

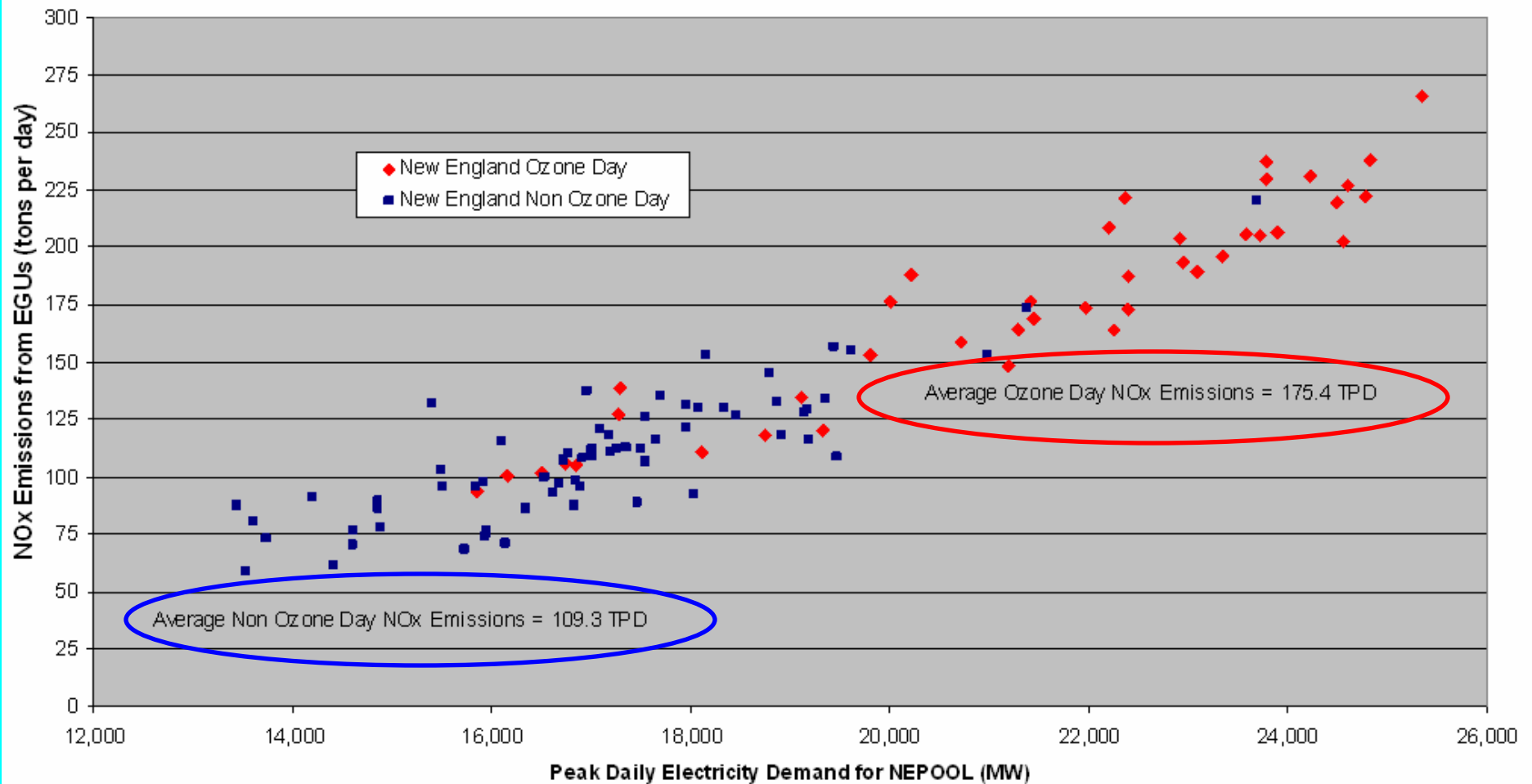
**Air Quality on  
High Electric  
Demand Days  
&  
What We Can Do  
About It**

Chris Salmi, NJDEP  
February 6, 2007

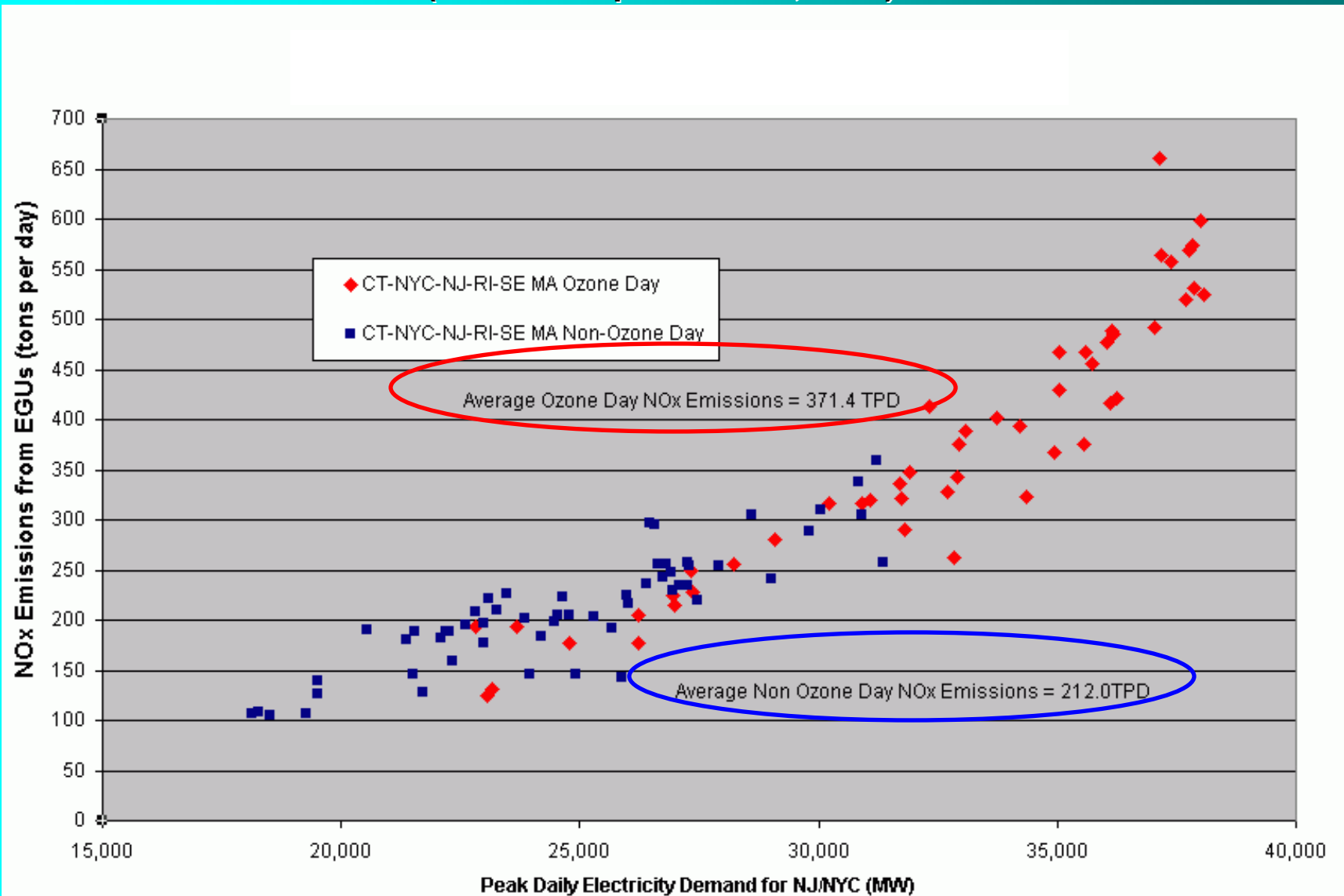
# Three Points!

- **Emissions** from Electric Generating Units (EGUs) are **higher on high electric demand days**
- This results in **poorer air quality**
- Flexibility and innovation can result in **successful programs** to address this issue

# NO<sub>x</sub> Emissions Versus Peak Electricity Demand in New England on Ozone and Non-Ozone Exceedance Days (June 1- September 15, 2002)



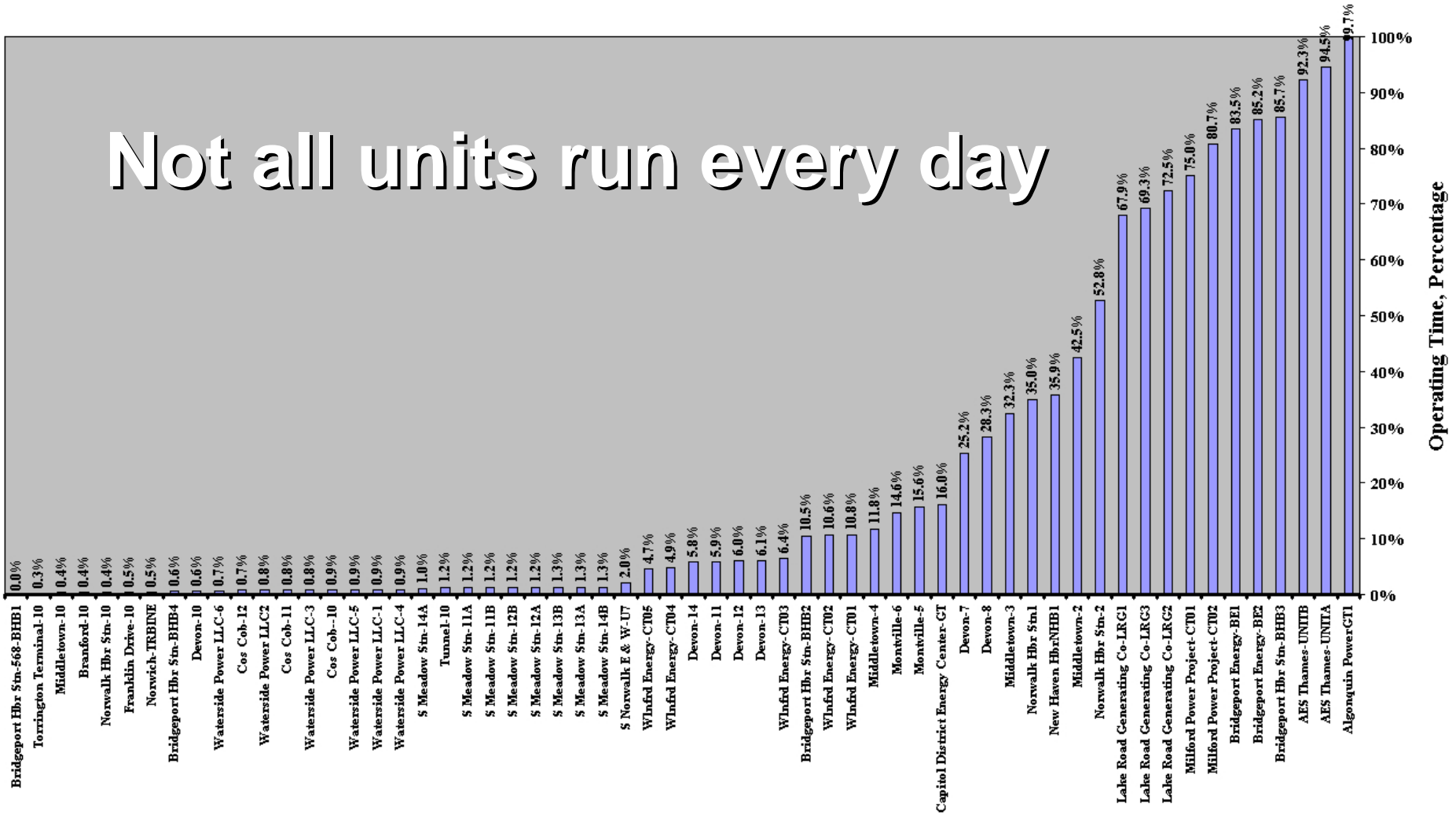
# NO<sub>x</sub> Emissions Versus Peak Electricity Demand in NJ/Downstate NY on Ozone and Non-Ozone Exceedance Days (June 1 - September 15, 2002)



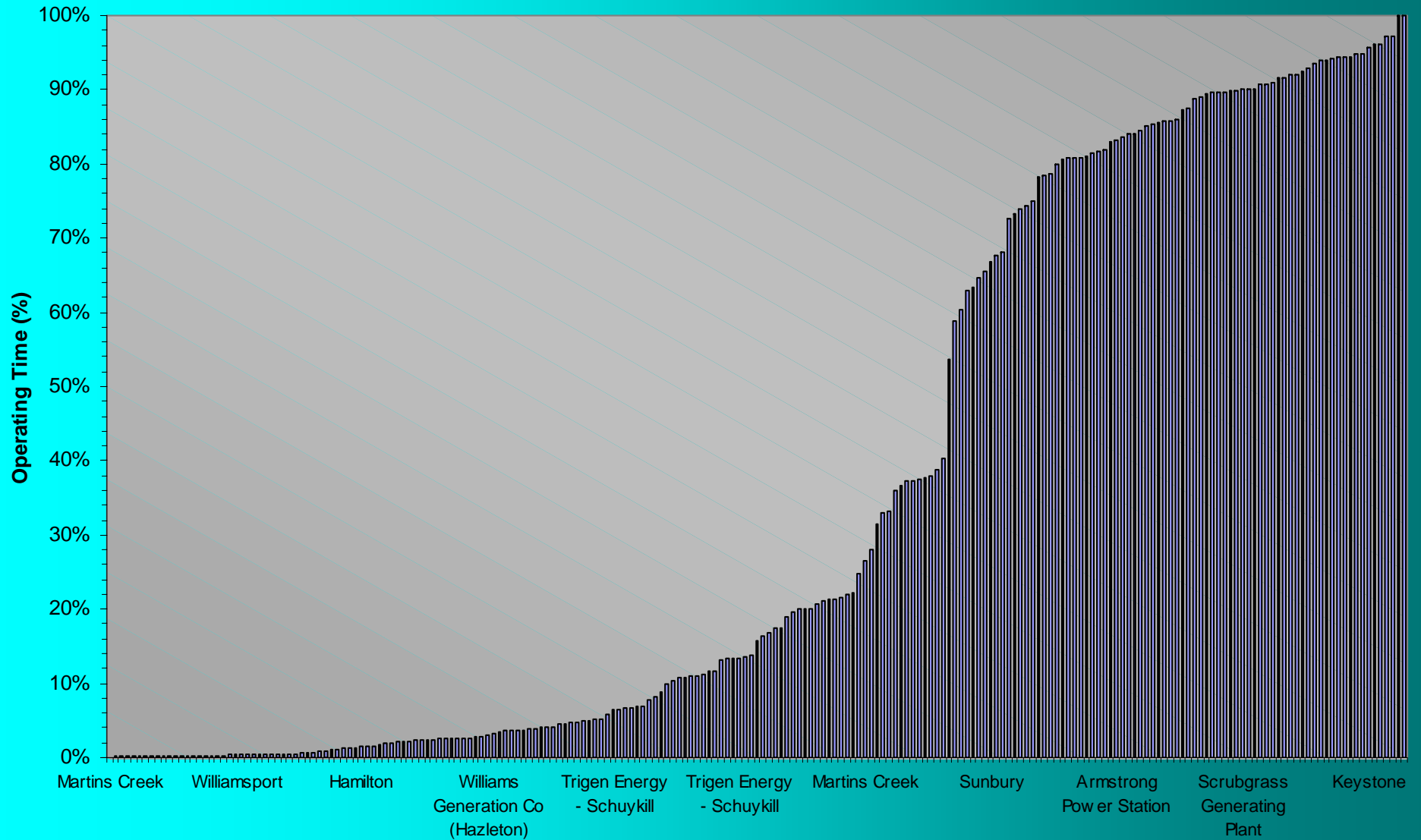
**The Mix of Generating  
Units varies  
by day and region**

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

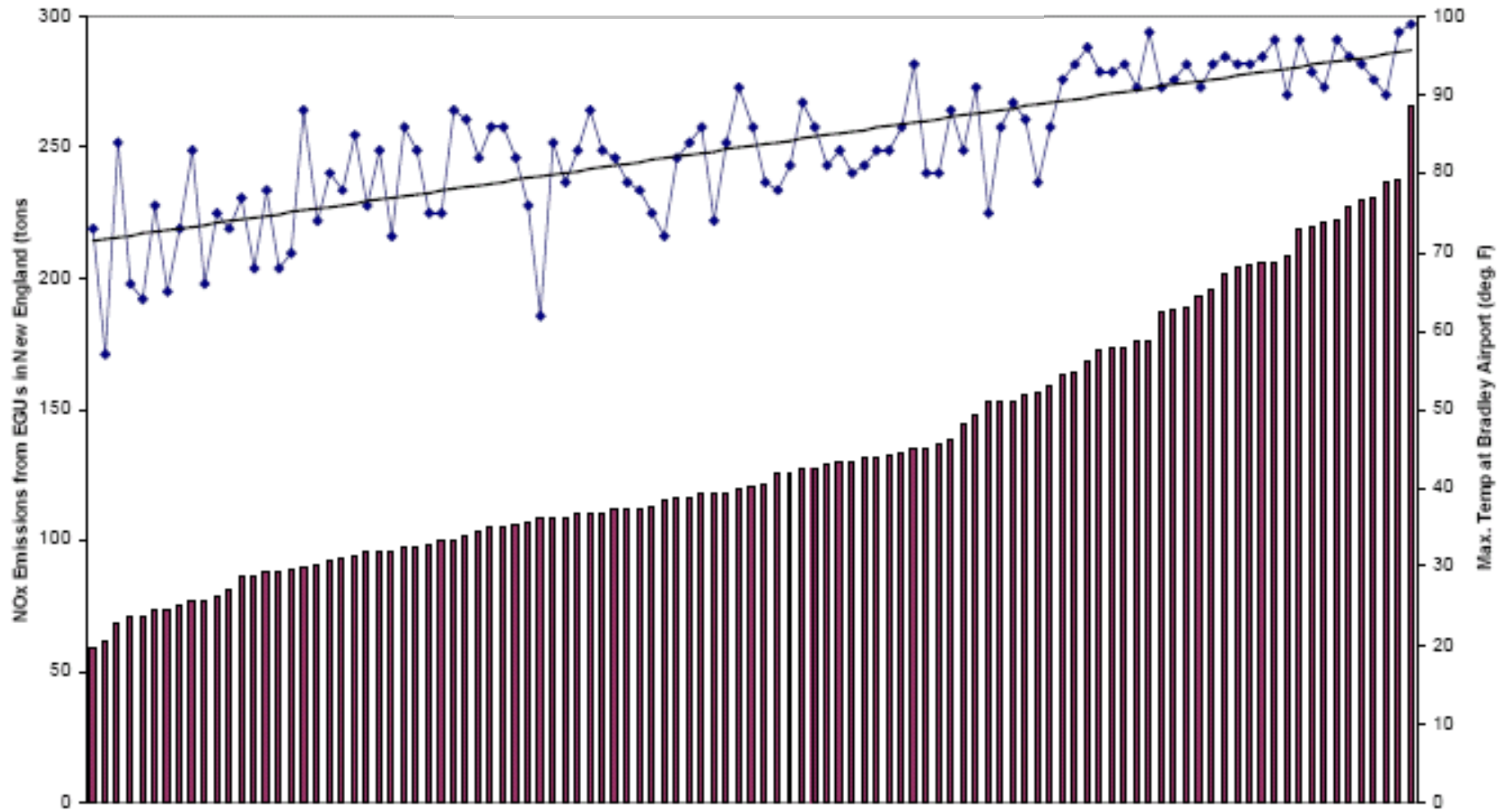
Not all units run every day



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

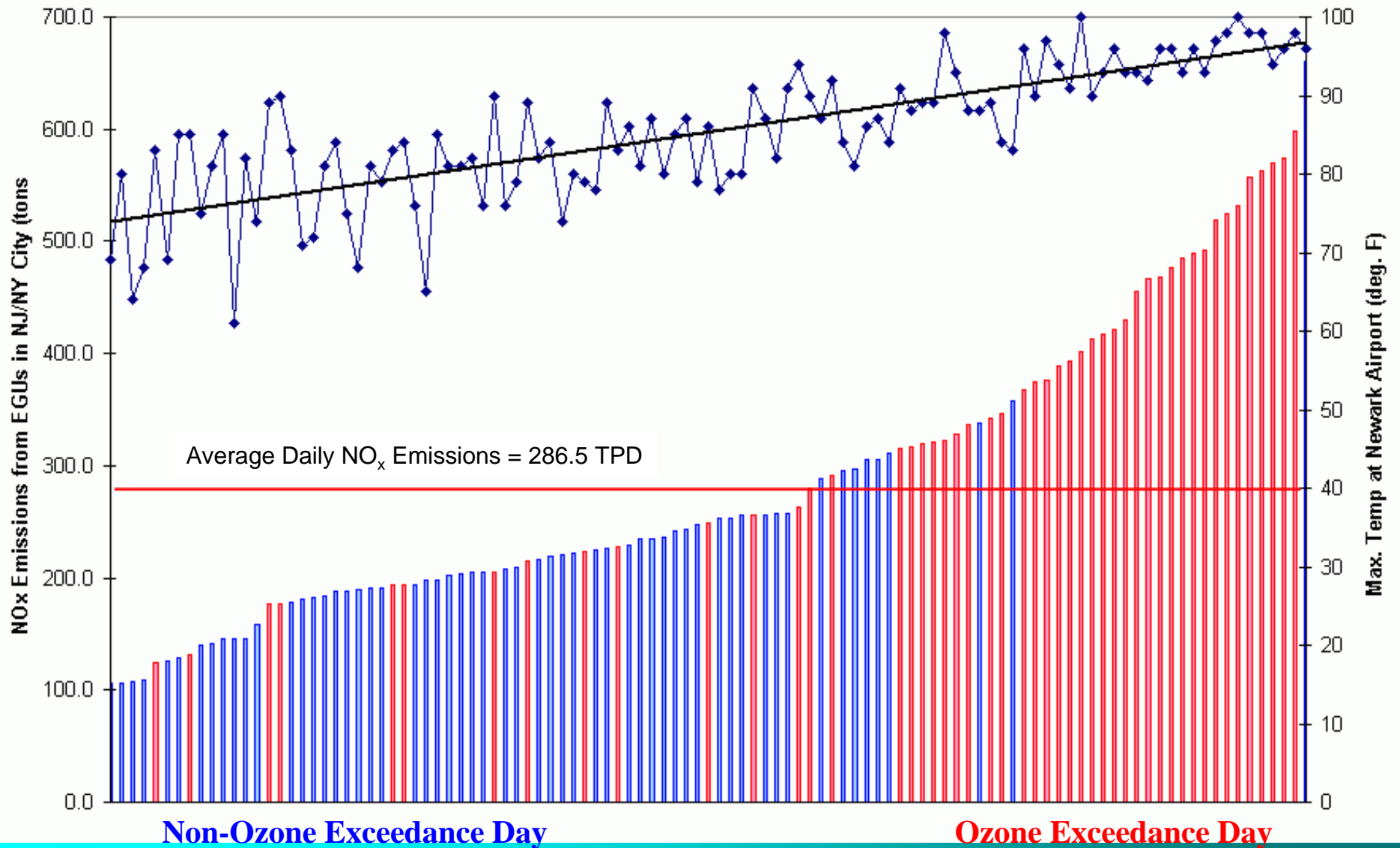


# Daily NO<sub>x</sub> Emissions from EGUs in New England (June 1 - September 15, 2002)

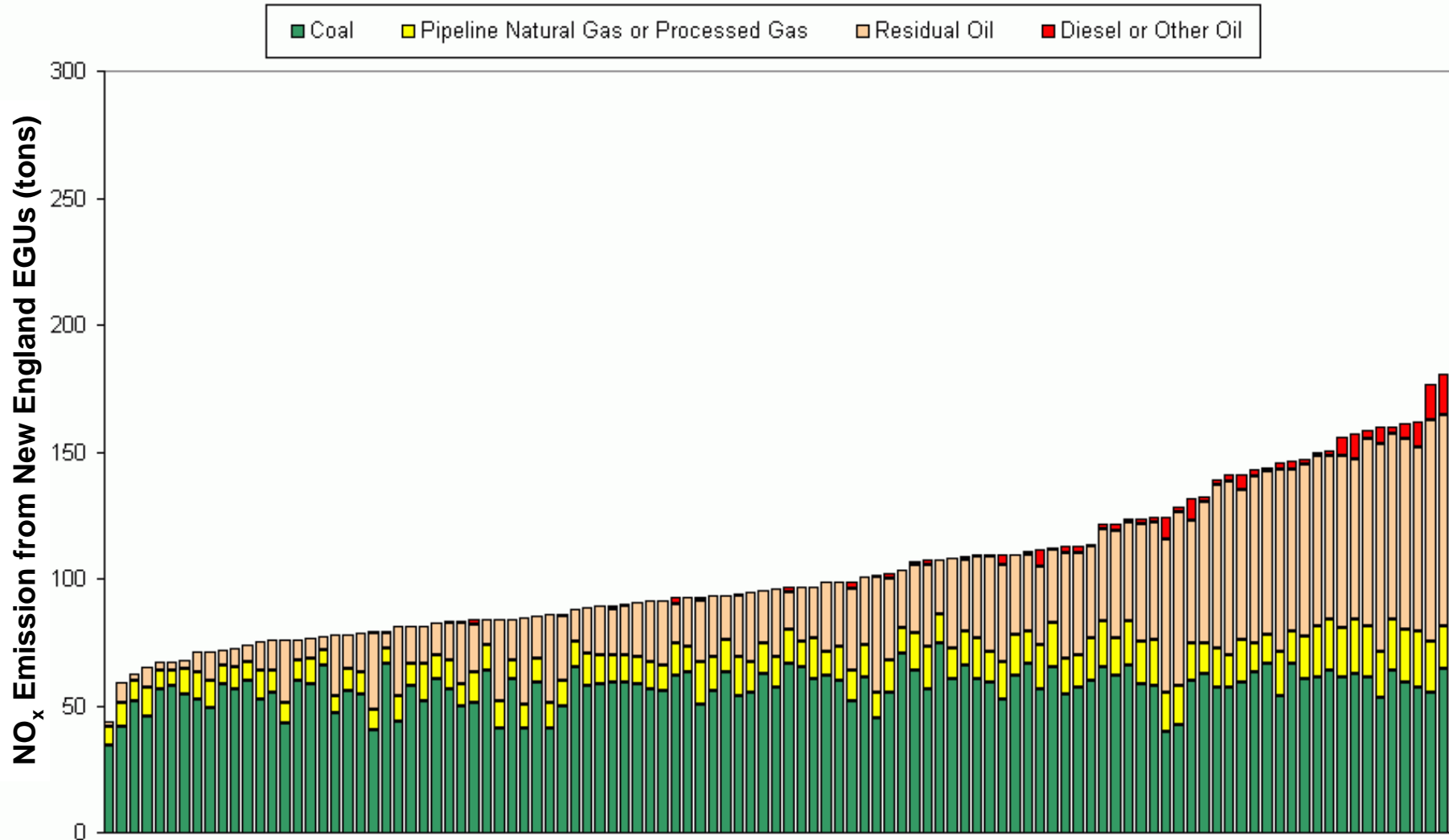




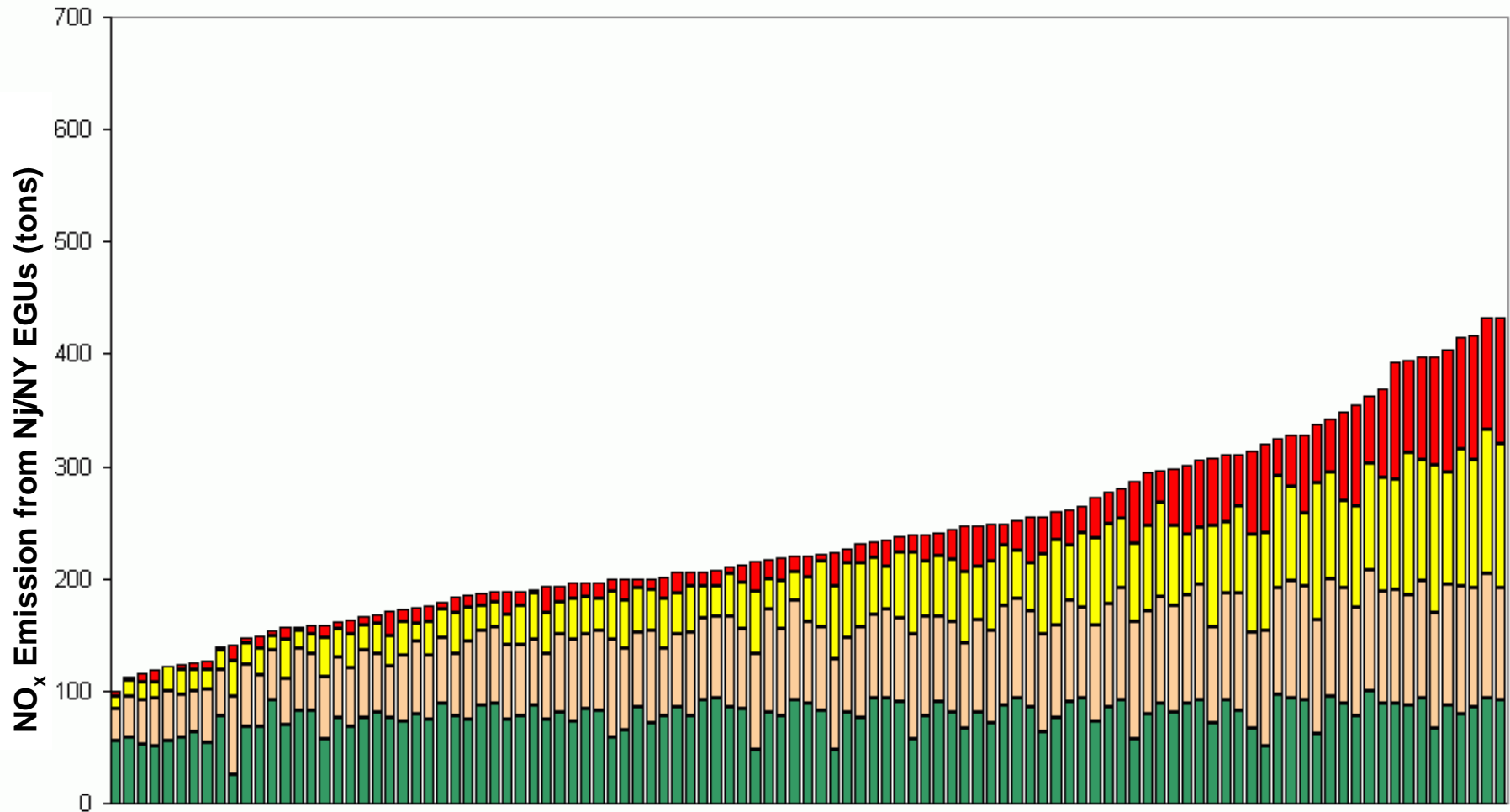
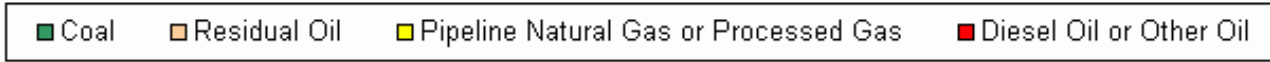
# Daily NO<sub>x</sub> Emissions from EGUs in NJ/NY City (June 1 - September 15, 2002)



# Fuel Types Comprising the Daily NO<sub>x</sub> Emissions sorted by NO<sub>x</sub> Mass from New England EGUs June 1 - September 15, 2005



# Fuel Types Comprising the Daily NO<sub>x</sub> Emissions sorted by NO<sub>x</sub> Mass from NY City and NJ EGUs June 1 - September 15, 2005



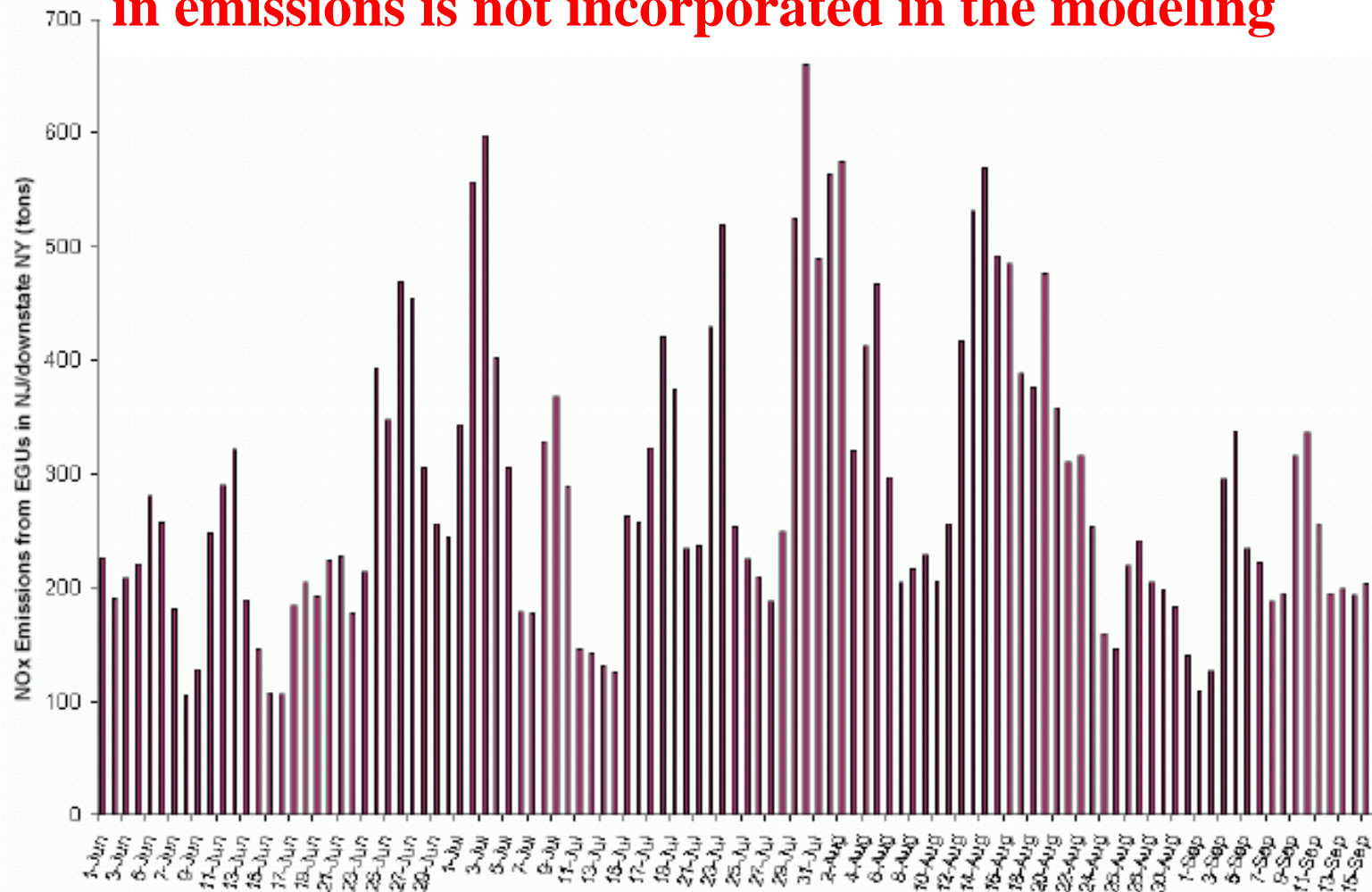
# **EGU Emission Reductions on High Electric Demand Days appears to lead to improved air quality**

Preliminary Modeling from Early 2006 – Does not reflect the strategy under consideration

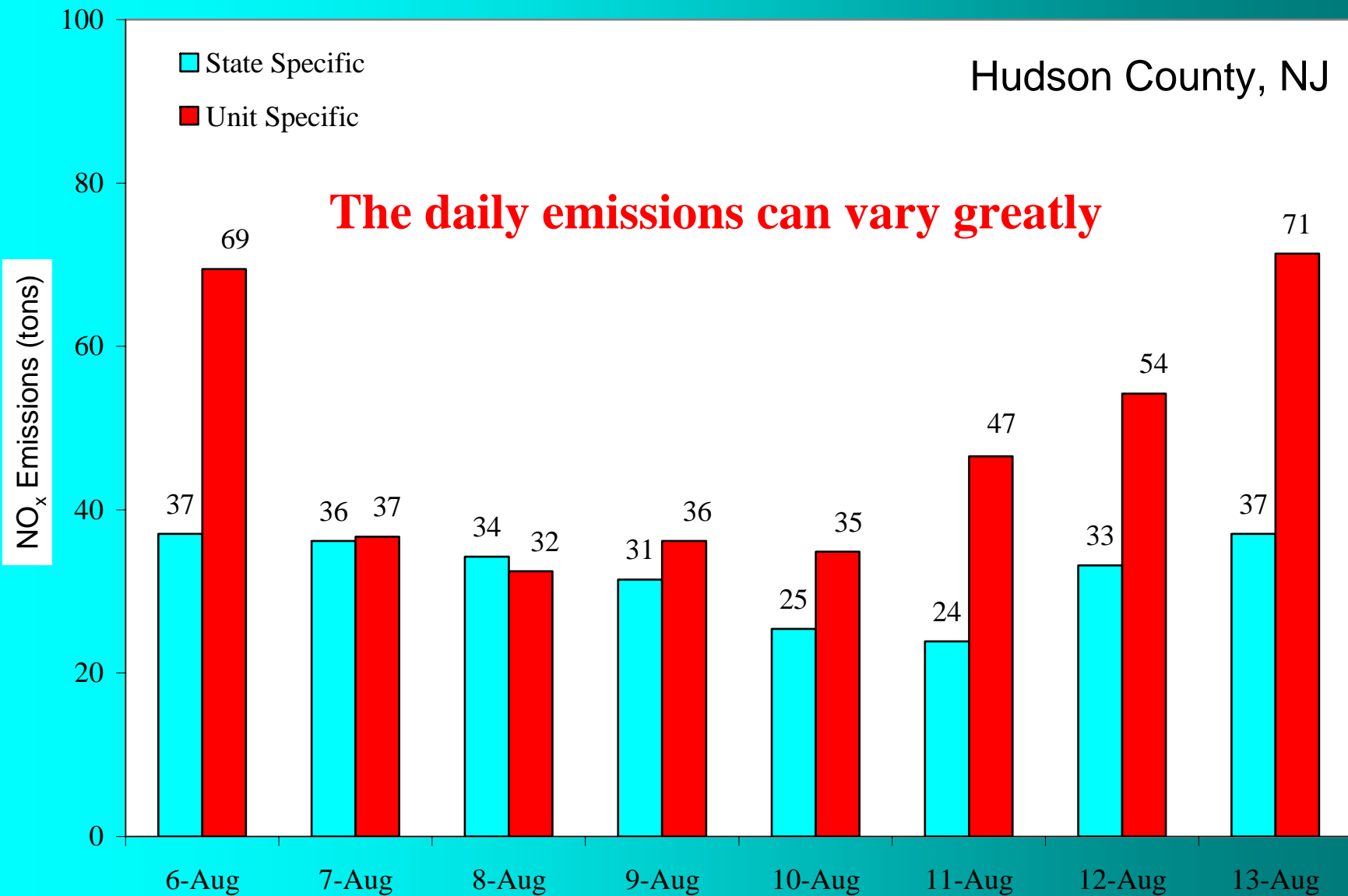
# Daily NO<sub>x</sub> Emissions from EGUs in NJ/downstate NY

June 1-September 15, 2002

**The actual daily and hourly temporal changes in emissions is not incorporated in the modeling**



# Modeling Daily NO<sub>x</sub> Emissions

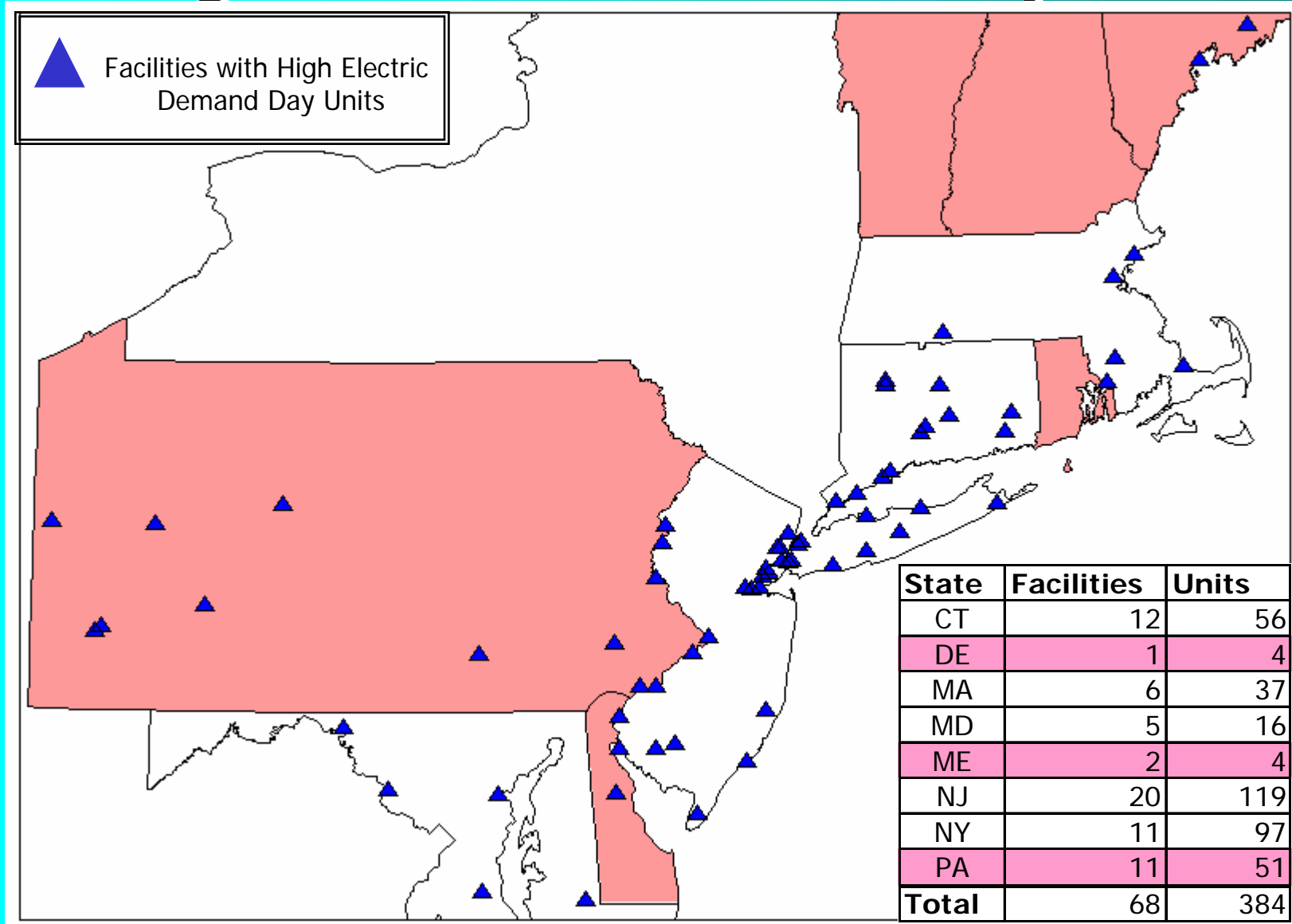


# Modeling Impact of High Electric Demand Day Units

- **Looked at units operating on high electric demand days, 2002-5 ozone seasons**
  - NJ & MD : units whose average operating time is  $\sim < 20\%$
  - CT: units whose average operating time is  $\sim < 50\%$
- **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  $> 1\%$**

Preliminary Modeling from Early 2006 – Does not reflect the strategy under consideration

# High Electric Demand Day Units



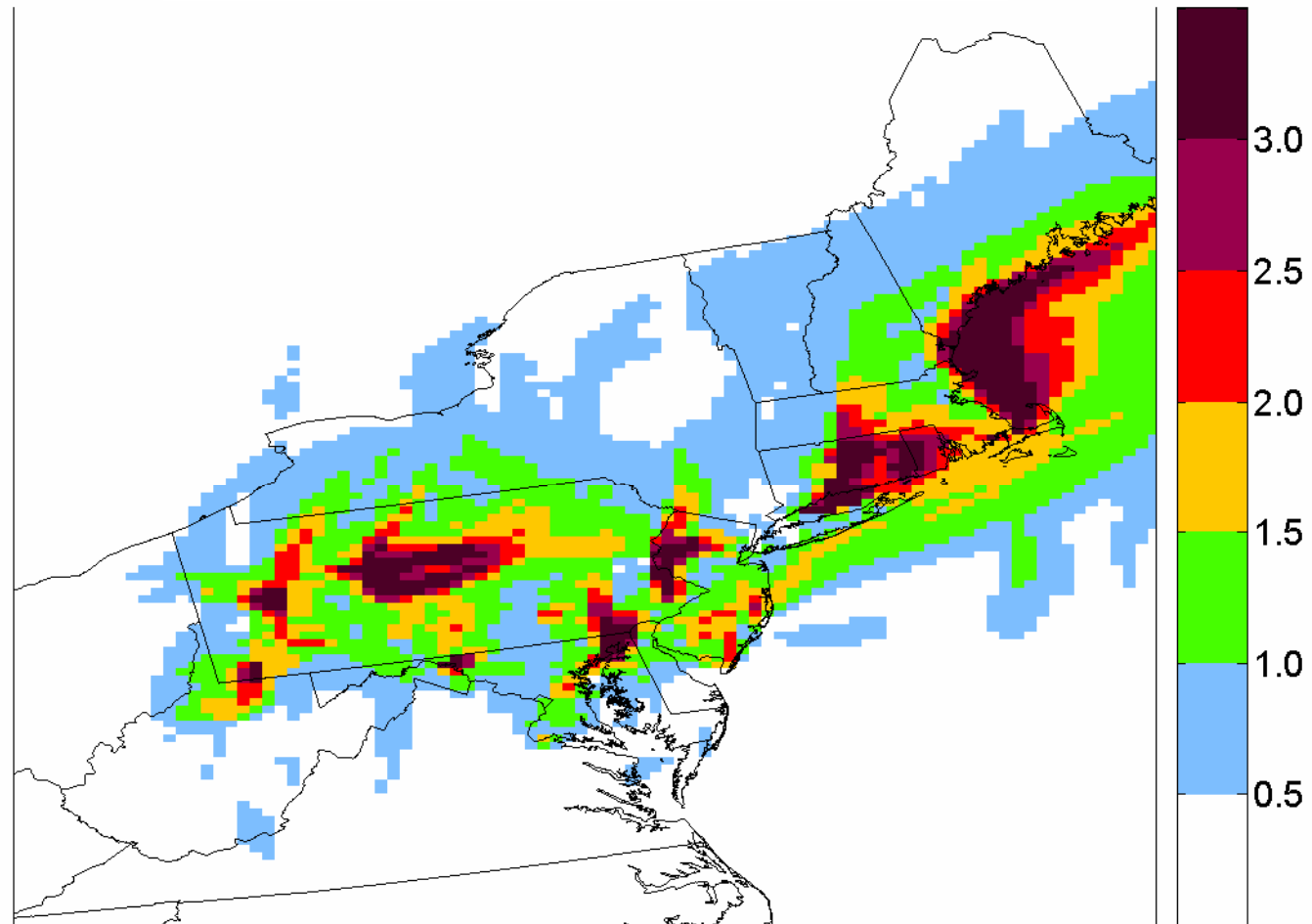
Preliminary Modeling from Early 2006 – Does not reflect the strategy under consideration



# 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)

Preliminary Modeling from Early 2006 – Does not reflect the strategy under consideration

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

# Baseload Getting Cleaner

## HEDD Emissions Remain High

PJM Generating Peak (MW)				
43,166	78,821		61,038	133,761
Emissions (TPD)				
Typical Summer Day			High Electric Demand Day	
8/7/2002	6/4/2005	Δ	8/12/2002	7/26/2005
992		441	1615	
	551	798		1349



Baseload units  
are getting  
cleaner



Delta getting larger--  
HEDD units have a more  
profound effect

# Daily NO<sub>x</sub> Emissions from All Units\* in OTR States



Date (2005)	NO <sub>x</sub> 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<sub>x</sub> Budget Program and/or Acid Rain Program

# Daily NO<sub>x</sub> 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<sub>x</sub> Budget Program and/or Acid Rain Program

# Cannot Attain without Effectively Addressing Peak Days

- **Demand for electricity is increasing and the increase in the peak is growing faster than the base:**
  - PJM Interconnection: consumer peak demand for electricity will **rise ~ 1.6% annually** over the **next decade**.
  - NE ISO: peak demand will **rise ~2.4% annually**.
  - NYISO: relies heavily on many, many combustion turbines to maintain NYC grid.
- **Meeting hot day peak electrical demand requires bringing on more units, which are not necessarily clean. These same units appear insignificant in inventory.**
- **Attainment plans must address high demand day units.**

**Developing a Program  
to Address This Issue -**

**The HEDD Partnership Plan**

# OTC High Electric Demand Day Initiative

- Long Term – Clean Units
- Short Term (2009) – Reductions to Aid Attainment
- Existing and New Small Units – Clean
- Leverage Energy Markets and PUC Actions



# Long Term

- Set Clean Performance Standards
- Allow Implementation Flexibility Through HEDD Partnership

# Short Term

- Provide Emission Reductions for 2009 Attainment
- Emission Reduction Responsibility Assigned to each State
  - Goal = ~25% Reduction in HEDD Unit Emissions
- State and Generator HEDD Partnership
  - Action Oriented
  - Flexible
  - Enforceable
  - Incorporate in the SIP

# Existing and New Small Units

- Scope:
  - Distributed Generation Units
  - Demand Response Units
- Benchmarked:
  - Permitting Rules
  - Control Levels
  - Definitions
- Action??

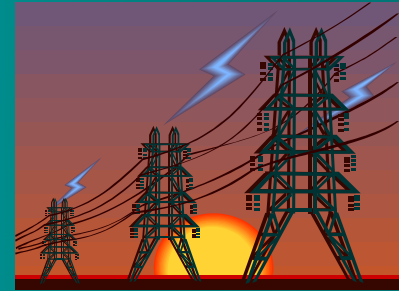
# Leverage Energy Markets and PUC Actions

- Efforts to Reduce Electrical Demand
  - Energy Efficiency Programs
- Efforts to Improve System Reliability
- Efforts to Promote Fuel Diversity
  - Renewable Energy Programs
  - Diversity Requirements
- Actions Include:
  - Real Time Metering Infrastructure
    - Cost Considerations
  - Dynamic pricing for retail customers
  - Removal of electric distribution company disincentives - decoupling
    - Broaden the focus on energy efficiency to include demand response and make energy efficiency a resource that can compete for market share

# State - Generator HEDD Partnership

- Agreement
- Emission Reduction Responsibility
- Defined Actions on High Electric Demand Days
- Quantification Methods
- Reporting Requirements
- Incorporated into the SIP

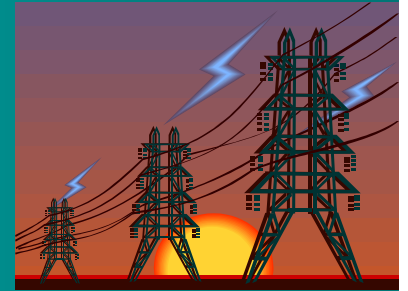
# Flexibility & Certainty



- **Flexibility**

- HEDD unit owners choose the most cost effective path
- Avoid “Command & Control” approach
- Allows the use of conservation to minimize peaks & minimize the commitment impact
- If not double-counted, HEDD unit owners responsibility can span state borders if directionally correct
- Allows time to comply, financial markets to respond, and continue to plan

# Flexibility & Certainty



- **Certainty**
  - State and the generator enter into a mutually agreed upon plan using a formal agreement as the “contract” which gets submitted in the SIP
  - Lays out what is expected of both parties
  - Provides the certainty required to plan future actions

# State Reduction Responsibility

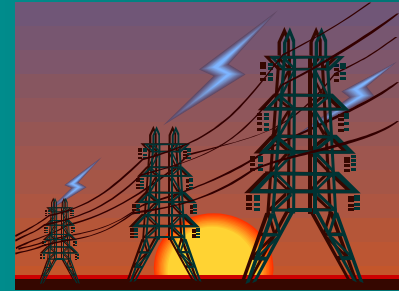
State	NO <sub>x</sub> (Tons per Day)	% Reduction From HEDD Units
CT	11.7	-25%
DE	6.3	-30%
MA	6.1	-26%
MD	23.9	-32%
NJ	19.8	-28%
NY	46.1	-26%
PA	22.2	-32%
	<b>136.1</b>	<b>-28%</b>

The Reduction Responsibility likely to change as the list of HEDD units is finalized




# Workgroup Participants

- ConEd
- Dominion
- Exelon
- Keyspan
- NRG
- PPL
- PSEG
- Reliant



**What's in it for...**

**The State:  Attainment**

**HEDD Unit Owners:  Flexibility  
& Certainty**