub> and VOC source categories

**Draft NO<sub>x</sub> RACT Whitepaper:** First Draft posted on OTC website; Will forward final draft to EPA for use in RACT Guidance

Covers 8 (non-EGU) source categories, NO<sub>x</sub> emissions limits, RACT Rules adopted by OTC states for 2008 O<sub>3</sub> NAAQS

<b>Industrial/Commercial/Institutional Boilers</b>	<b>Stationary Gas (Combustion) Turbines</b>
<b>Municipal Waste Combustors</b>	<b>Stationary Reciprocating Engines</b>
<b>Cement Kilns</b>	<b>Hot Mix Asphalt Production Facilities</b>
<b>Glass Furnaces</b>	<b>Natural Gas Pipeline Compressors</b>



# Technical Support Documents

- ✓ Work Product from OTC stationary and mobile sources workgroups:  
Draft NO<sub>x</sub> and VOC Technical Support Documents

## **We finalized the NO<sub>x</sub> and VOC TSDs now because:**

- They have never been published for any of the 2009 model rules
- Some states need to cite these documents in their SIPs.
- The TSDs now include 2 CP updates, an AIM update, ICI boiler rule updates, previously missing solvent degreasing model rule, and two mobile source rules.
- Collating of the TSDs into a single package for easy reference.

**TSDs posted on OTC website**

# Questions?



# Extra Slides

# Small Electric Generating Units (EGUs) (<25 MW)

## **SMOKE processing of small EGUs (<25 MW): is the model getting peak day emissions right?**

- Annual emissions are known
- Typically operate for limited time periods:
  - HEDD periods (aka peak days)
  - When larger units are offline for maintenance
  - When necessary to ensure grid reliability

## **Large units' operating profiles developed from hourly CEMS data, but what about the smaller units – those without CEMS?**

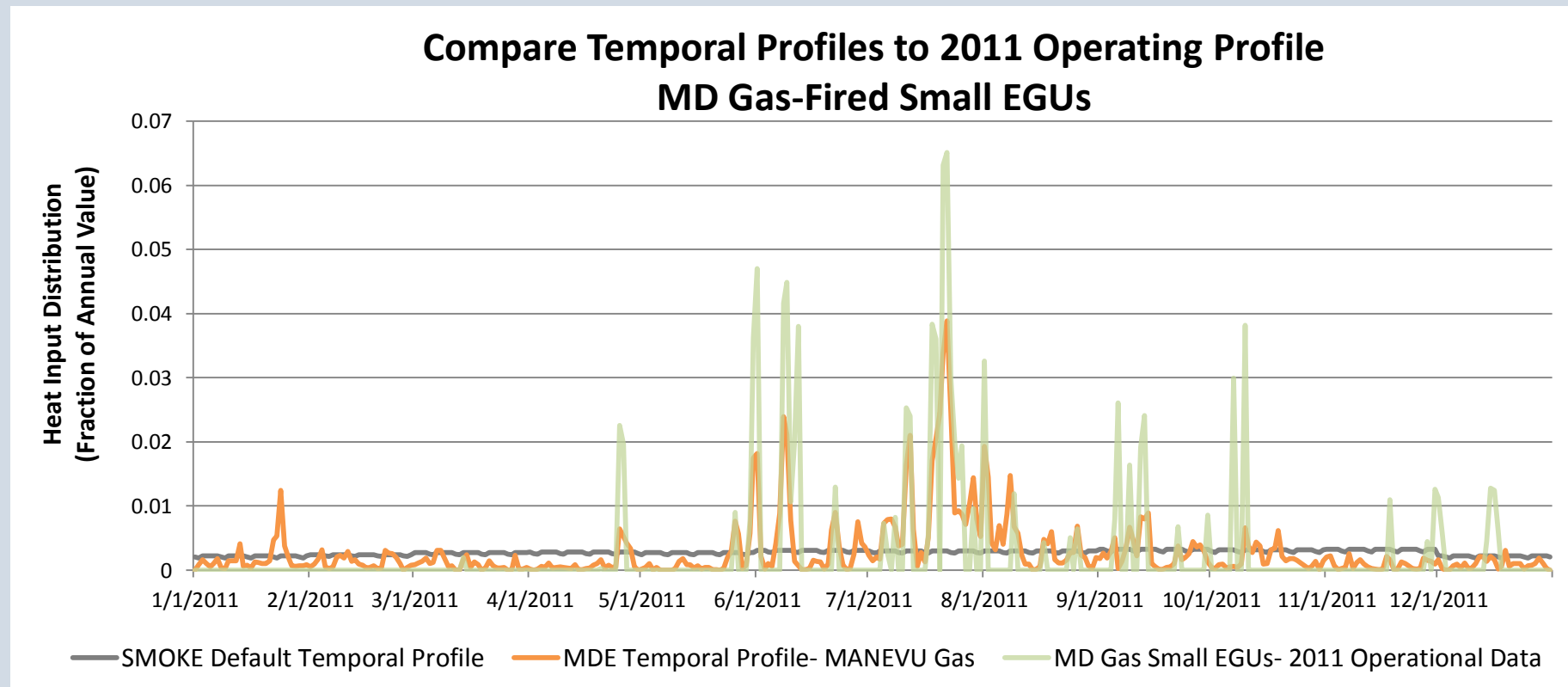
- Annual emissions known
- Temporal profiles used to distribute emissions to the hour

## **MDE developed more realistic temporal profiles for coal, oil, and gas-fired EGUs <25 MW.**

- Profiles for these units should show limited annual operation, but high peak day operation

# Temporal Profiles for Small EGUs (<25 MW)

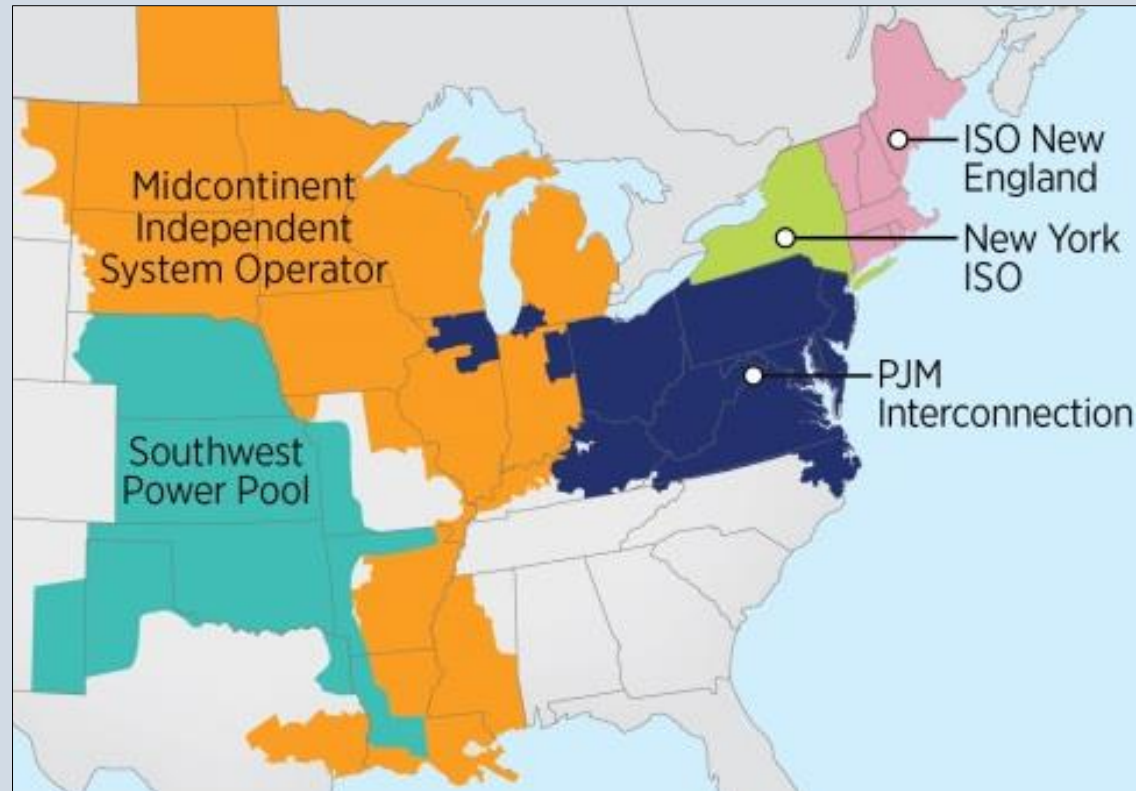
- Not adding additional emissions to the inventory – simply changing the hourly distribution of annual emissions
- Default temporal profiles smear emissions fairly evenly throughout the year
- MDE's new temporal profiles allocate emissions based on CAMD data from peaking units
  - MDE also collected 2011 operating data from MD gas-fired small EGUs. New temporal profile closely matches actual operating profile.



# Emissions Estimates for BUGs

NO<sub>x</sub> Emissions in Tons/Day (or Tons/“Event”)

Region	Low Bound	High Bound
ISO-NE	8	32
NY-ISO	7	30
PJM	7	29

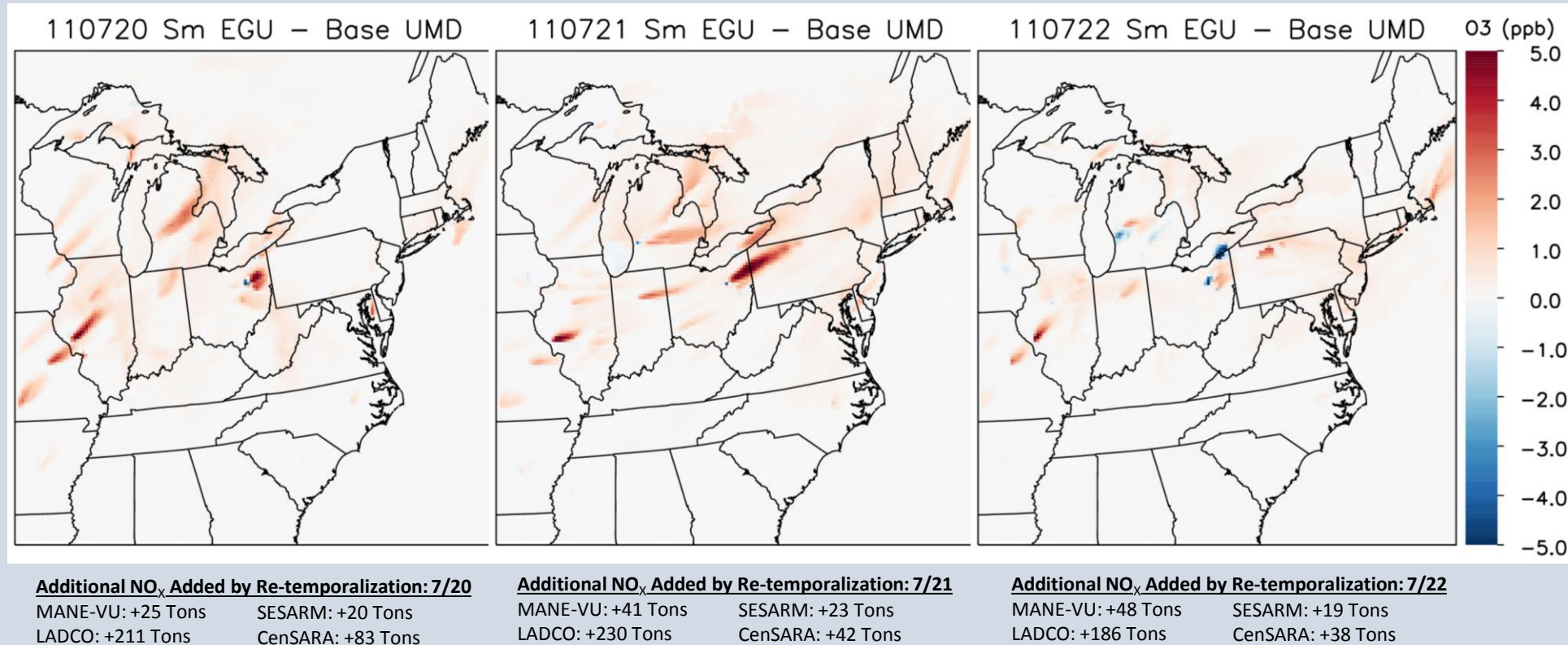




# Ozone Impact of Small EGUs (<25 MW)

July 20 – 22, 2011 Event Period

Preliminary Modeling Results

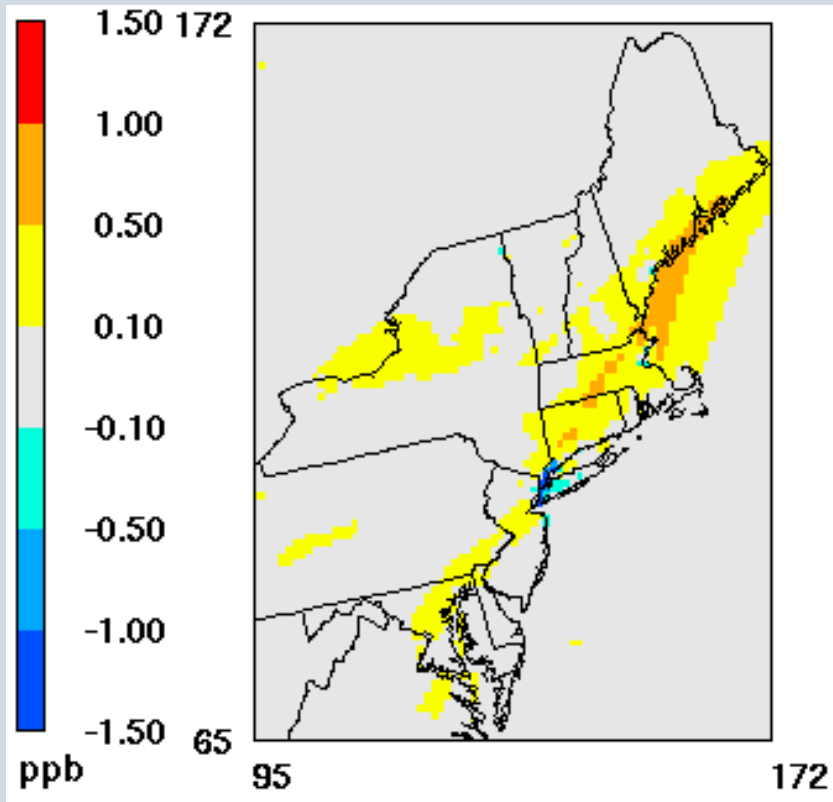


- Small EGU units can have an impact of up to **5 ppb** in some areas on HEDDs.
- On non-HEDDs impact of small EGU units is insignificant.

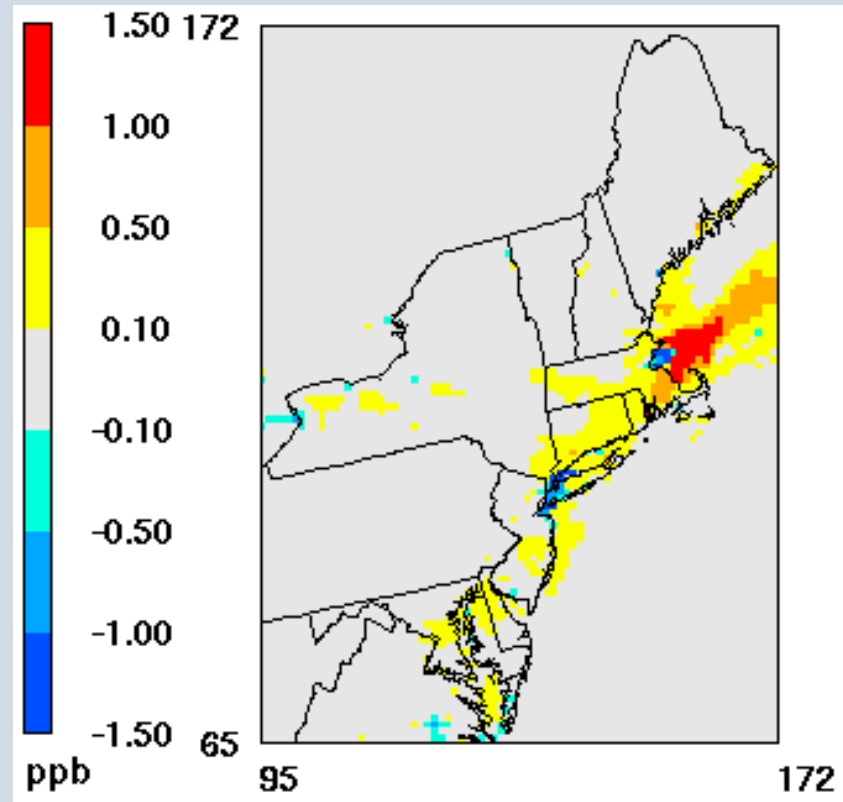
# Ozone Impact of BUGs

Difference in Daily Maximum 8-hour Ozone  
2011 Base w/ BUGs minus 2011 Base

July 21, 2011



July 22, 2011

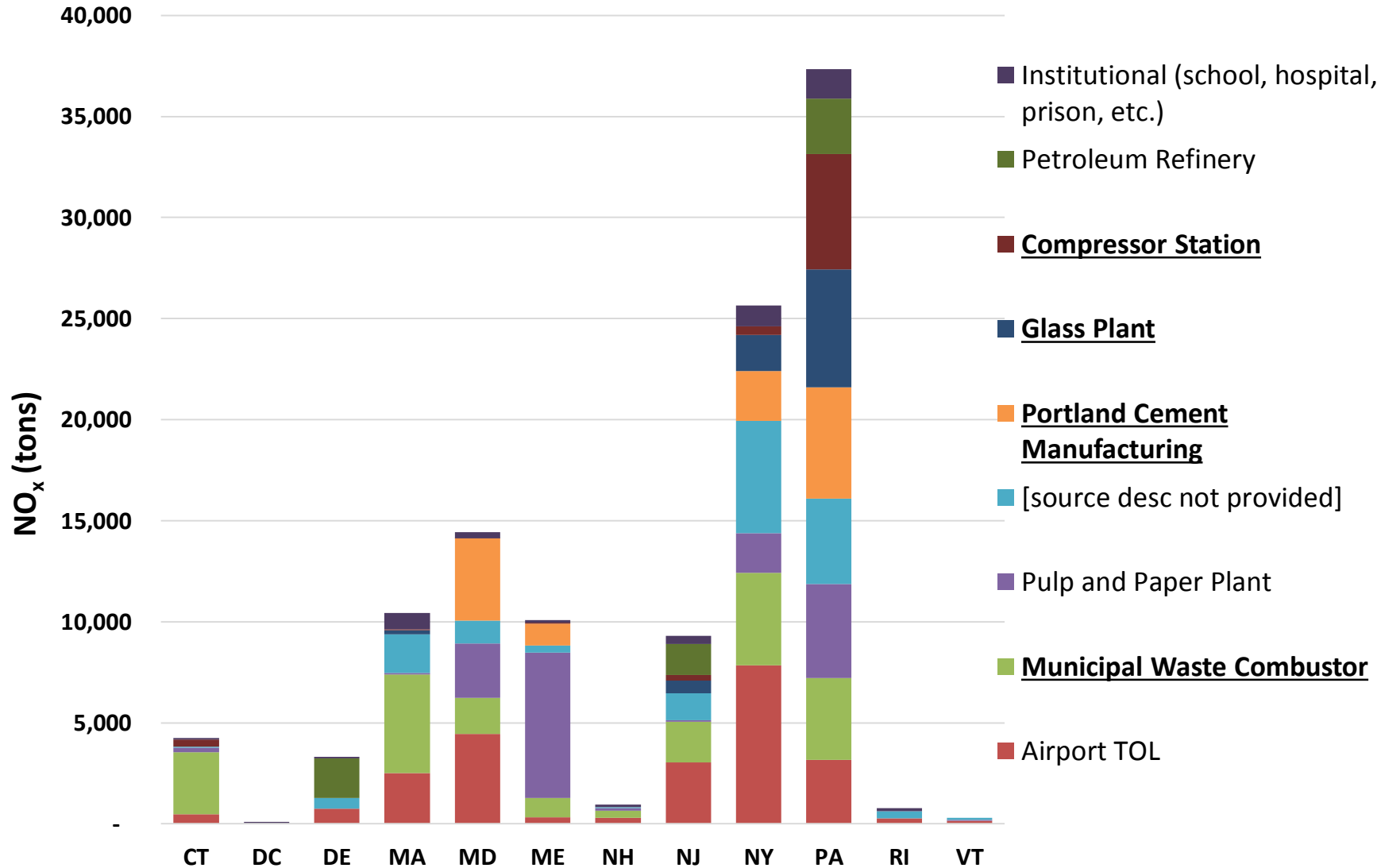


Thanks to NYSDEC for performing the SMOKE and CMAQ processing

# RACT Workgroup Charge: Develop emission rates / ranges determined to be RACT for significant NO<sub>x</sub> & VOC source categories in OTC states

## NO<sub>x</sub> Emissions from Non-EGU Stationary Sources

(2014 NEI v1, top 90% of OTR NO<sub>x</sub> source types, not including VA OTR)



## NO<sub>x</sub> RACT Whitepaper

8 (non-EGU) source categories

ICI Boilers

Stationary Gas (Combustion) Turbines

Stationary Reciprocating Engines

Hot Mix Asphalt Production Plants

Glass Manufacturing Plants

Cement Manufacturing Plants

Nat Gas Compressor Stations

Municipal Waste Combustors



- ✓ First Draft posted on OTC website
- ✓ Will convey Final Draft to EPA for use in Guidance