High Electric Demand Days & Air Quality

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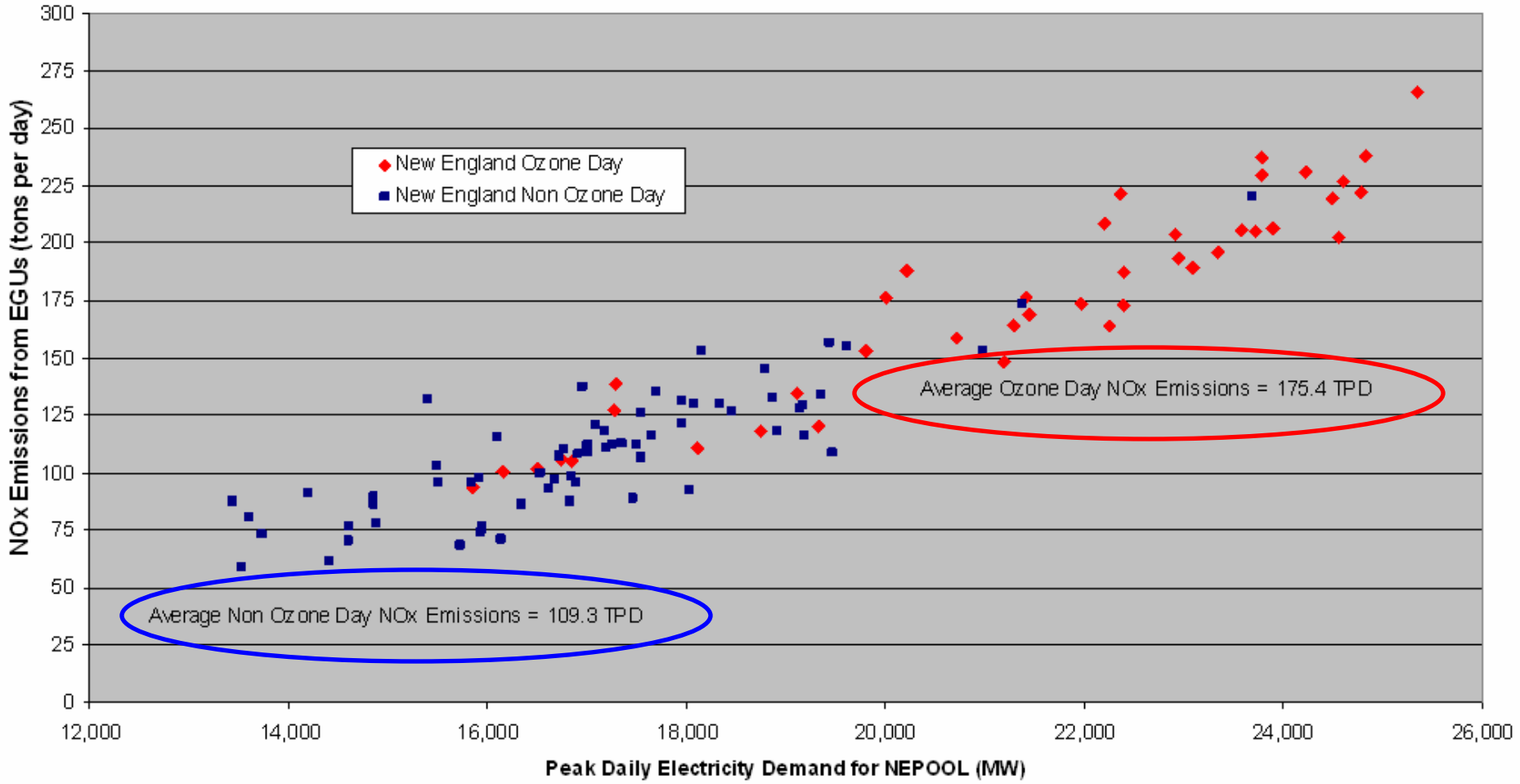
Three Points!

- **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

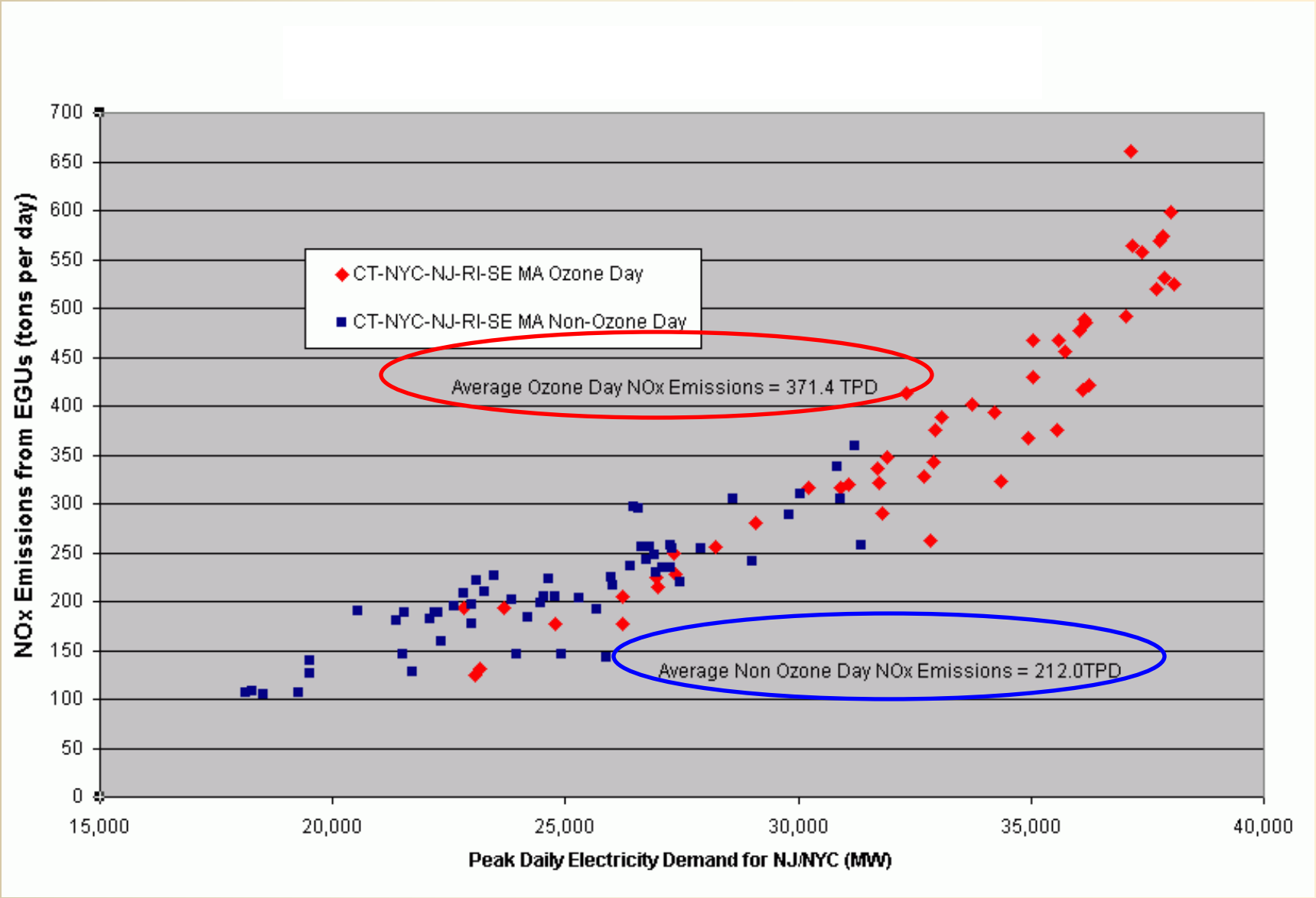
NO_x Emissions Versus Peak Electricity Demand in New England on Ozone and Non-Ozone Exceedance Days

(June 1- September 15, 2002)



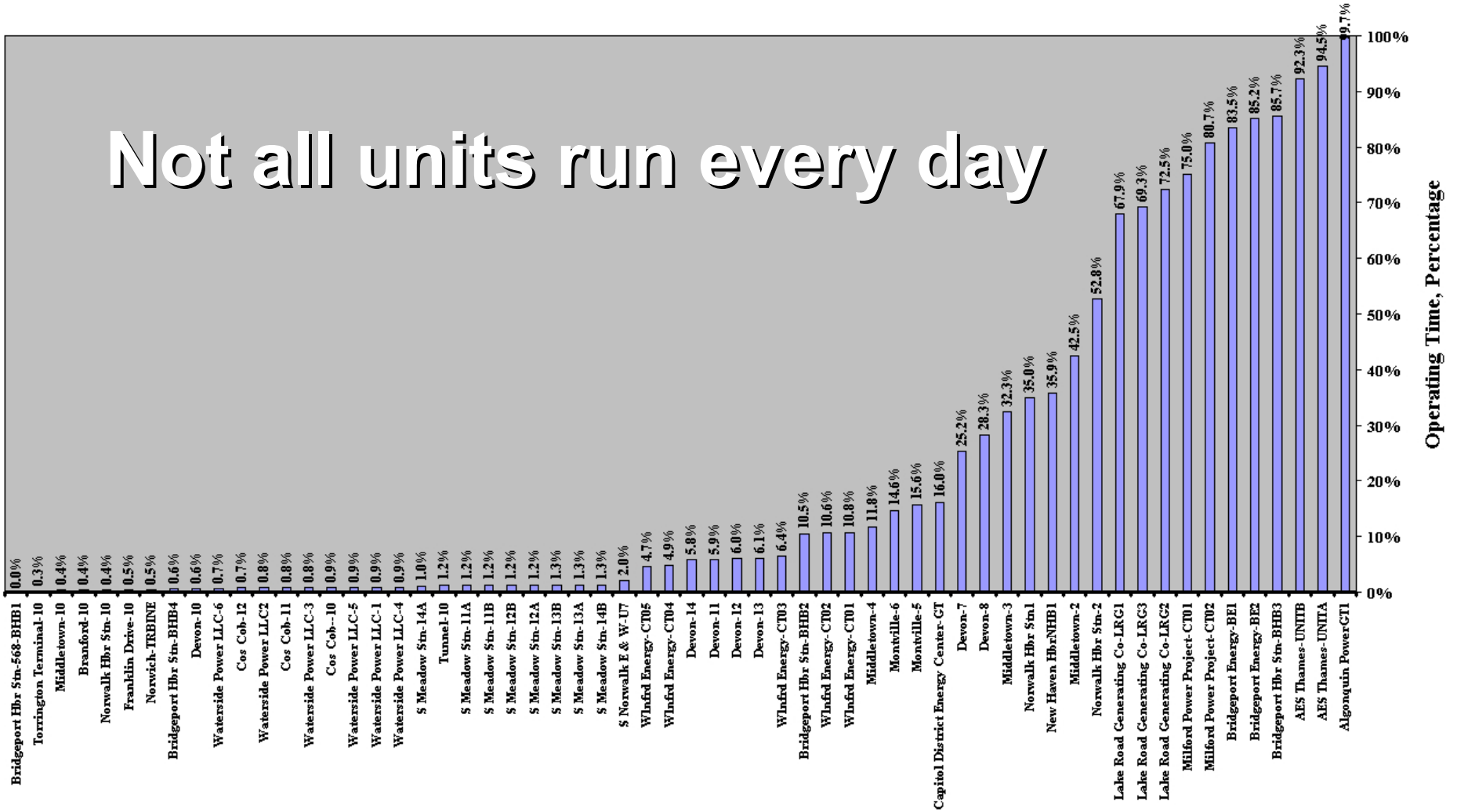
NO_x Emissions Versus Peak Electricity Demand in NJ/Downstate NY on Ozone and Non-Ozone Exceedance Days

(June 1 - September 15, 2002)

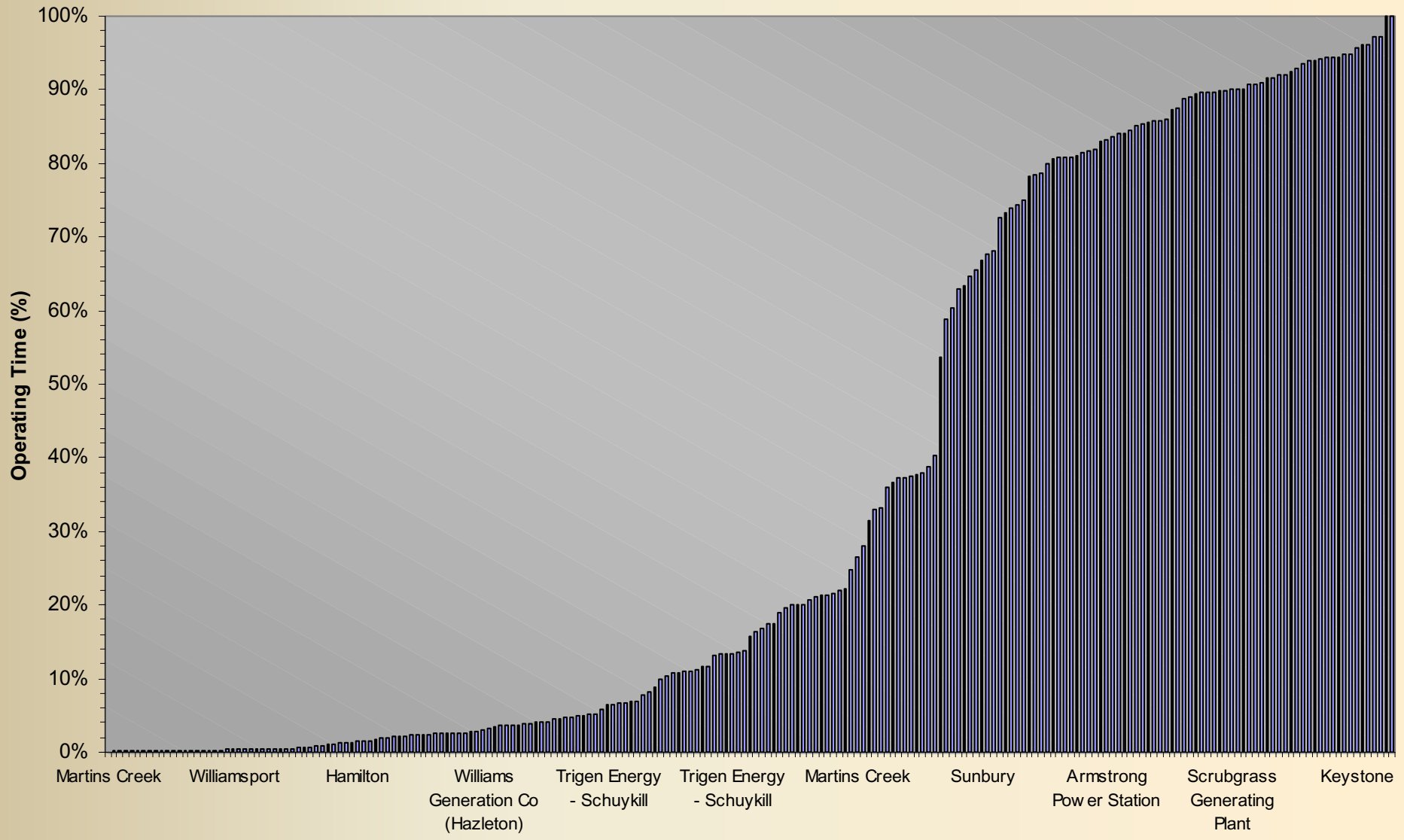


The Mix of Generating Units varies by day and region

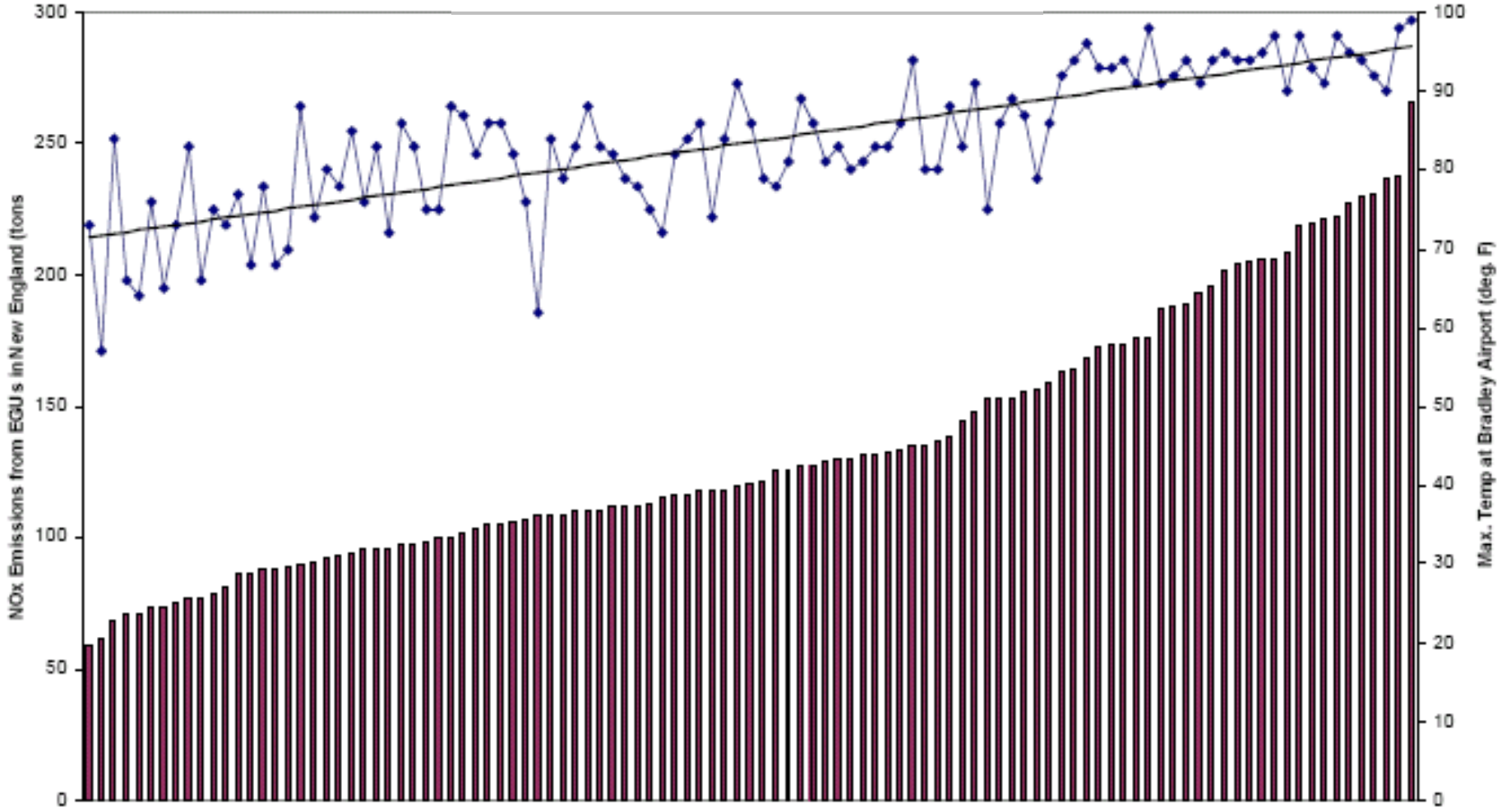
CT Electric Generating Utility Average Percent Operating Time
2002-2005 Ozone Seasons



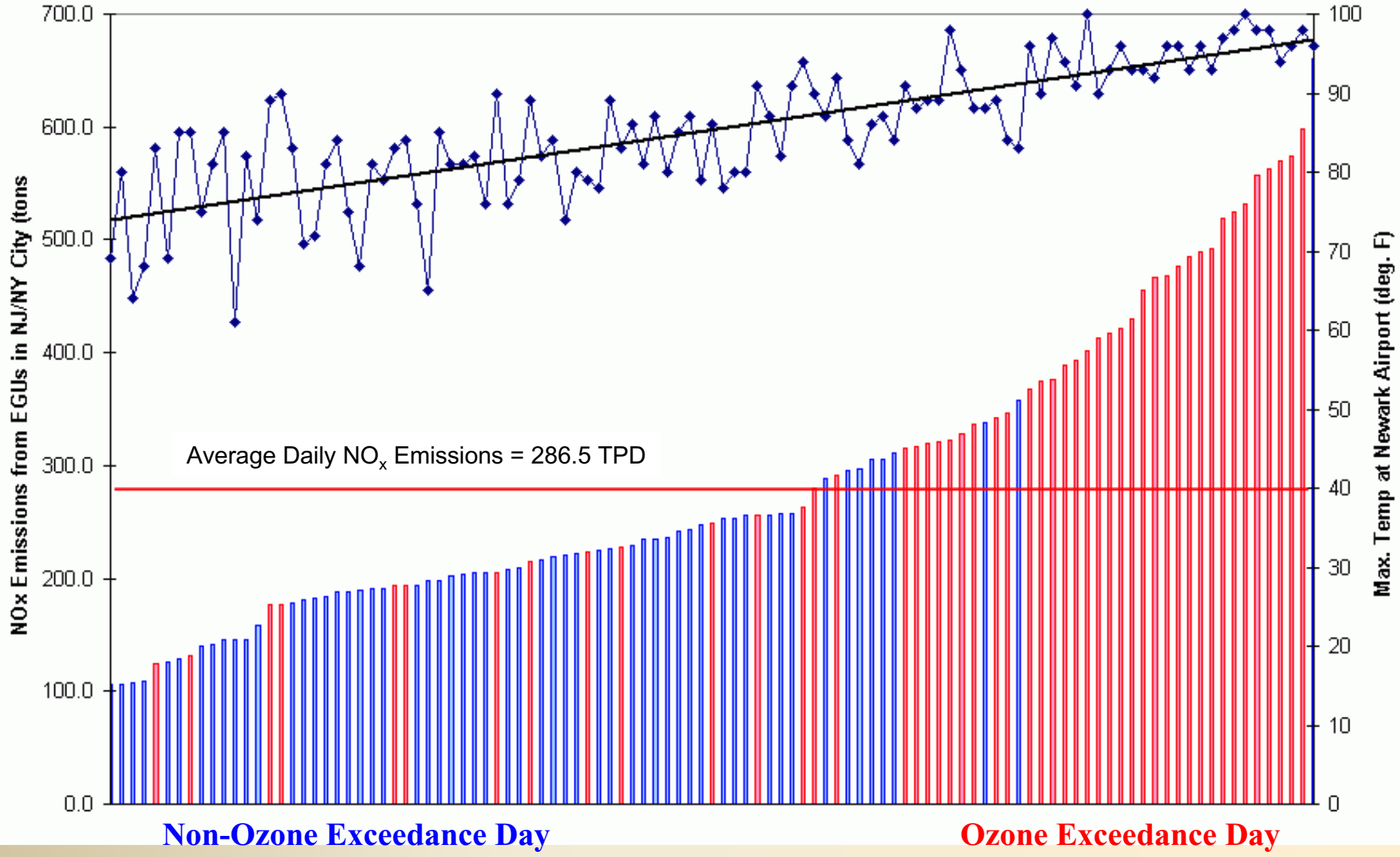
PA Electric Generating Utility Average Percent Operating Time 2002-2005 Ozone Seasons



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

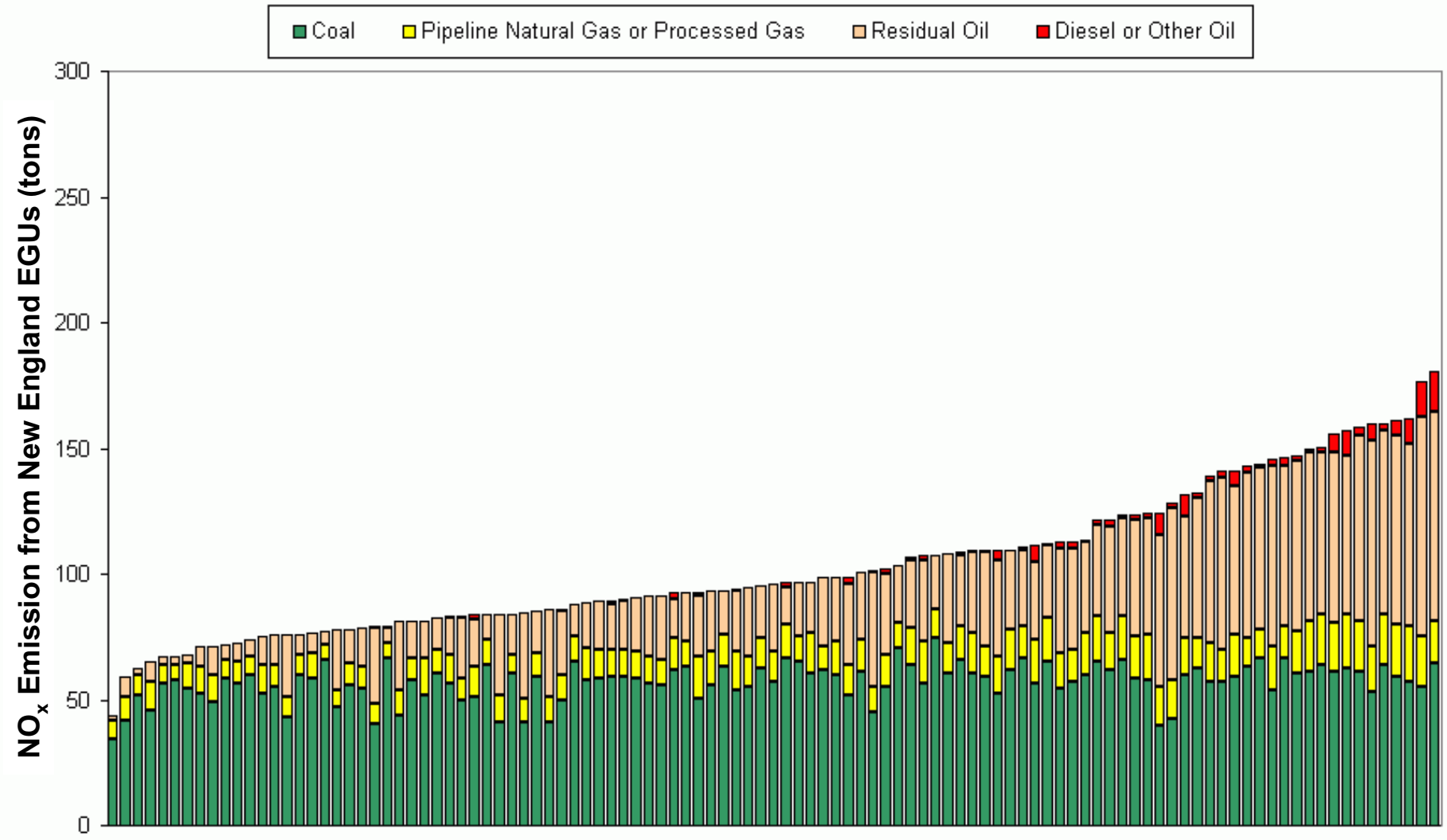


Daily NO_x Emissions from EGUs in NJ/NY City
(June 1 - September 15, 2002)



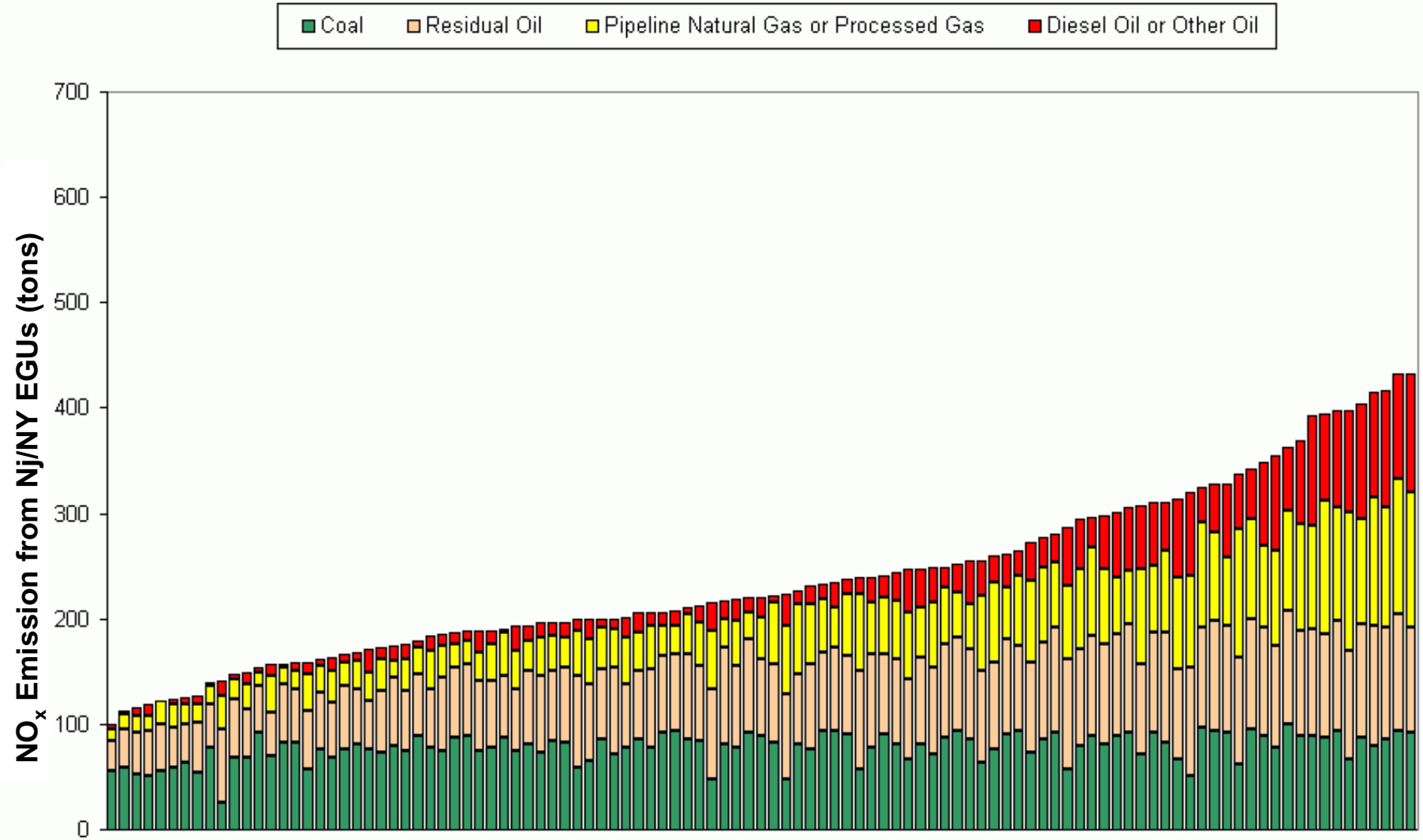
Fuel Types Comprising the Daily NO_x Emissions sorted by NO_x Mass from New England EGUs

June 1 - September 15, 2005



Fuel Types Comprising the Daily NO_x Emissions sorted by NO_x Mass from NY City and NJ EGUs

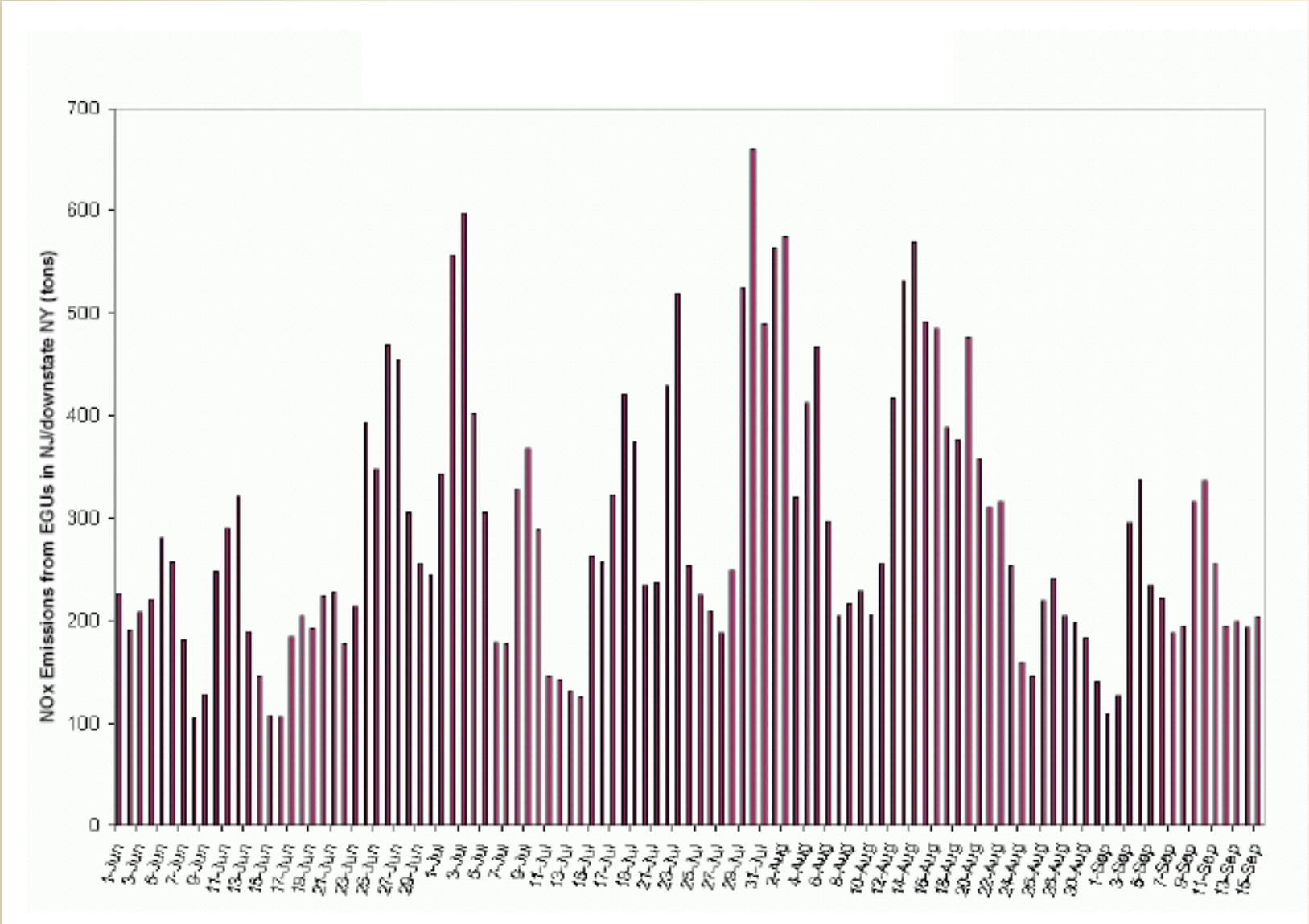
June 1 - September 15, 2005



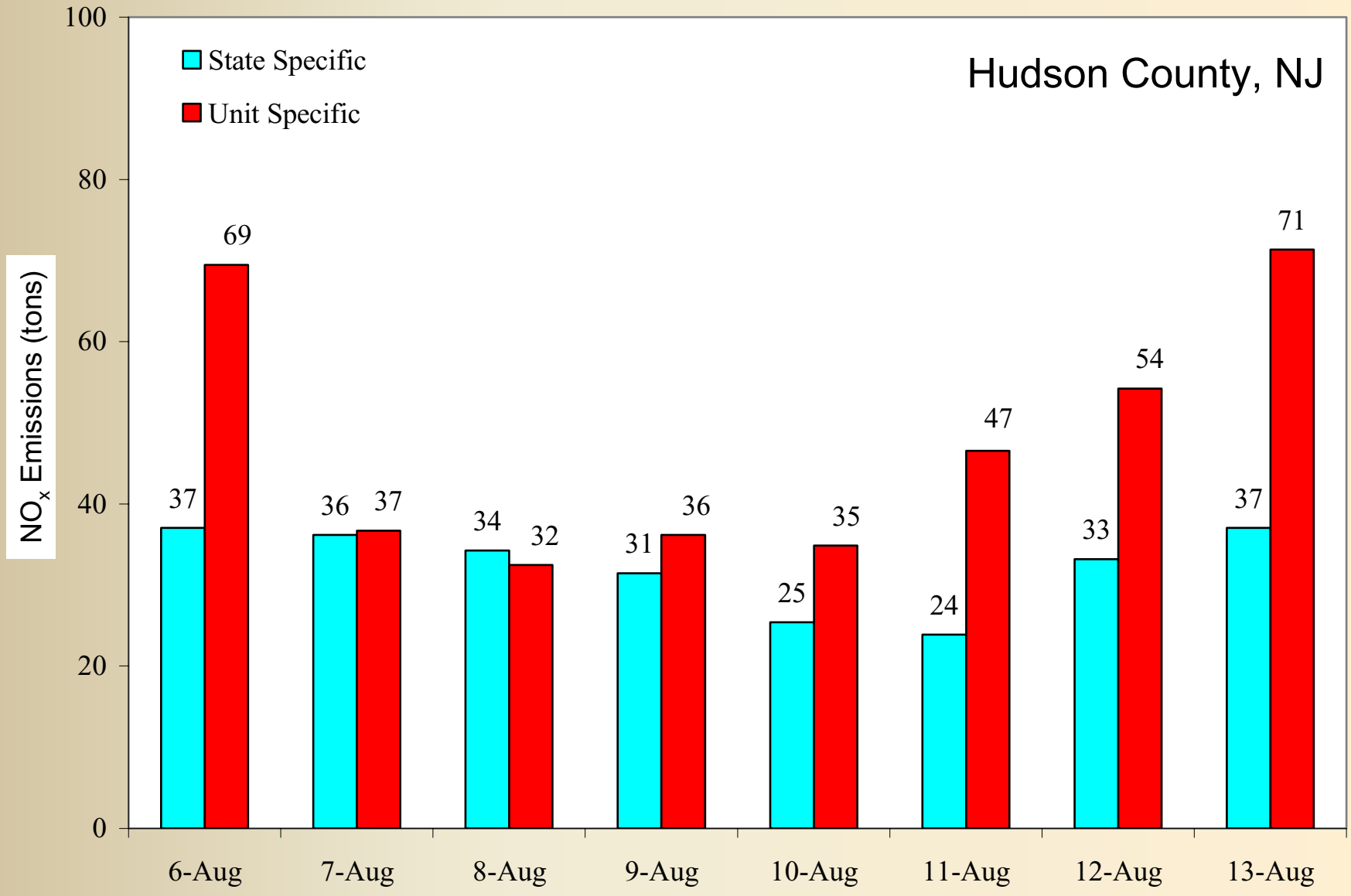
Understanding the Air Quality implications

Daily NO_x Emissions from EGUs in NJ/downstate NY

June 1-September 15, 2002



Modeling Daily NO_x Emissions

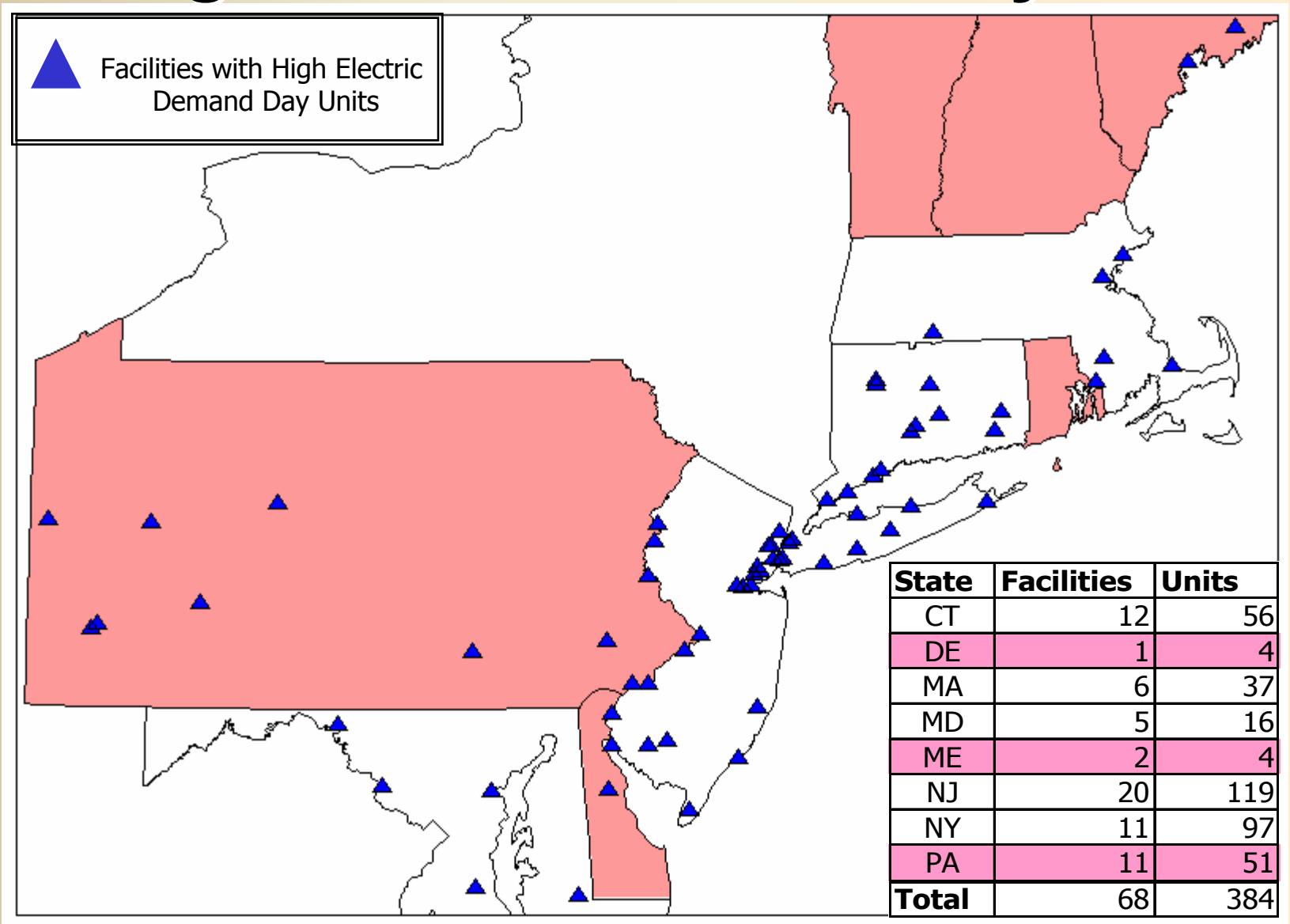


EGU Emission Reductions on High Electric Demand Days appears to lead to improved air quality

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%

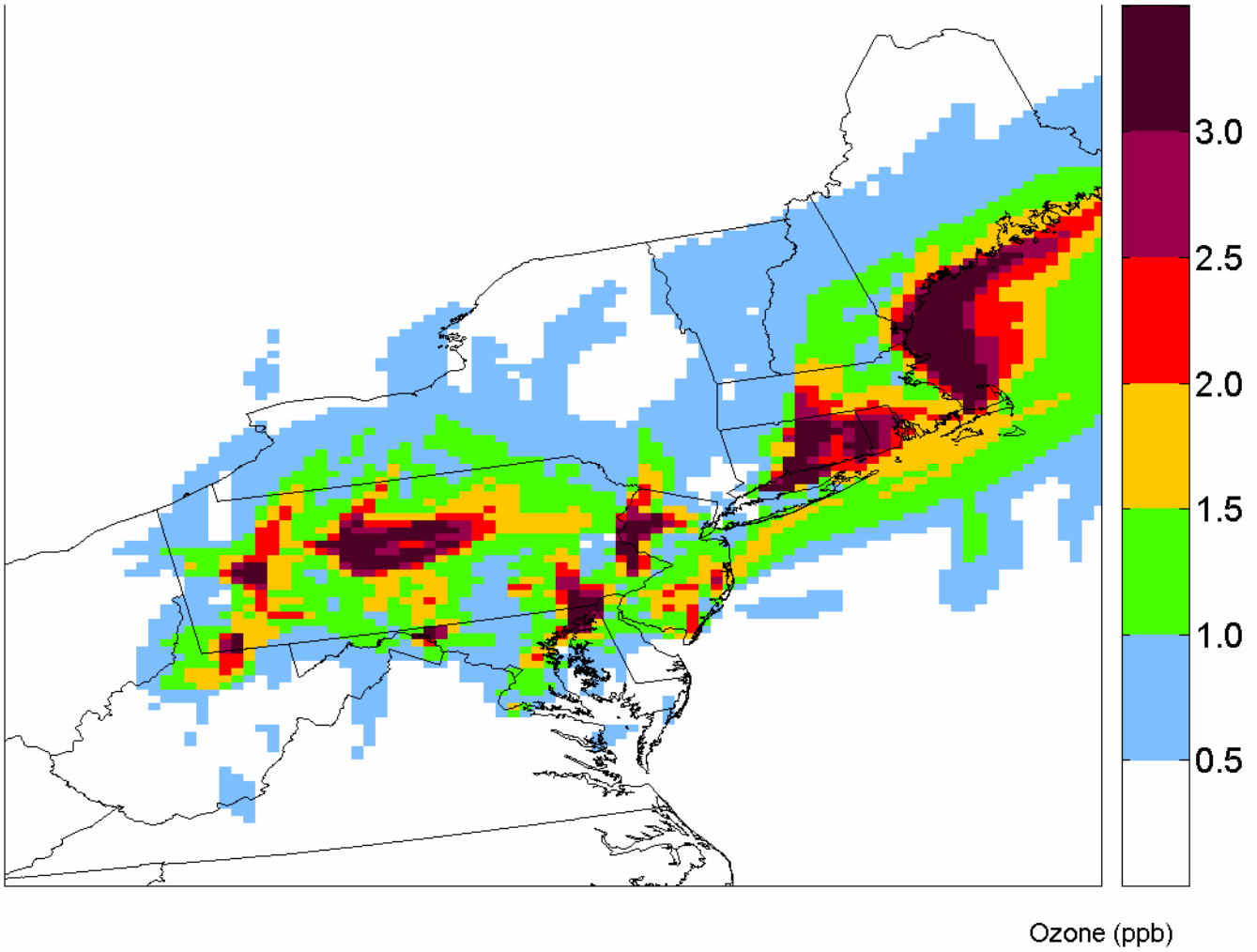
High Electric Demand Day Units



State	Facilities	Units
CT	12	56
DE	1	4
MA	6	37
MD	5	16
ME	2	4
NJ	20	119
NY	11	97
PA	11	51
Total	68	384

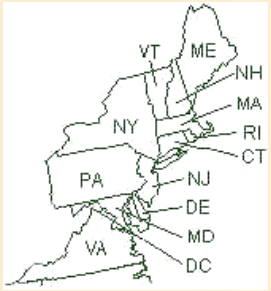
Maximum Ozone Reductions (ppb) from High Electric Demand Day Units

NO_x = 0.1 lb/ mmBtu **Modeling Episode- Aug 1-15, 2002**



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

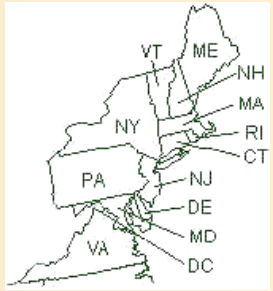
Daily NO_x Emissions from All Units* in OTR States



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