

OTC Modeling Committee HEDD Update



Buffalo NY
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NH DES



Screening Modeling

HEDD (High Electricity Demand Day) Workgroup formed under the request of the OTC Modeling Committee 3/17/09

Charge

Determine and recommend:

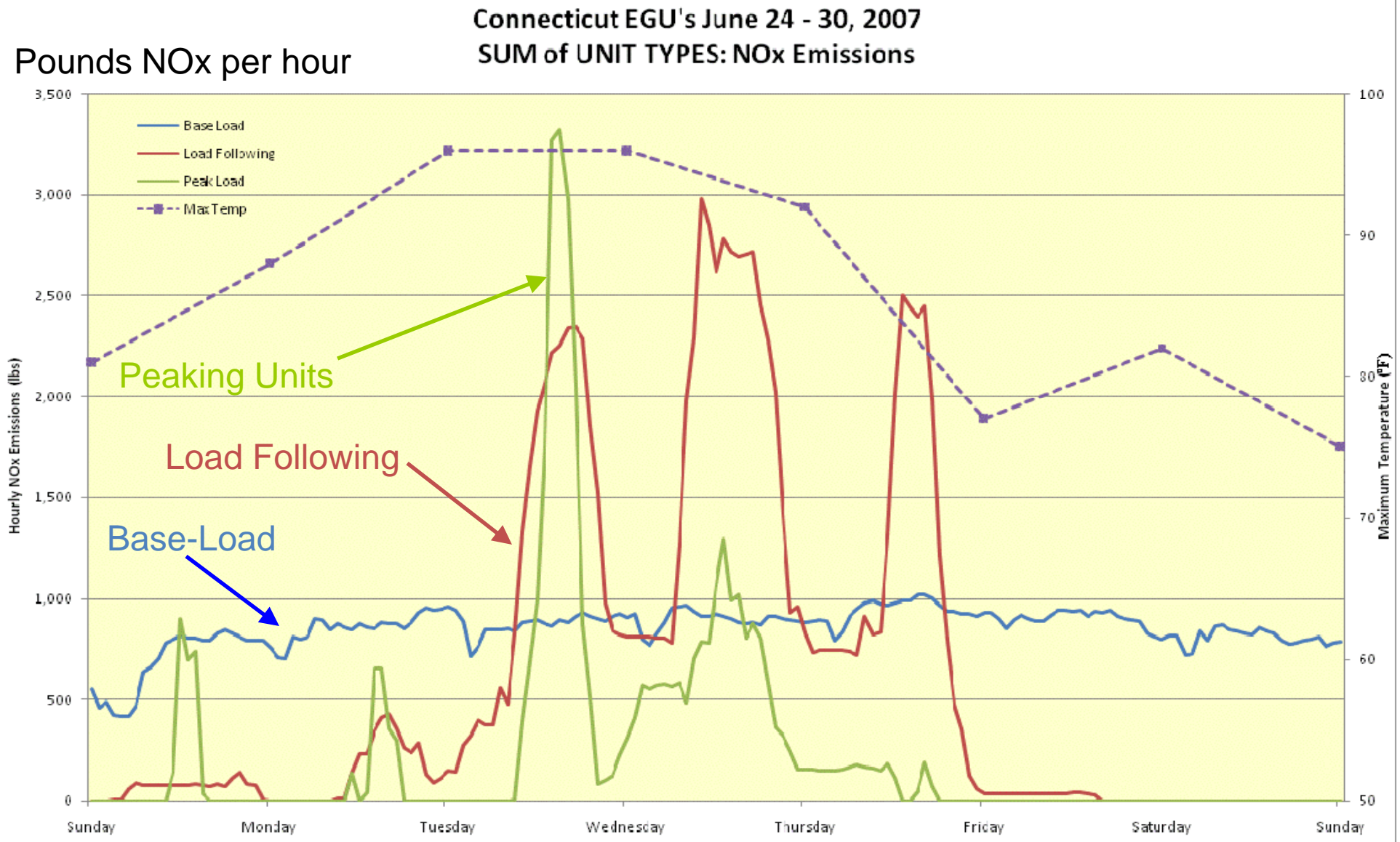
- Data needs for temporal modeling of HEDD units
- Research modeling process for handling HEDD
- Propose methodology for assessing importance of HEDD sources on air quality

Screening Modeling

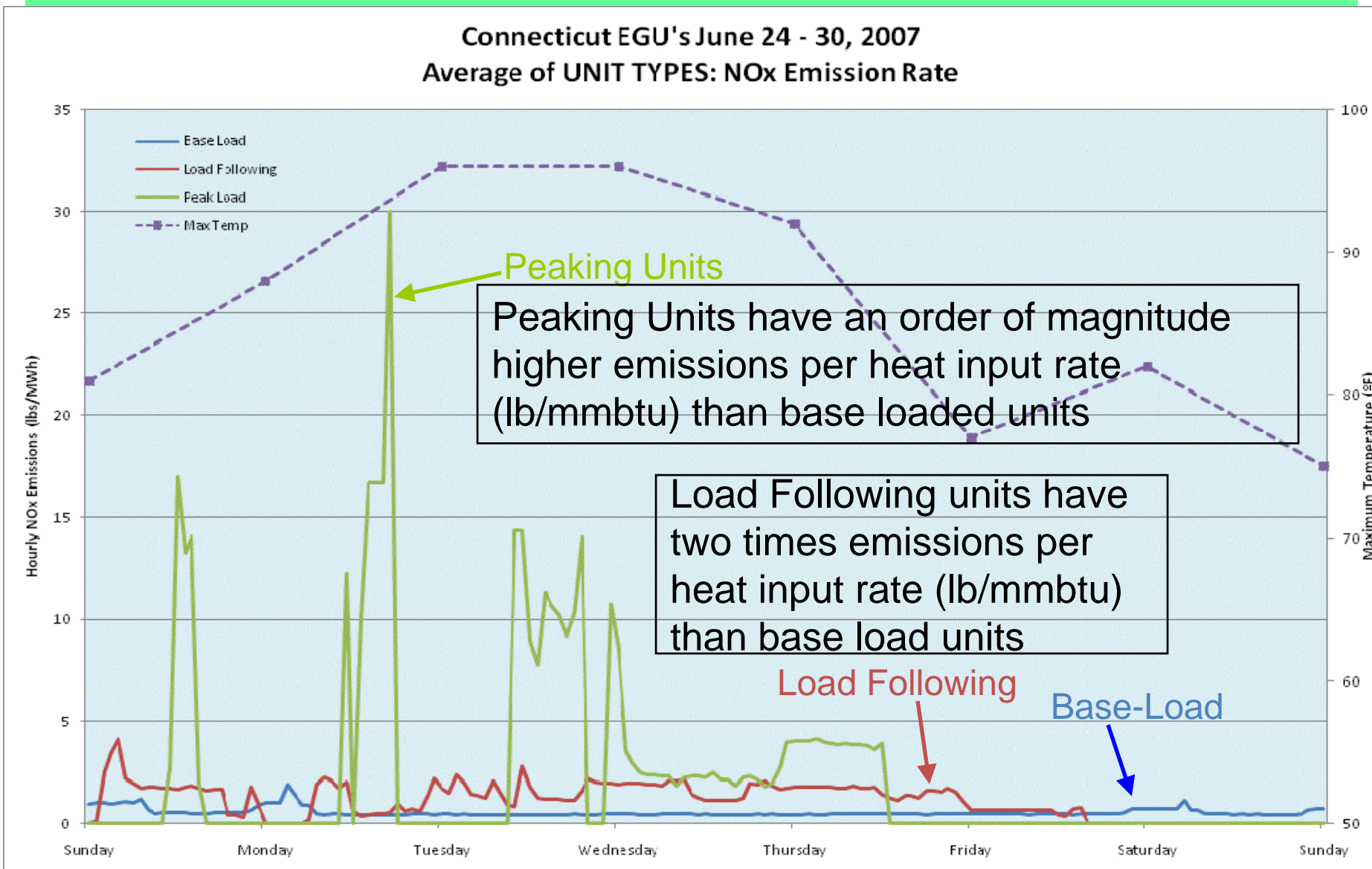
Steps

- Identify HEDD units on state-by-state basis
- Match HEDD units within modeling files to reported hourly emission data and compare data with reported NEI data
- Insert hourly emission data into modeling files for HEDD units
- Perform modeling to assess the benefits from emission controls to HEDD units

Load Following Boilers and Peaking Units Often Have High NOx Emission Rates

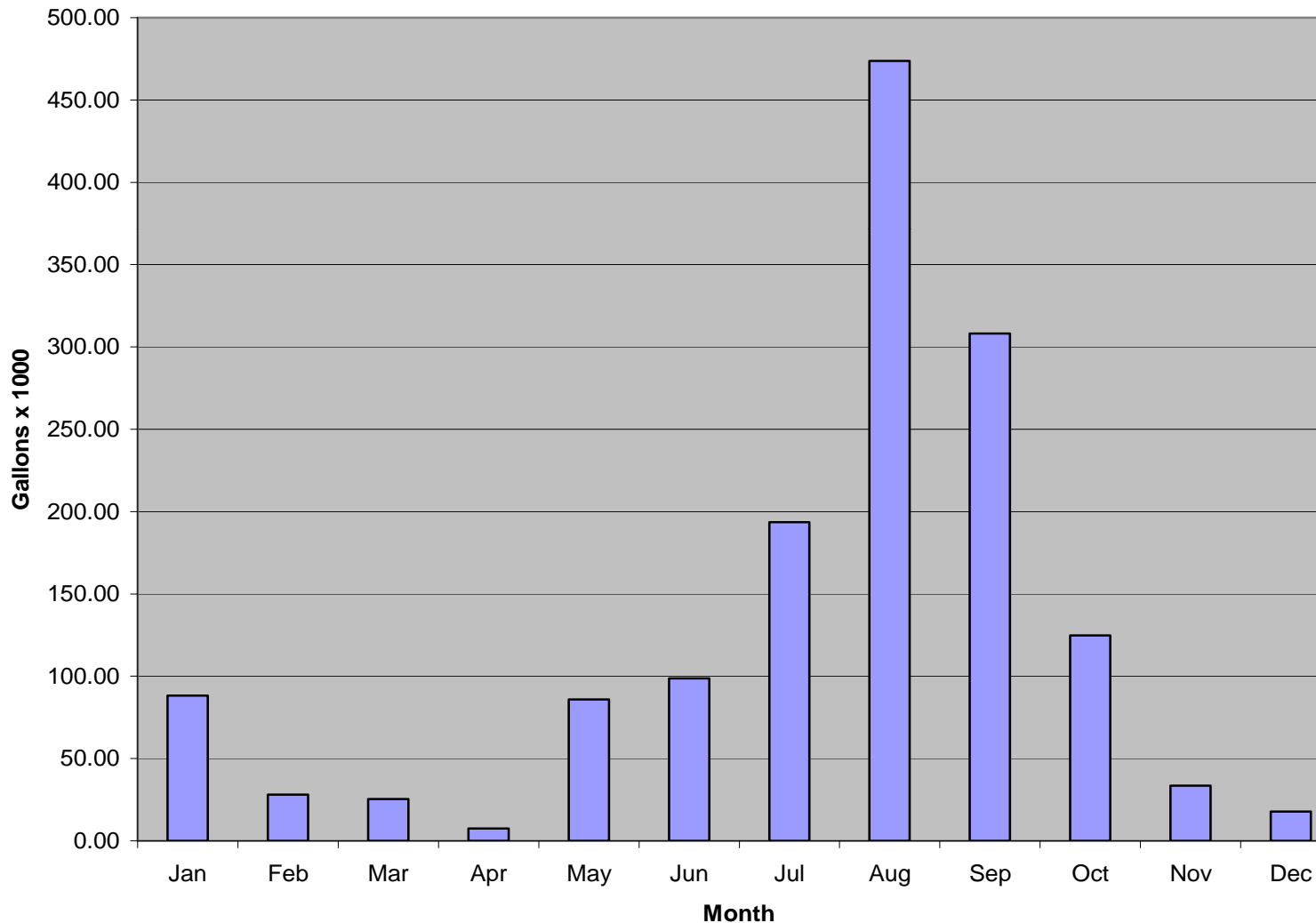


HEDD Units High Emissions Per Energy Generated



Diesel generation units in Philadelphia have shown usage patterns which appear to follow HEDD

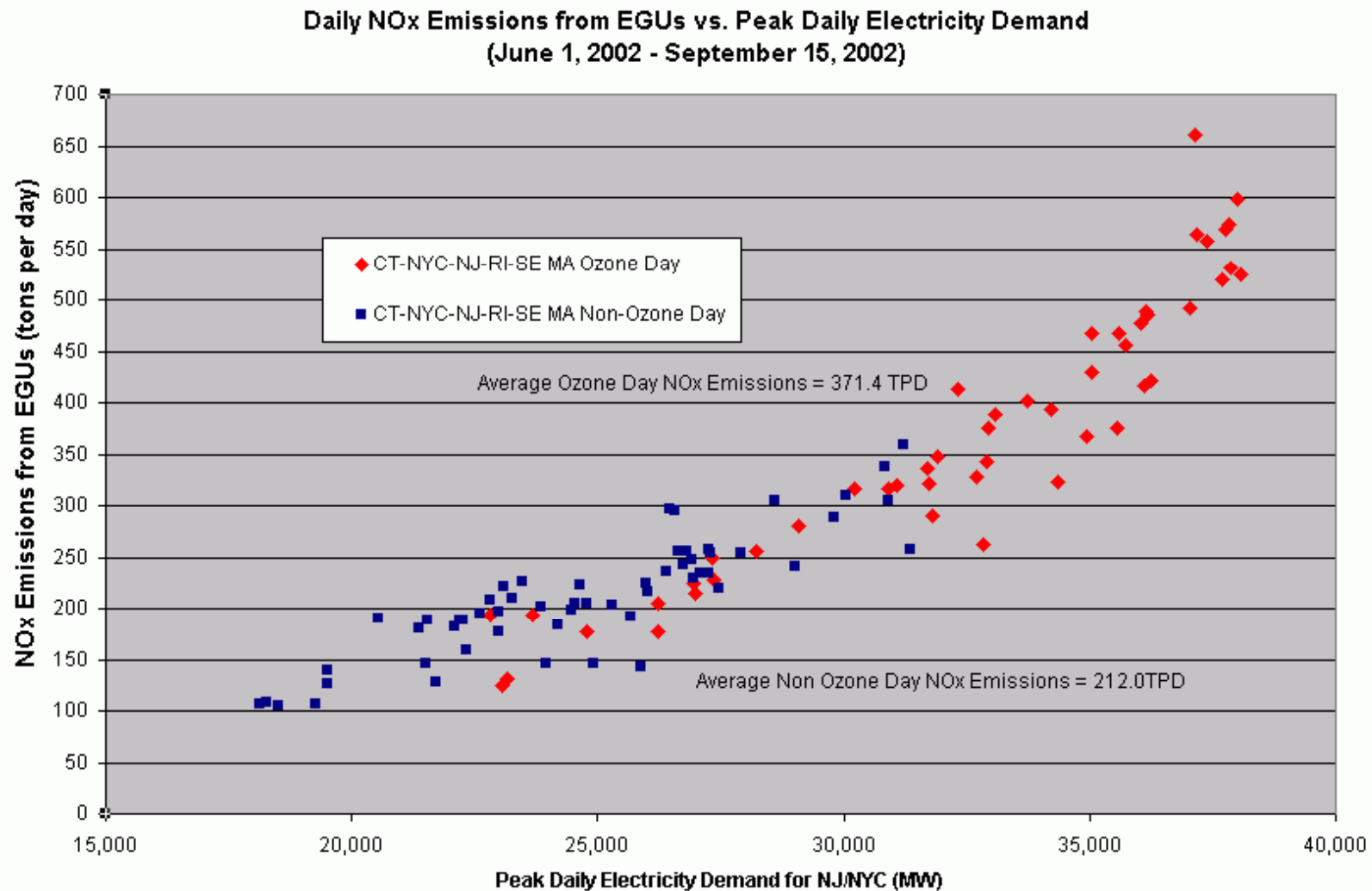
2006 Diesel Throughput for Engines < 25 MW Capacity in the City of Philadelphia by Month



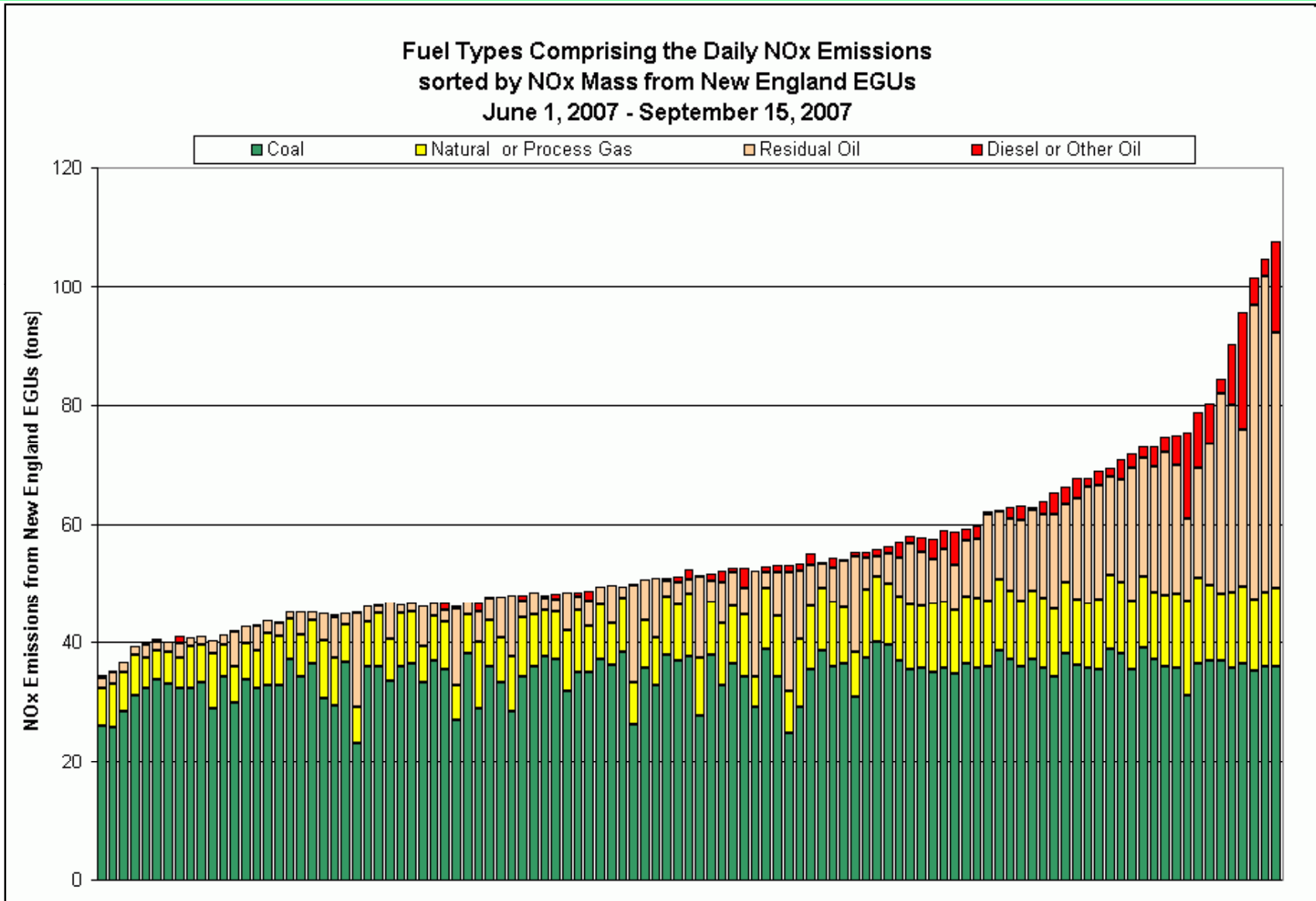
Diesel generator emissions are estimated to be substantial in the southern OTR.

DE, NJ, PA, and VA indicated that DG may be important peak day emission sources in their states.

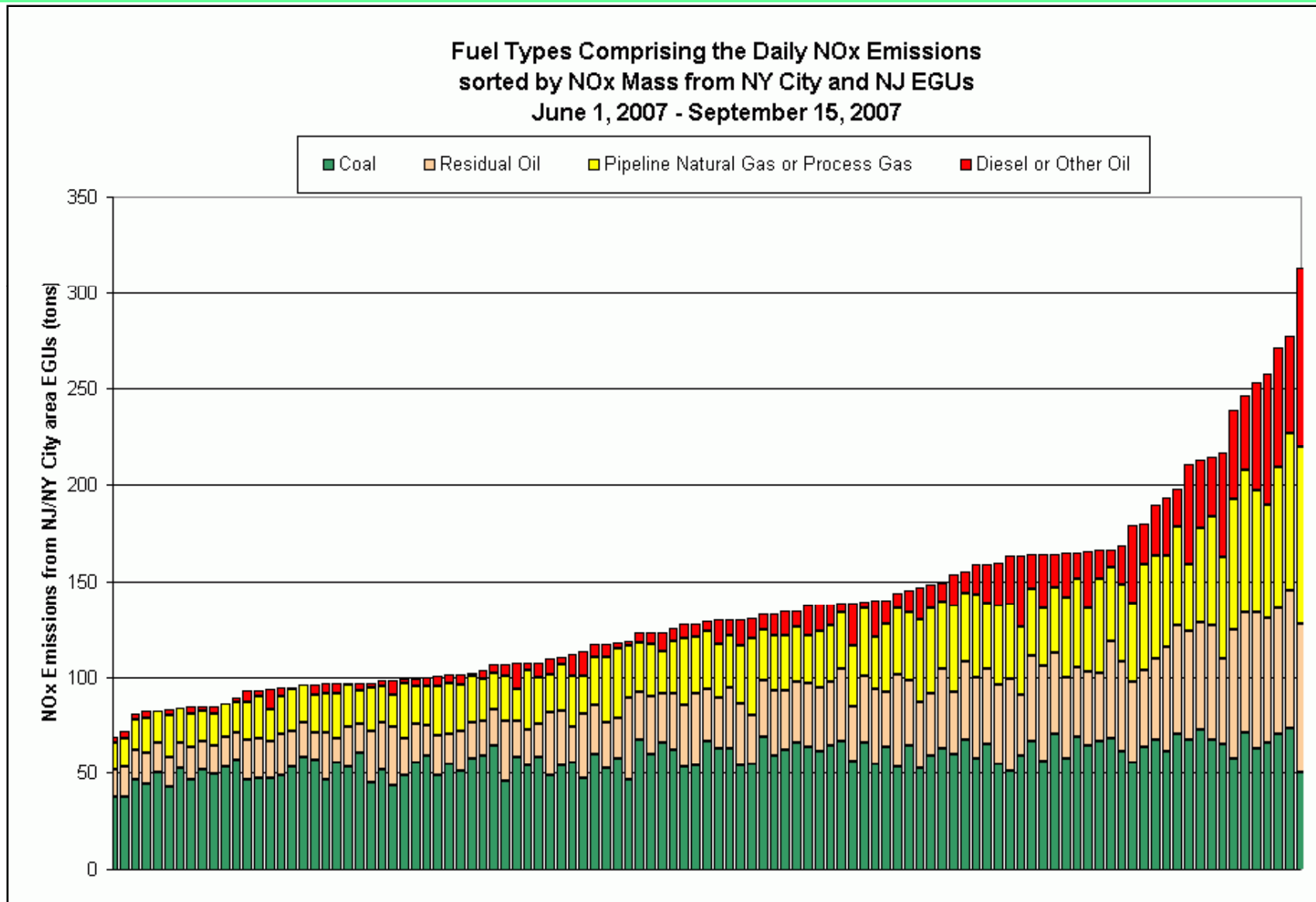
High Demand Leads to Higher NOx Emissions on Ozone Days



In New England, Peakers Tend to Be Oil and Diesel Based

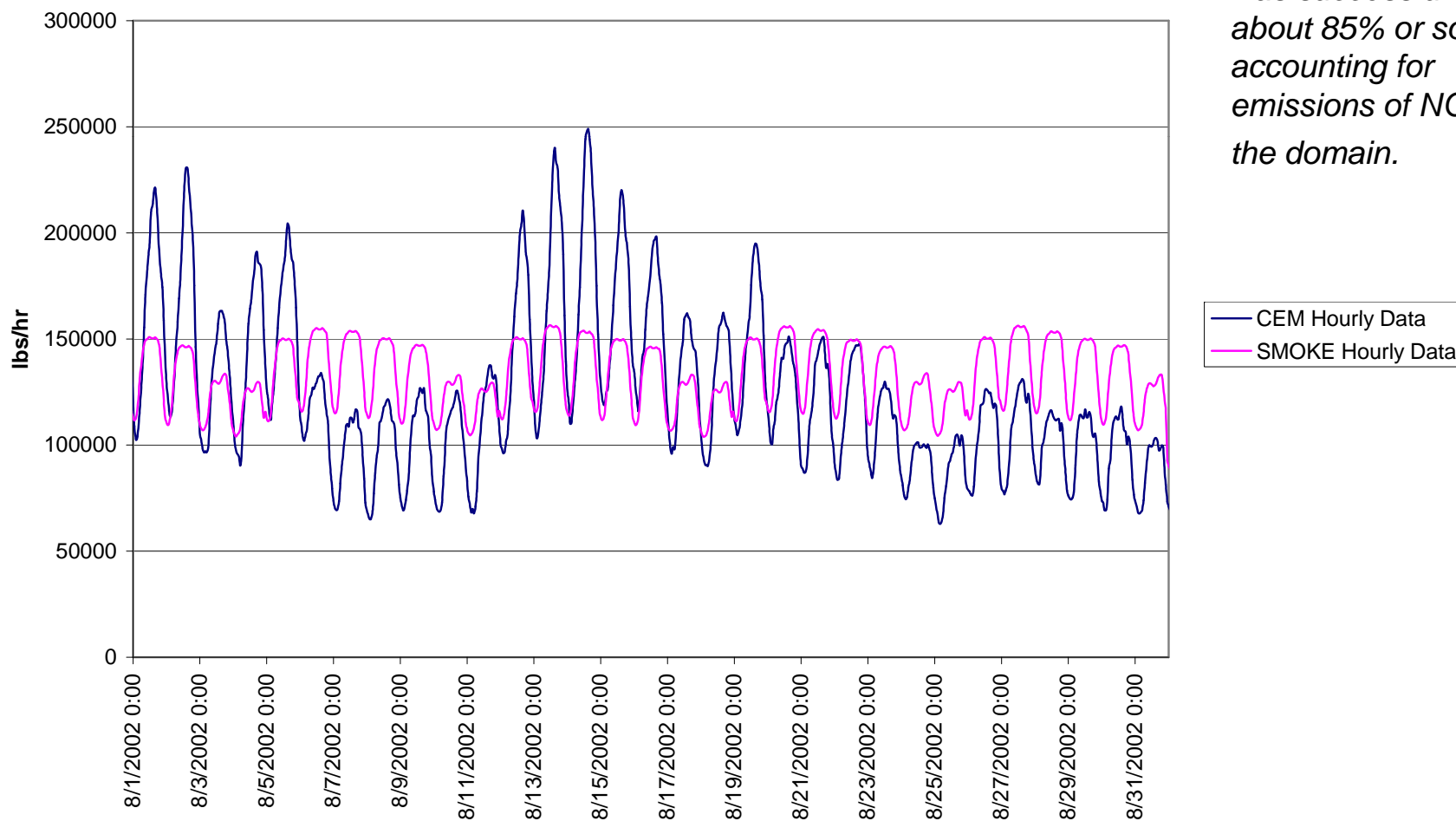


In New York and New Jersey, Peakers Also Include Natural Gas



The SMOKE Model applies month-of-year, day-of-week, and hour-of-day profiles to the annual emissions. For temporal allocation Requires manual override with CEMS data.

August 2002 Hourly NOx Emissions in the MANE-VU Region from CEM Data and SMOKE-Processed Point Source Files (Adjusted to Remove the Effect of non-CEM-matched Point Sources)



Crosswalk matching was successful only to about 85% or so in accounting for emissions of NOx over the domain.

Identification of HEDD Units

- Major EGU and Distributed Generation units are to be identified in the OTR states
- States can use their own processes, rules, or legislation to make such definitions
- This modeling effort will not override existing definitions and instead will use unit commonalities to identify and separate HEDD units into 3 bins
 - HEDD1: EGUs with available CAMD hourly data
 - HEDD2: EGUs without available CAMD hourly data
 - HEDD3: Distributed generation units associated with peak day operation.

Emission Groups

- These bins will aid in future modeling sensitivity work as it may be requested.
- HEDD1 sources should be readily found in the CAMD database
- HEDD2 and HEDD3 bins would need additional inventory work to estimate approximate operational patterns.

Screening Modeling

- HEDD Screening In support of the next round of State Implementation Plans (SIPs) to assess relative importance
- 2 Episodes targeted for HEDD Screening Modeling: (15 to 20 episodic and spin-up days)
 - Focus days: June 27 and August 3
- The primary focus of the effort will be on ozone, although changes in PM_{2.5} will be noted.

Screening Modeling

Four Recommended Simulations:

1. 2007 base case using CAMD hourly data rather than SMOKE profiles to allocate annual emissions
2. 2007 base using SMOKE profiles to allocate annual emissions
3. 2007 run #1 (above) with all identified Major EGU HEDD units turned off
4. 2007 run #3 (above) with displaced capacity redistributed

Screening Modeling

- MARAMA working with states to identify units that are Major EGU HEDD units.
- Two separate annual inventory files will be created, called "summer annual" and "winter annual"
- Units that have year-round hourly reported values should reflect the annual totals and should be in agreement between the CAMD and the State data.
- Units that report only summer hourly values, the 'winter annual' will be the difference between the CAMD summer total and the annual State data.

Screening Modeling

- Approaches for projecting future years are not yet recommended by the workgroup.

Summary

- Emissions during high electricity demand days can be considerably higher than on other days.
- Peaking and load following units often have higher emission rates than other units.
- Peaking and load following units often operate on days with already poor air quality.
- Standard emission modeling procedures, including CEMS reporting units, can do a poor job developing modeling input files representing actual emission conditions.

Summary

- There are techniques being applied or being considered, but none are considered standard.
- Episodic screening modeling for base year 2007 is proposed for OTC ozone modeling.
- States are to identify their HEDD sources based on their own state definitions
- Methodology for projection of hourly emissions to future years is not yet fully developed.
- A new hourly version of IPM is not yet proven and would be expensive.