

Summary of Distributed Generator Survey Findings

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Group
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Draft – for discussion purposes only

Background

- ✓ The NY Dept. of Environmental Conservation (DEC) has drafted rules (Part 222.1) that address environmental restrictions on the use of emergency generators in demand response programs
- ✓ To better understand emergency generator participation in EDRP/SCR, the NYISO surveyed CSPs/RIPs in July 2006
- ✓ This presentation summarizes the results of that survey

General Statistics

- ✓ 11 CSPs/RIPs responded to survey (out of 36 registered)
- ✓ 3 CSPs/RIPs indicated no generation resources
- ✓ 246 sources reported:
 - *151 less than 150 kW nameplate and located in Zones H, I, J or K*
 - *95 subject to Part 222 based on nameplate*
 - *None reported having a Title V permit with a Part 227 Variance*
 - *All units reported are located in Zones J or K*
- ✓ Any assumption of randomness needs to recognize the self-reported nature of the sample data

General Statistics

- ✓ 96 sources surveyed are known to be generators in NYISO records (39%)
- ✓ 150 sources surveyed are not listed as generators in NYISO records (61%)
- ✓ For the 96 known sources, total ICAP in August 2006 was 57.8 MW
- ✓ For the 150 newly-identified generators, total ICAP in August 2006 was 26.8 MW

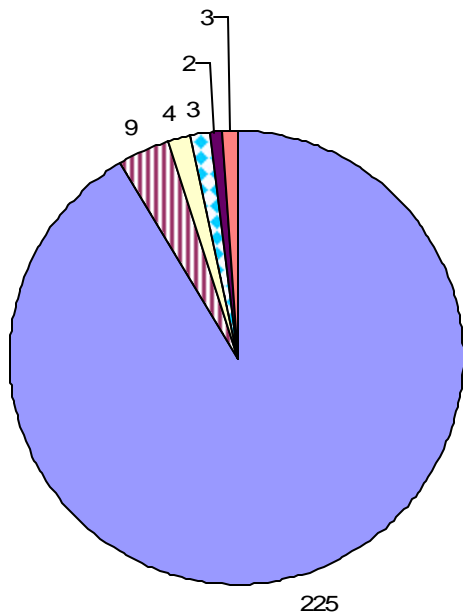
General Statistics

For sources subject to Part 222:

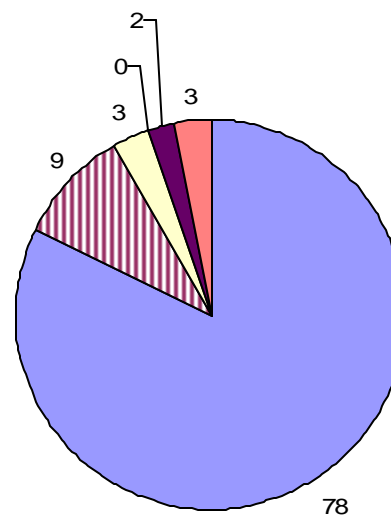
- ✓ 53 sources surveyed are known to be generators in NYISO records (56%)
- ✓ 42 sources surveyed are not listed as generators in NYISO records (44%)
- ✓ For the 53 known sources, total ICAP in August 2006 was 51.9 MW
- ✓ For the 42 newly-identified generators, total ICAP in August 2006 was 12.3 MW

Generator Type

Generator Type, All Reported Units



Generator Type, Units Subject to 222



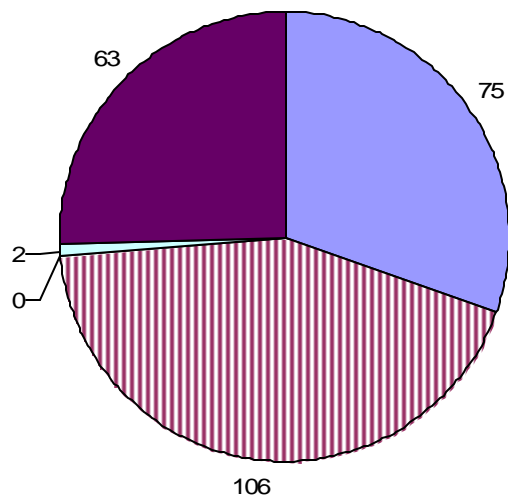
- IC engine
- lean-burn IC engine ($\geq 1\%$ O2 exhaust)
- turbine
- microturbine (less than or equal to 250 kW)
- other (specify)
- no generator type specified

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✓ Most smaller units are either IC engines or microturbines

Fuel Type

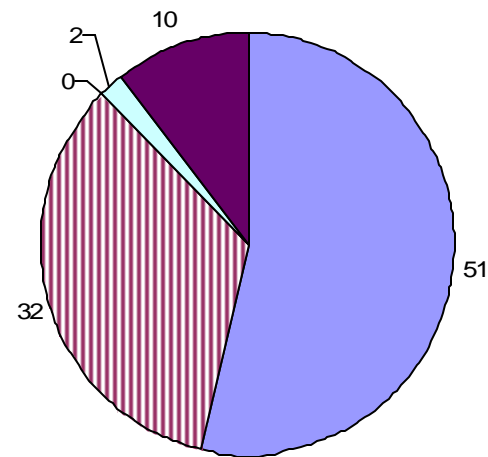
Fuel Type, All Reported Units



■ diesel ■ natural gas ■ biogas ■ other (specify) ■ no fuel type specified

5 units regularly use low-sulfur fuel and are equipped with a particulate control device

Fuel Type, Units Subject to 222

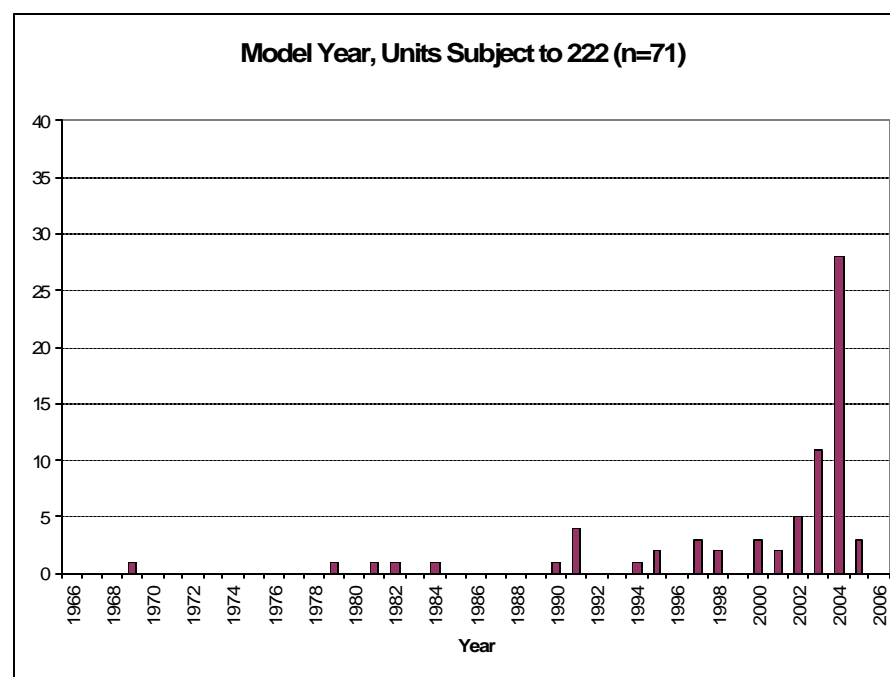
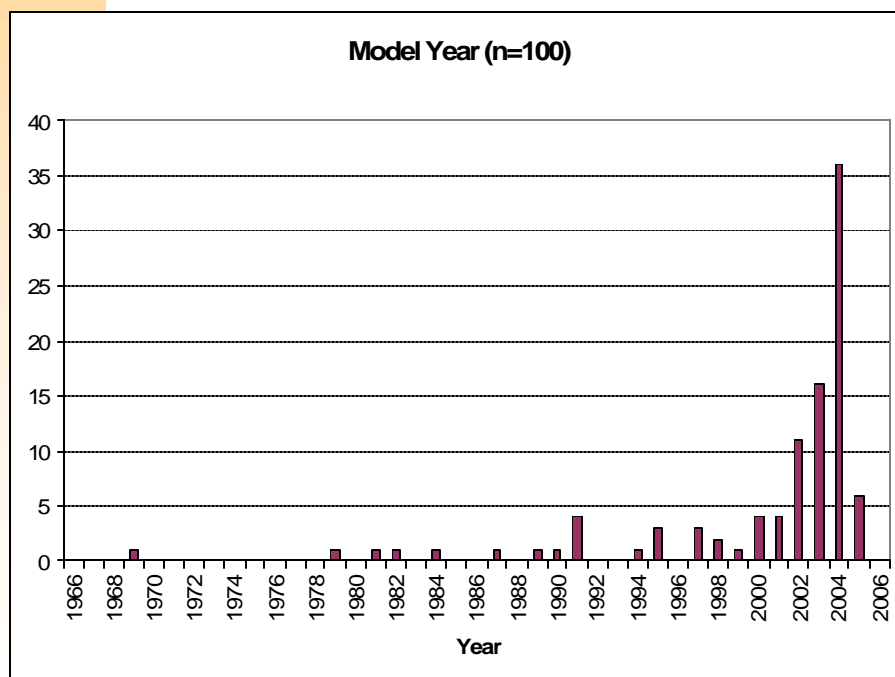


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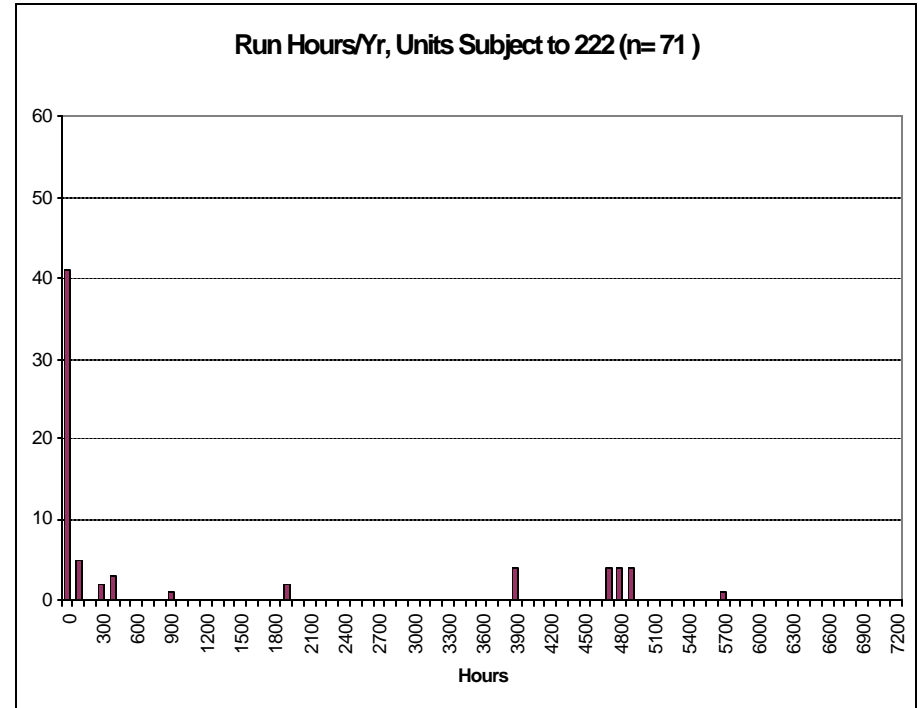
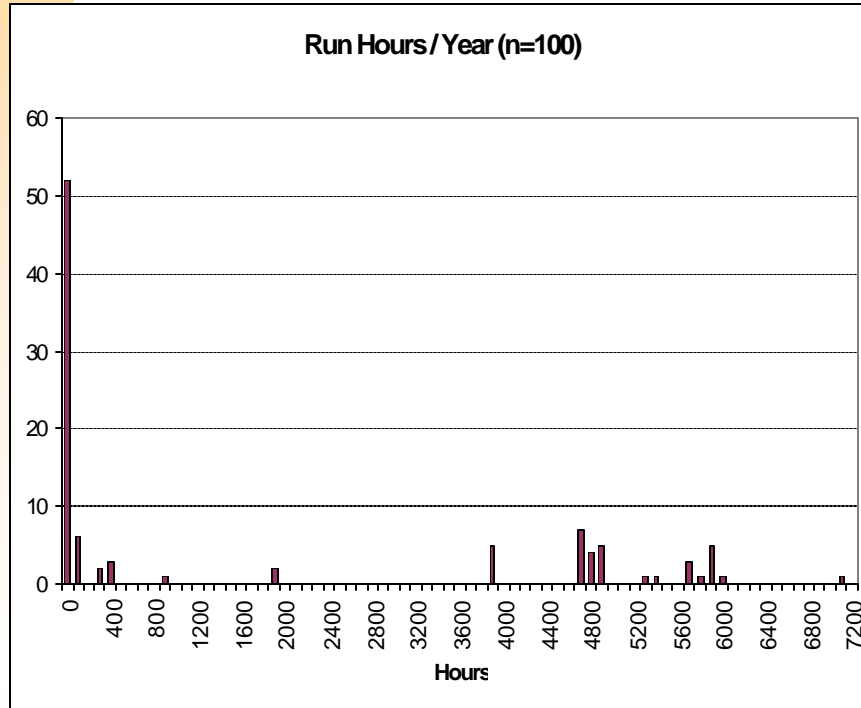
3 units regularly use low-sulfur fuel and are equipped with a particulate control device

Predominant fuel for all reported units is natural gas; for units that would be subject to Part 222, predominant fuel is diesel

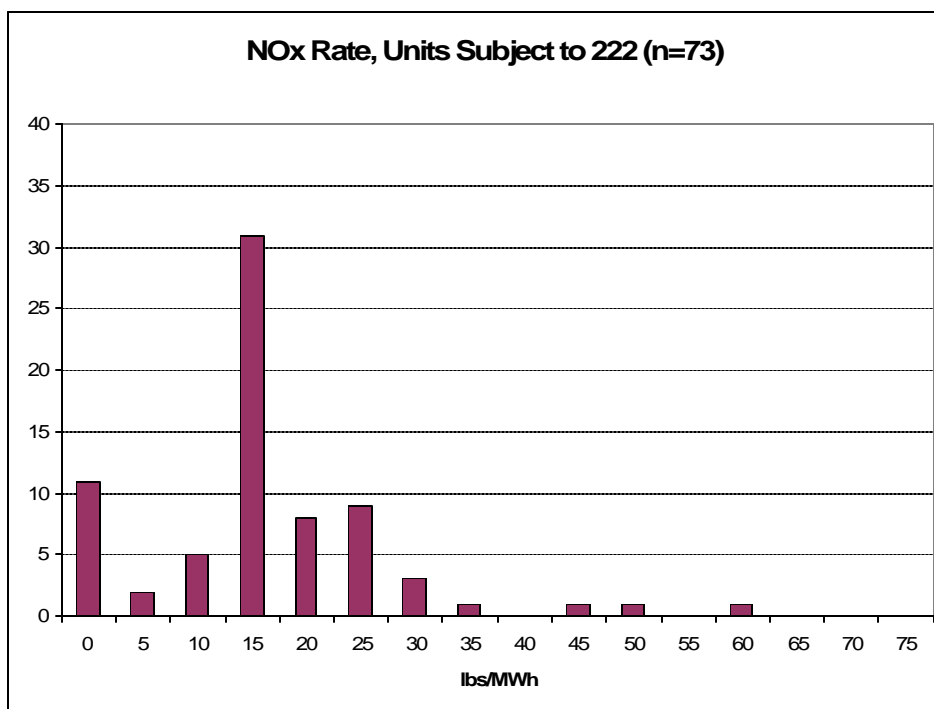
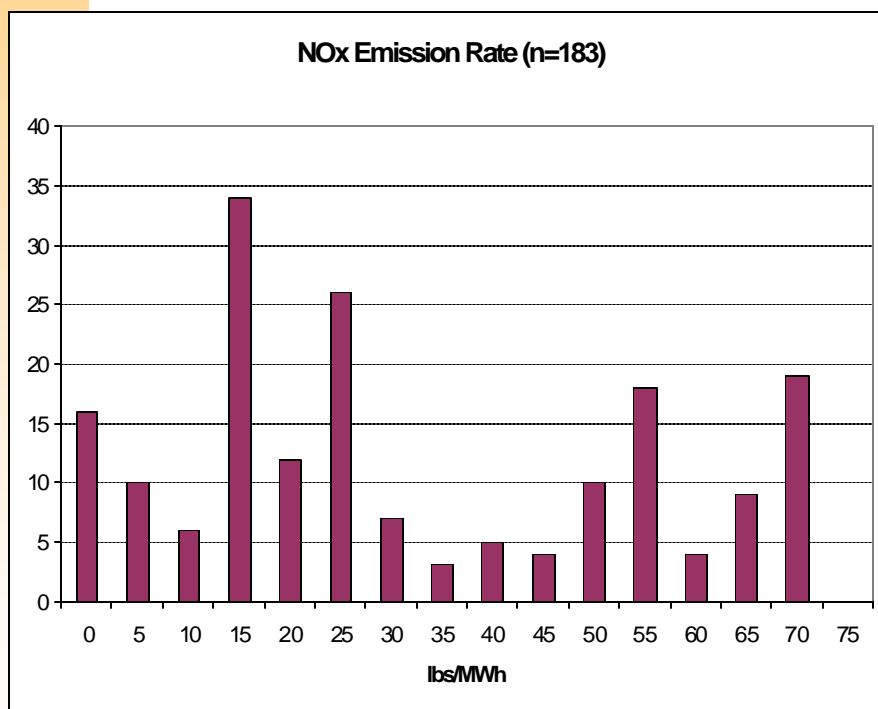
Model Year Survey Results



Annual Run Hours Survey Results

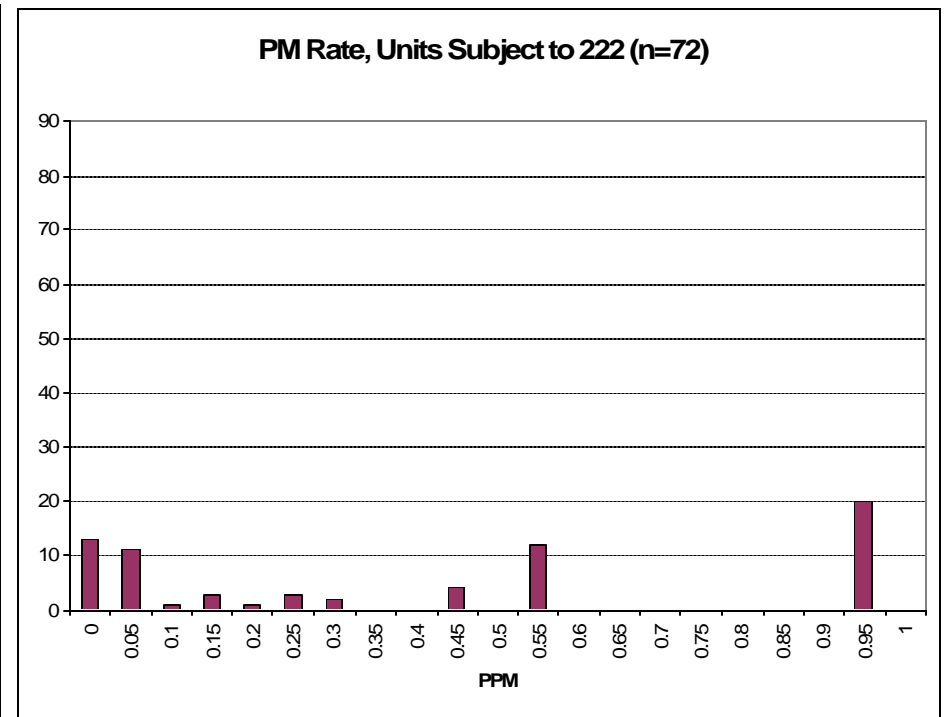
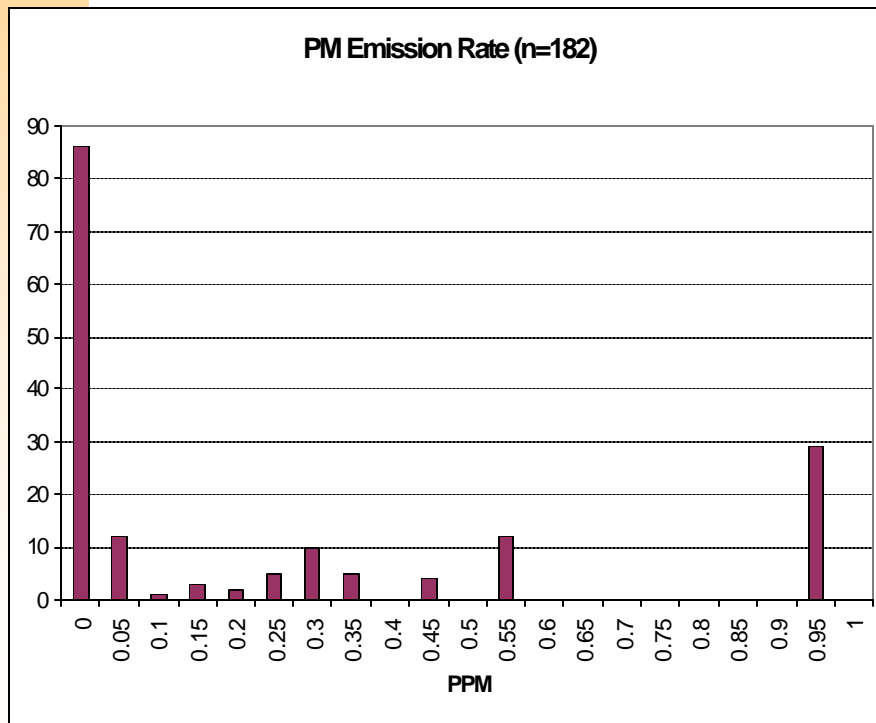


NOx Emissions Rate Survey Results



- ✓ Significant difference in mean values (34.7 lb/MWh for all units reported, 19.1 lb/MWh for units subject to Part 222)

PM Emissions Rate Survey Results



✓ Smaller, gas-fired units emit very little PM

Resources Meeting Part 222, Sec. 1.5 (Emissions Limits)

- ✓ Of the 95 sources large enough to fall within Part 222, there are several units that, by virtue of their NO_x emission rates, would be able to meet DG emissions limits in 222.1.5:
 - 2 sources (0.35 MW total) are lean burn engines firing natural gas with NO_x rate < 9 lb/MWh
 - 7 sources (5.6 MW) are rich burn engines firing natural gas with NO_x rate < 6 lb/MWh
 - 24 sources (8.7 MW) are engines firing diesel with NO_x rate < 22.5 lb/MWh

Using Survey Sample to Estimate Population

- ✓ From the survey **sample** of generating units, we know the proportion of MW of newly-identified generation to MW of total reported generation:

$$26.8 \text{ MW new} / 84.6 \text{ MW total} = 0.317 = p$$

- ✓ A (1-a)100% confidence interval on the upper bound for potential additional generation in the **population** is given by:

$$p + z_{a/2} \sqrt{pq/n}, \text{ where}$$

$z_{a/2}$ = area under the normal curve leaving an area of a/2 to the right,

$$q = 1-p (=0.683)$$

n = # observations (in this case 246)

Using Survey Sample to Estimate Population

- ✓ At a 99% confidence level, $z_{\alpha/2} = 2.576$
- ✓ The estimated upper bound on the potential proportion of additional generation in the **population** is:
$$0.317 + 2.576 \cdot \sqrt{[(0.317)(0.683)/246]}$$
$$= 0.393$$
- ✓ From the August 2006 EDRP/SCR registration, there are 173.9 MW of known generation resources in Zones J and K. An upper bound on the MW of unknown generation resources in the **population** is given as $173.85 \cdot 0.393 / (.683) = 112.6$ MW
- ✓ The total population of generation resources is estimated to be $112.6 + 173.9 = 286.5$ MW

Using Survey Sample to Estimate Population

- ✓ Of the known generators in the **sample**, 51.9 MW of the 57.8 MW are subject to Part 222 based on size ($51.9/57.8 = 0.898$)
- ✓ Of the newly-identified generators in the **sample**, 12.3 MW of the 26.8 MW are subject to Part 222 based on size ($12.3/26.8 = 0.459$)
- ✓ 99% confidence intervals on the upper bounds for known and newly-identified generation in the **population** are 0.978 and 0.591, respectively

Using Survey Sample to Estimate Population

- ✓ As an upper limit on the total amount of generation in the **population** subject to Part 222, we can estimate:
 - *97.8% of 173.9 MW (known) = 170 MW, plus*
 - *59.1% of 112.6 MW (upper bound on newly-identified generation) = 66.5 MW*
- ✓ The 99% upper confidence limit on generation resources in Zones J and K subject to Part 222 is estimated to be 236.5 MW

Conclusions

- ✓ Not counting generators exclusively in NYPA, LIPA, or Con Ed programs, we are close to the Part 222 cap (236.5 MW vs. cap of 271.9 MW in Zones J and K)
- ✓ 61% of the reported generators fall below the 150 kW minimum size for Part 222
- ✓ 33 of the 95 units reported that would be subject to Part 222 would meet the emissions requirements of Sec 1.5, which would reduce the MW subject to the cap by 14.7 MW
- ✓ NOx emission rates for reported units subject to 222 are far lower than the DEC used to determine the MW cap (19.1 lb/MWh vs. 40 lb/MWh noted in DEC June 29, 2006 meeting summary)