

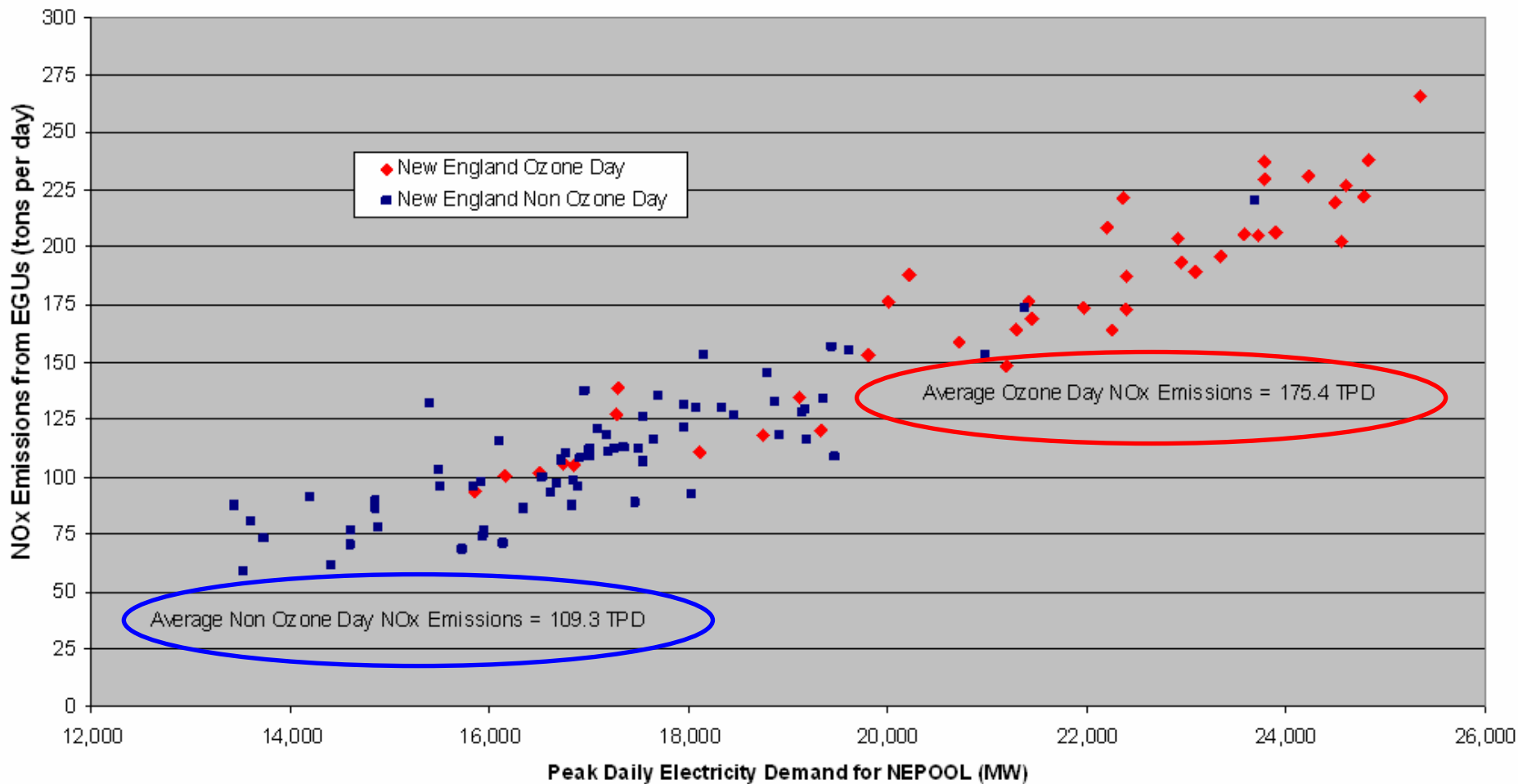
High Electric Demand Days & Air Quality

Chris Salmi
New Jersey DEP
June 6, 2006

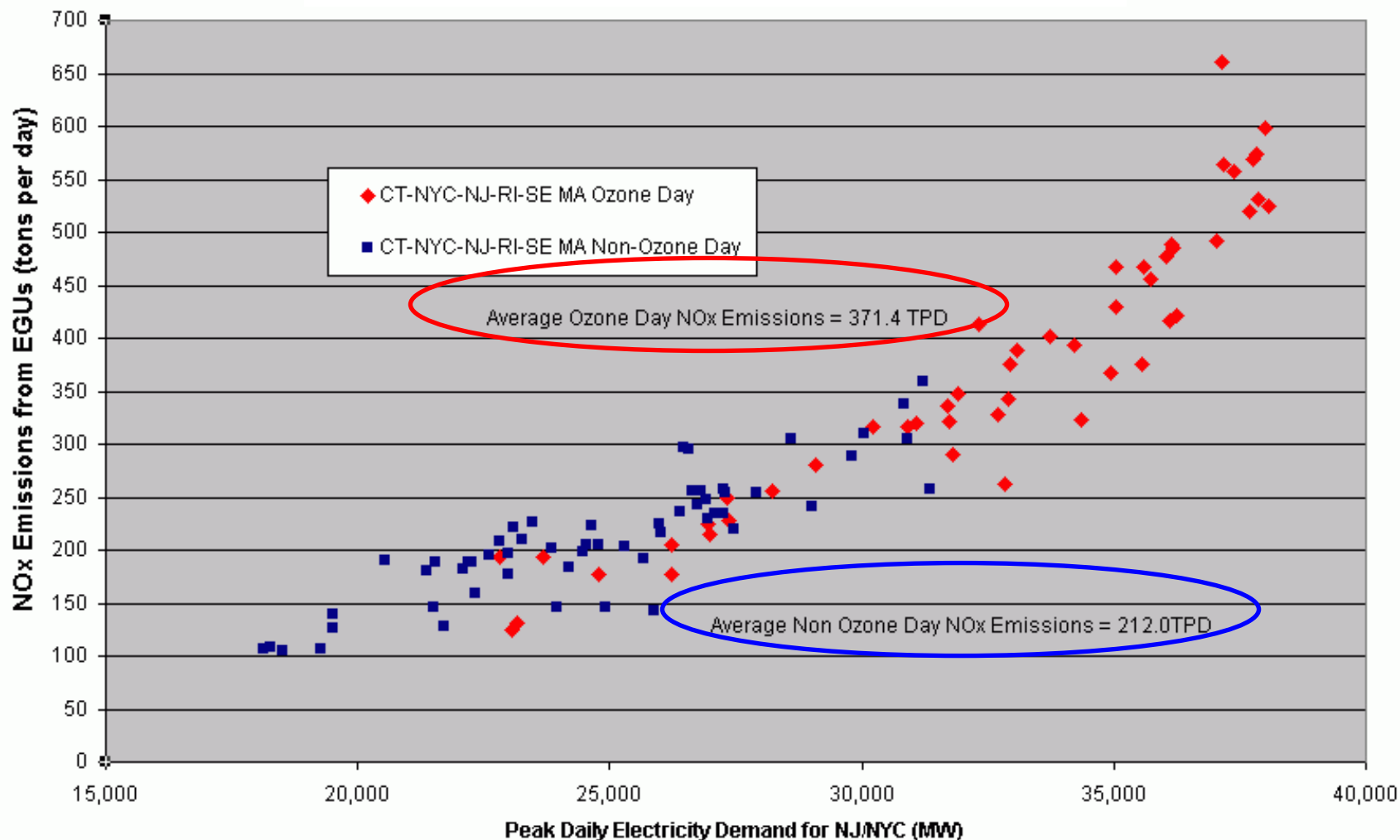
Three Points!

- **Emissions** from Electric Generating Units (EGUs) are **higher on high electric demand days**
- This results in **poorer air quality**
- It will take a **variety of solutions** to address this issue

NO_x Emissions Versus Peak Electricity Demand in New England on Ozone and Non-Ozone Exceedance Days (June 1- September 15, 2002)



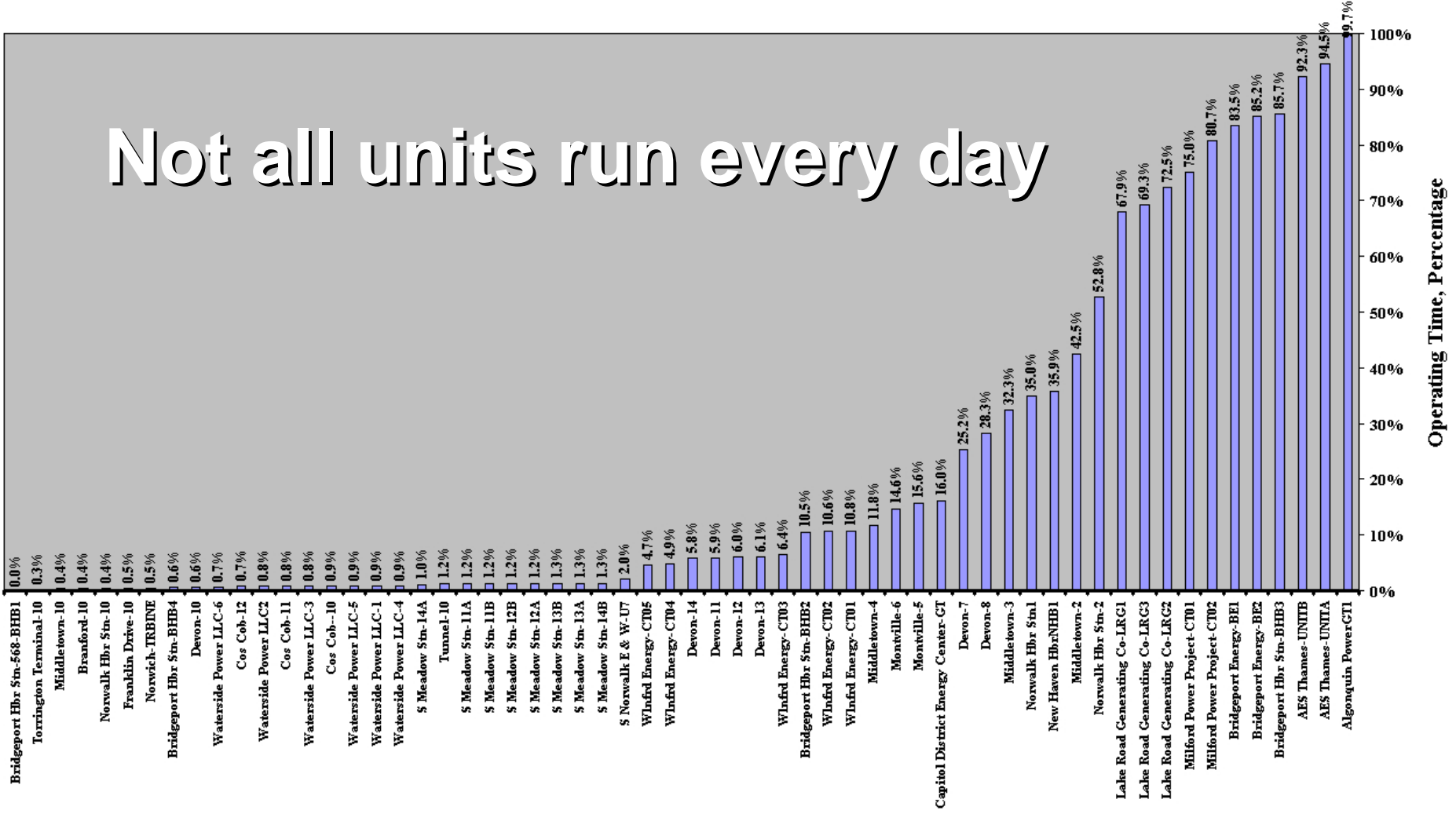
NO_x Emissions Versus Peak Electricity Demand in NJ/Downstate NY on Ozone and Non-Ozone Exceedance Days (June 1 - September 15, 2002)



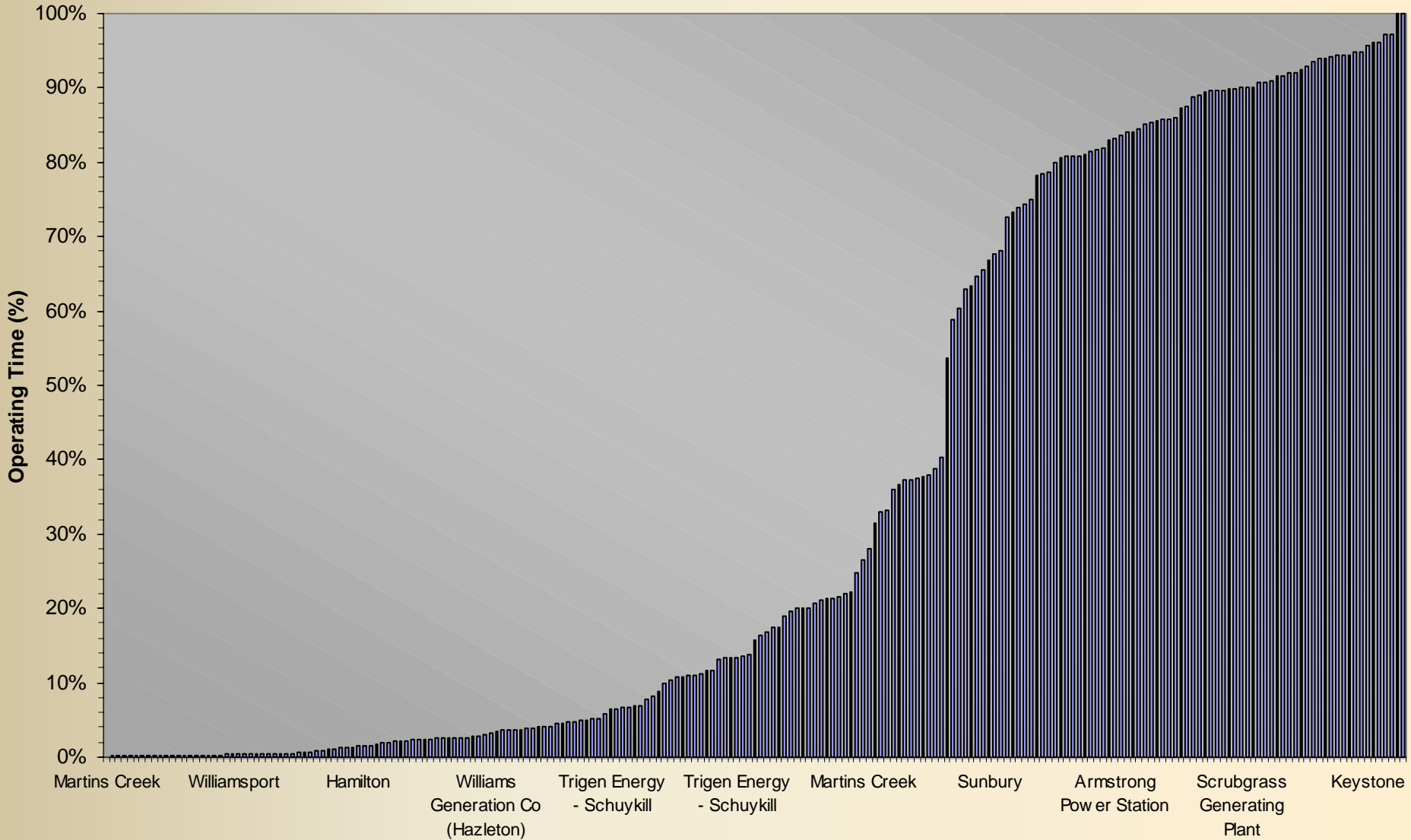
**The Mix of Generating
Units varies
by day and region**

CT Electric Generating Utility Average Percent Operating Time 2002-2005 Ozone Seasons

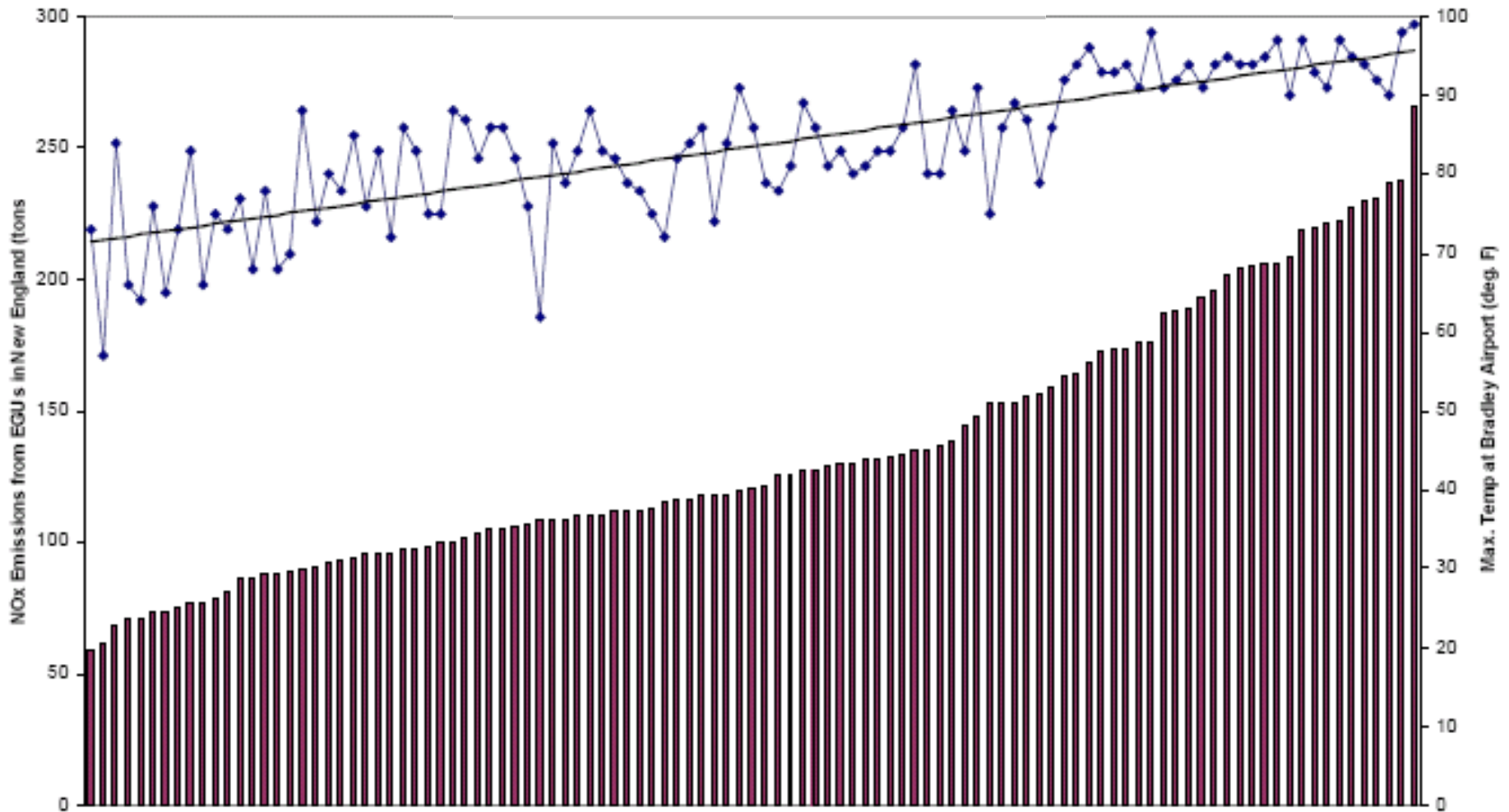
Not all units run every day



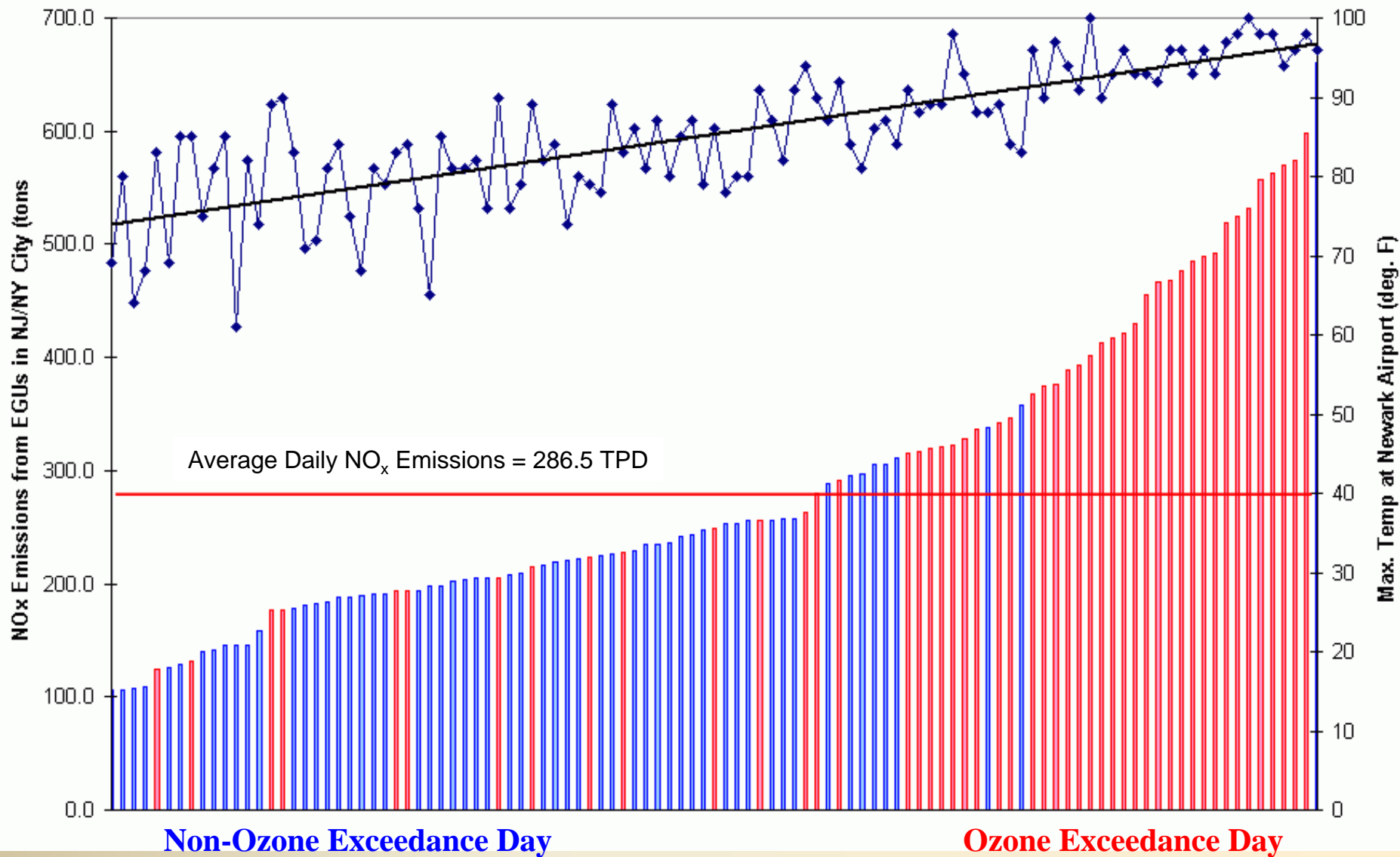
PA Electric Generating Utility Average Percent Operating Time 2002-2005 Ozone Seasons



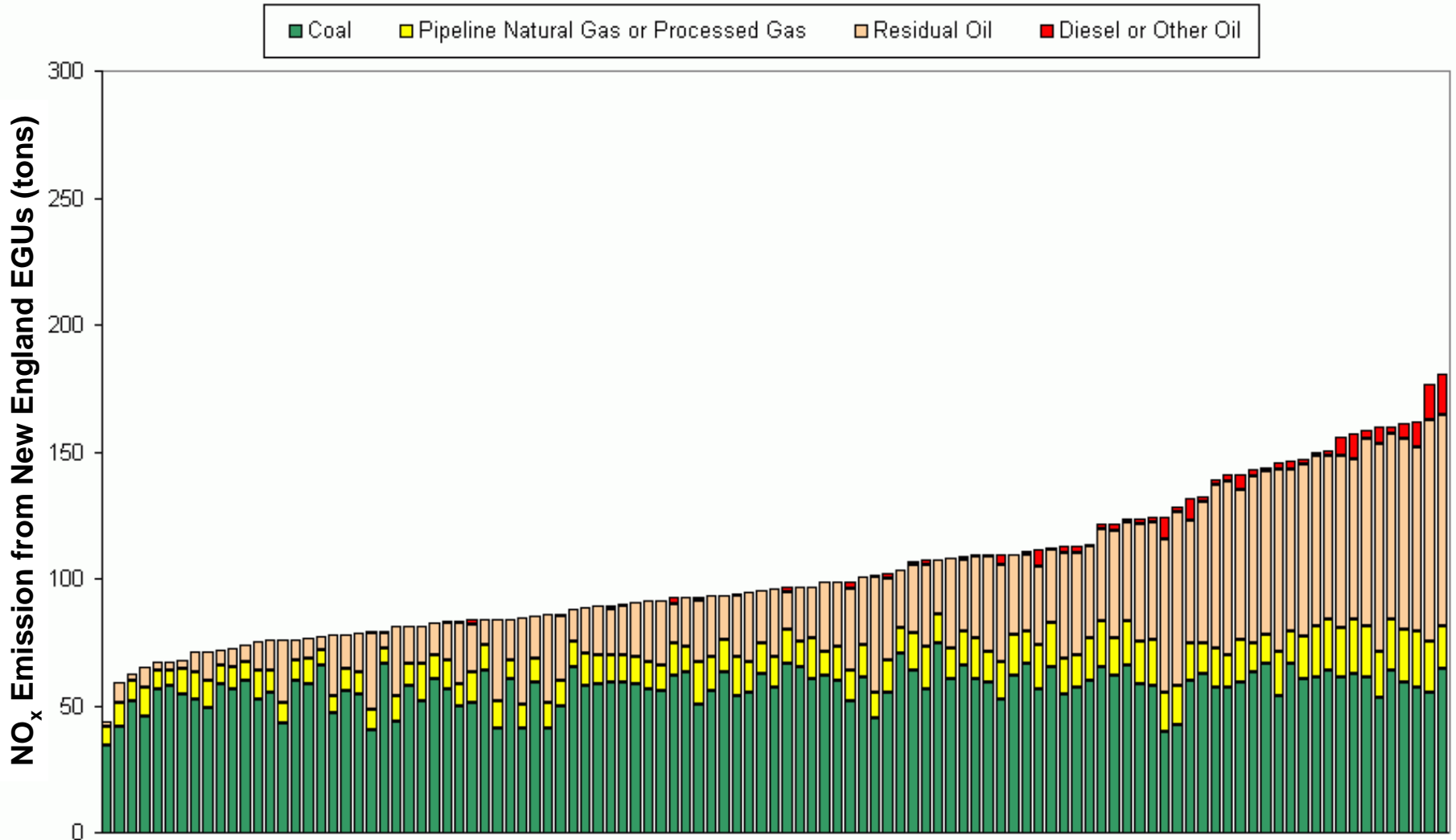
Daily NO_x Emissions from EGUs in New England (June 1 - September 15, 2002)



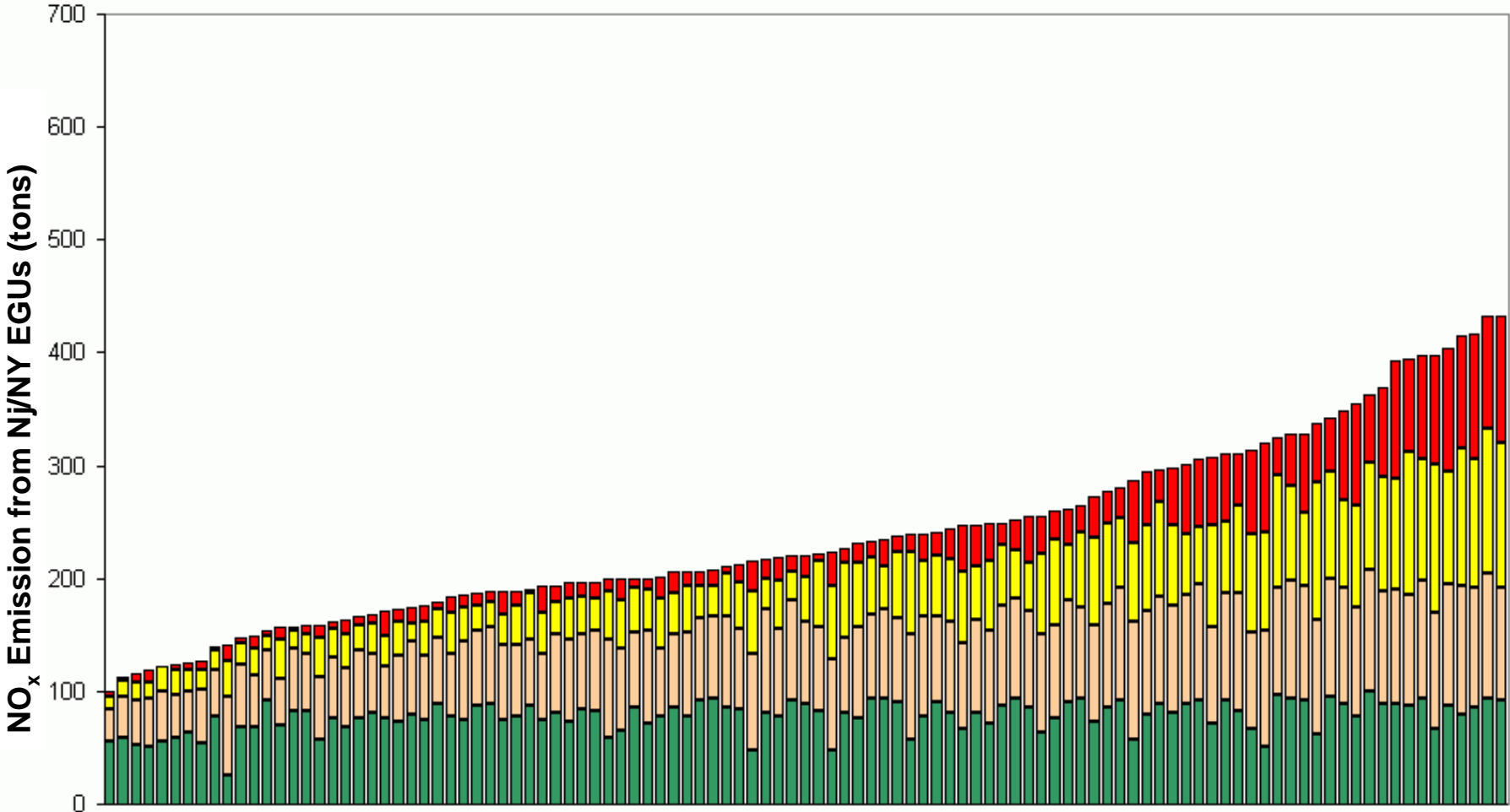
Daily NO_x Emissions from EGUs in NJ/NY City (June 1 - September 15, 2002)



Fuel Types Comprising the Daily NO_x Emissions sorted by NO_x Mass from New England EGUs June 1 - September 15, 2005



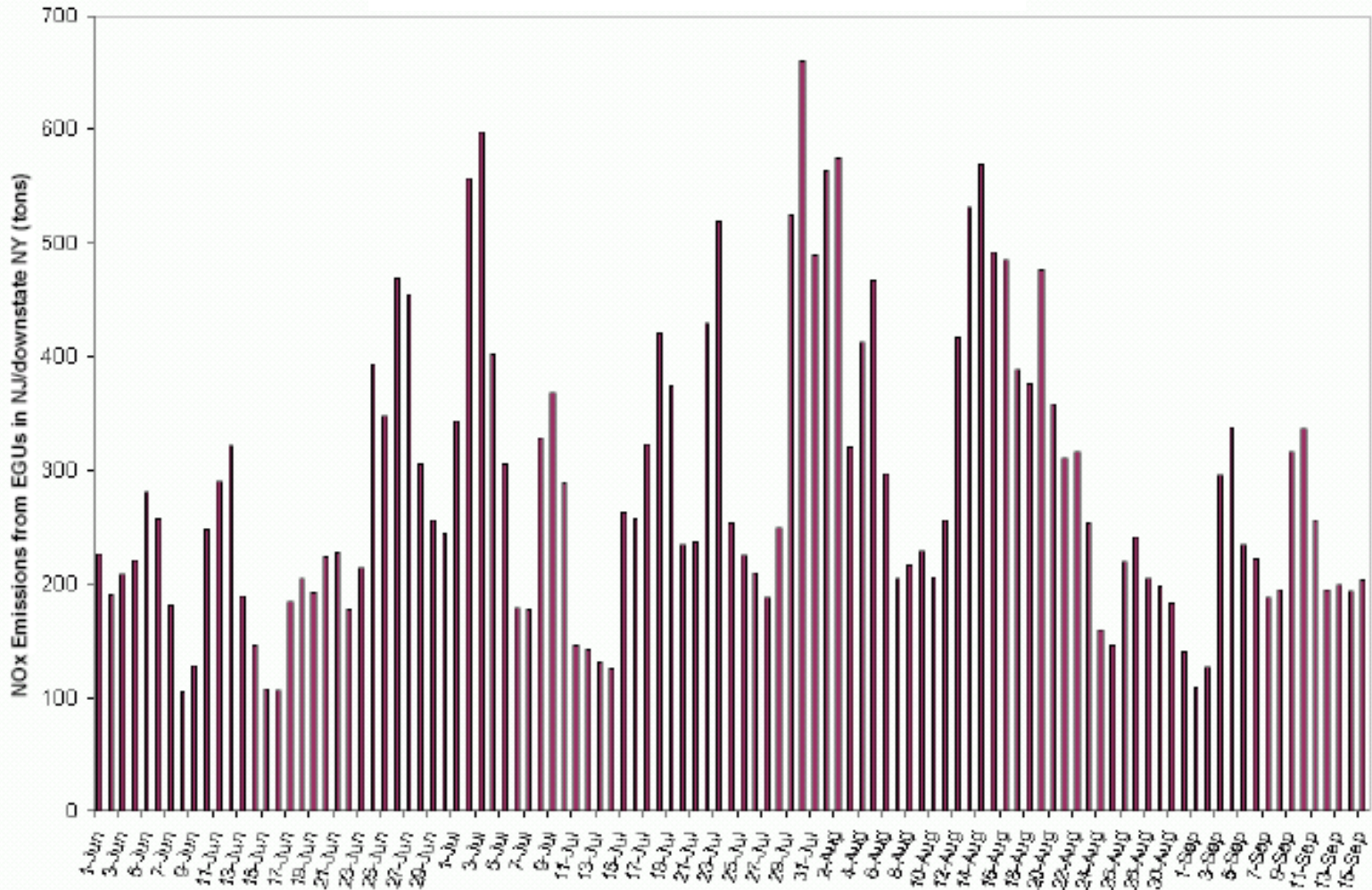
Fuel Types Comprising the Daily NO_x Emissions sorted by NO_x Mass from NY City and NJ EGUs June 1 - September 15, 2005



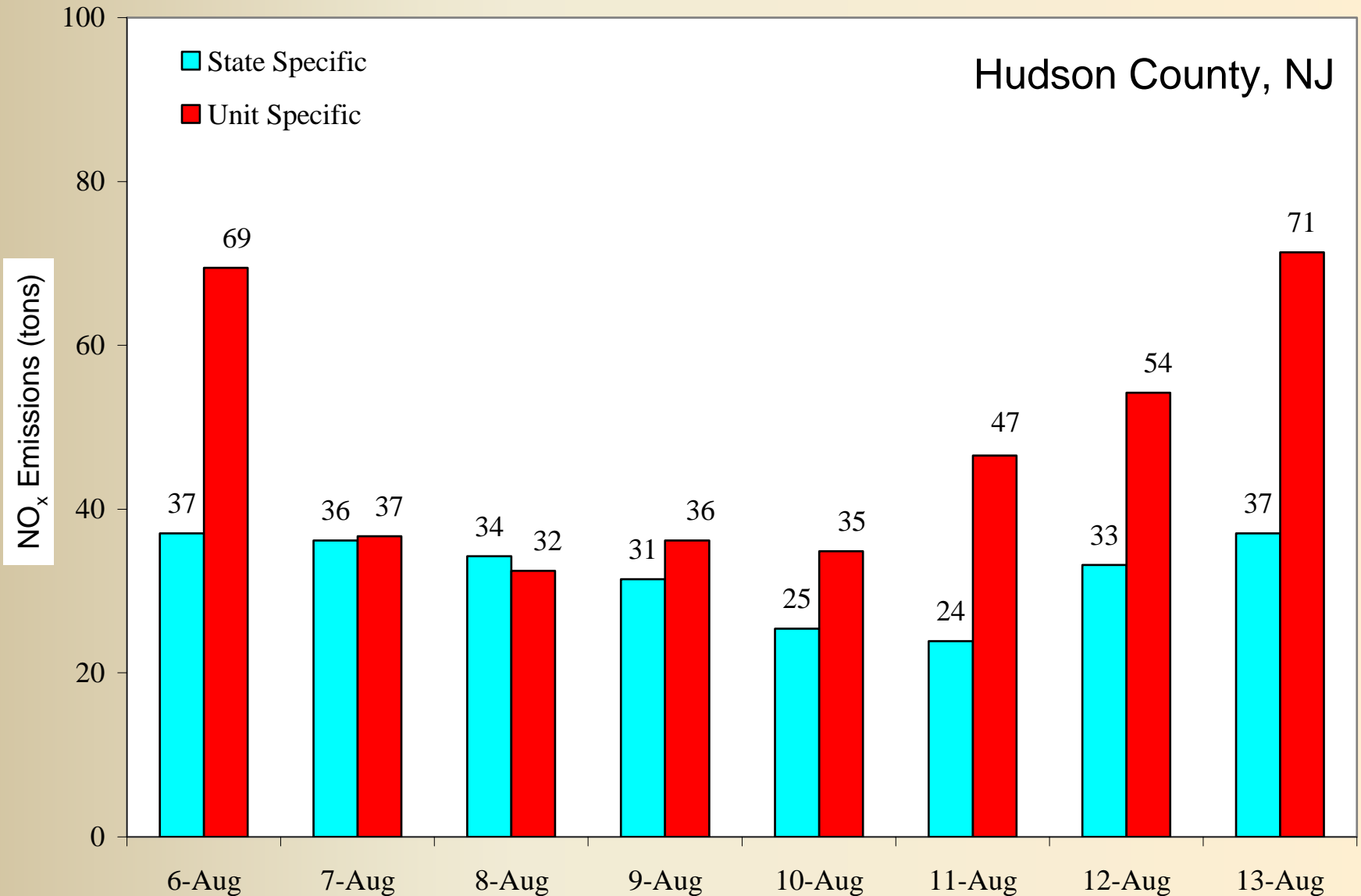
Understanding the Air Quality implications

Daily NO_x Emissions from EGUs in NJ/downstate NY

June 1-September 15, 2002



Modeling Daily NO_x Emissions

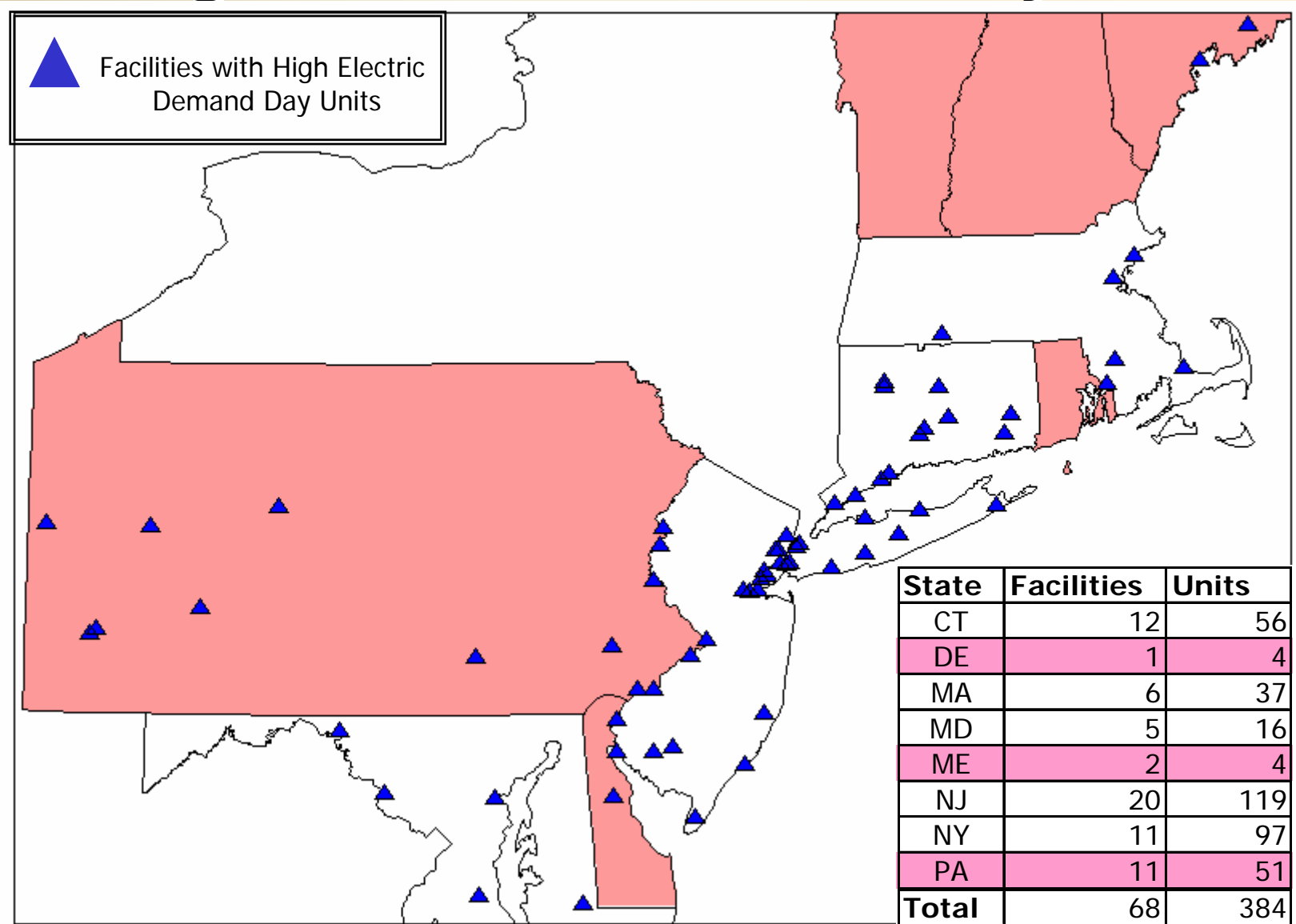


**EGU Emission Reductions
on High Electric Demand
Days appears to lead to
improved air quality**

High Electric Demand Day Units

- **Looked at units operating on high electric demand days, 2002-5 ozone seasons**
 - **NJ & MD : units whose average operating time is ~ < 20%**
 - **CT: units whose average operating time is ~ < 50%**
- **MA: six highest residual oil-fired load following units**
- **NY: units as defined at 6NYCRR, Part 200, Subpart 227-2**
- **Other states: units whose annual contribution <2% and maximum hourly contribution >1%**

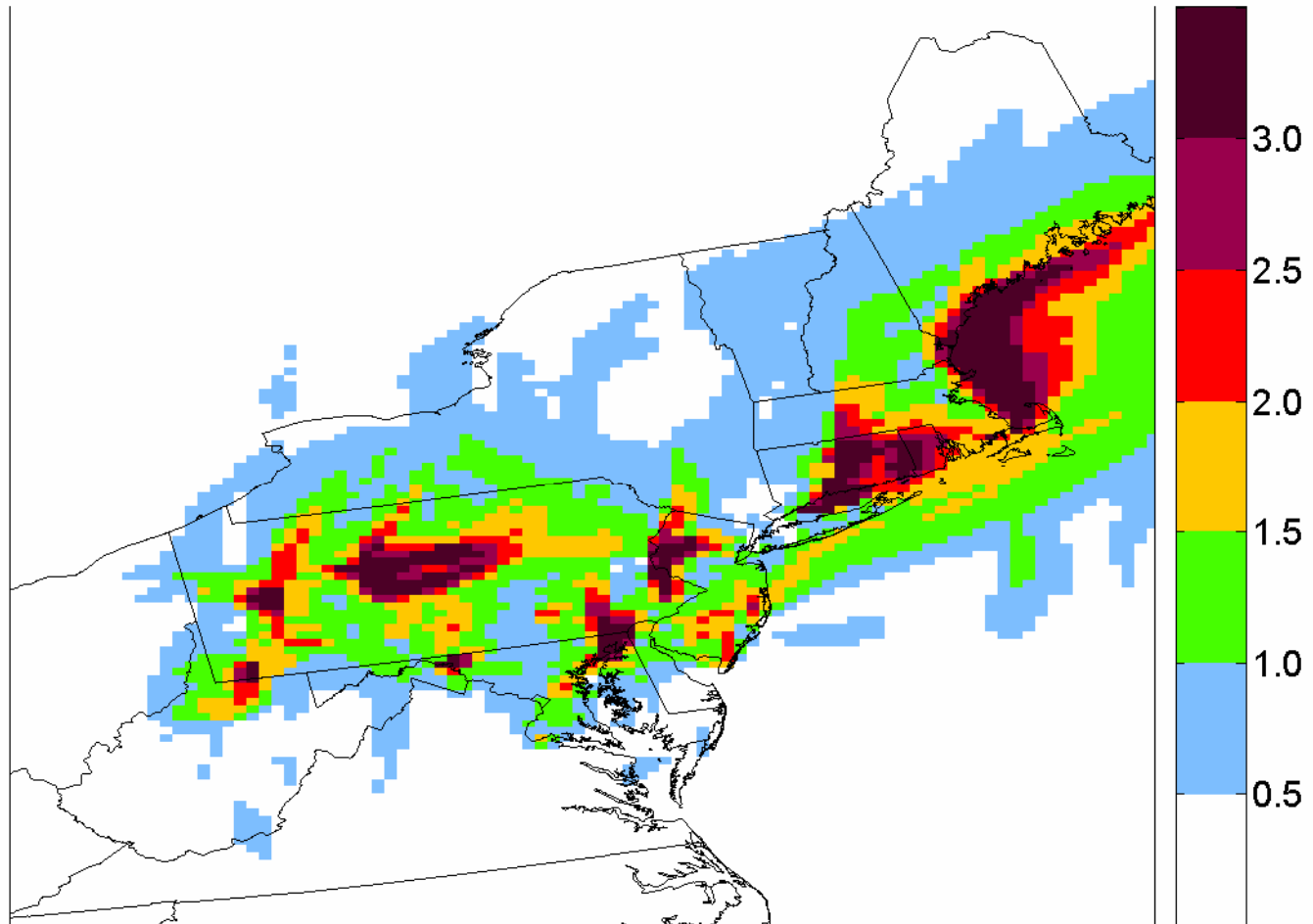
High Electric Demand Day Units



Maximum Ozone Reductions (ppb) from High Electric Demand Day Units

$\text{NO}_x = 0.1 \text{ lb/mmBtu}$

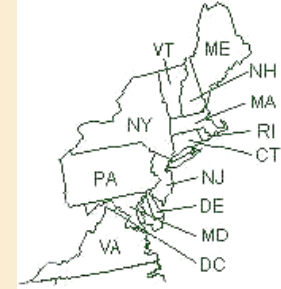
Modeling Episode- Aug 1-15, 2002



Ozone (ppb)

**Existing Cap & Trade Program
has been insufficient to
address this issue**

Daily NO_x Emissions from All Units* in OTR States



Date (2005)	NOx Emissions (tons)	Heat Input (mmBtu's)	Average Emissions Rate (lbs/mmBtu)
May 1 – Sept. 30	Seasonal total:163,833 Daily average: 1071	Seasonal total:1,995,251,140 Daily average: 13,040,857	.164
Tuesday July 26	1,677	19,811,372	.169
Wednesday July 27	1,668	19,619,927	.170
Wednesday August 4	1,619	19,050,297	.170
Friday August 12	1,588	18,501,509	.172

• There are 1168 units in OTR states that report their hourly emissions to EPA as either part of the NO_x Budget Program and/or Acid Rain Program

Daily NO_x Emissions from Combustion Turbines* in OTR



Date (2005)	NOx Emissions (tons)	Heat Input (mmBtu's)	Average Emissions Rate (lbs/mmBtu)
May 1 – Sept. 30	Seasonal total: 7,363 Daily average: 48	Seasonal total: 94,718,950 Daily average: 619,078	.155
Tuesday July 26	221	1,979,451	.223
Wednesday July 27	260	2,155,401	.241
Wednesday August 4	182	1,756,262	.207
Friday August 12	185	1,736,021	.213

• There are 491 combustion turbines in OTR states that report their hourly emissions to EPA as either part of the NO_x Budget Program and/or Acid Rain Program

**Variety of Solutions
needed to address the issue**

Traditional Measures

Established Performance Standards

- **SCR**
 - All EGUs
 - 95% reduction in NO_x emissions
- **Water Injection**
 - Combustion Turbines
 - 50% reduction in NO_x emissions
- **Repower/Replacement**
 - Combustion Turbines
 - 90% reduction in NO_x emissions
- **Other controls for boilers**
 - Ultra low NO_x burners, Flue Gas recirculation, and Selective non-catalytic reduction

Non-Traditional Measures

- **Defining resources**
 - Supply (Generation)
 - Demand (Efficiency and Conservation)
- **Supply - Incorporating environmental factors to alter price signals:**
 - Assure dispatch of cleanest units first
 - Encourage replacement of older dirtier units
 - Avoid use of dirty distributed generation
- **Demand - Incentives to create parity between demand and supply programs:**
 - Allow appropriate rate of return
 - Allowance allocation

Three Points!

- **Emissions from Electric Generating Units are higher on high electric demand days**
- **This results in poorer air quality**
- **It will take a variety of solutions to address this issue**

Action

- **Direct OTC staff to continue to work with PUCs, RTOs & the utility industry to explore the high electrical demand day issue & solutions**
- **Direct OTC staff to recommend action for the fall meeting**