



# IRP: Environmental Drivers

## September 20, 2011

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# Agenda

- Background
  - Sources Emissions
  - CAA Planning
  - NO<sub>x</sub>, SO<sub>x</sub>, HAPs, Allowances and CWA
- IRP base case assumptions and study plan

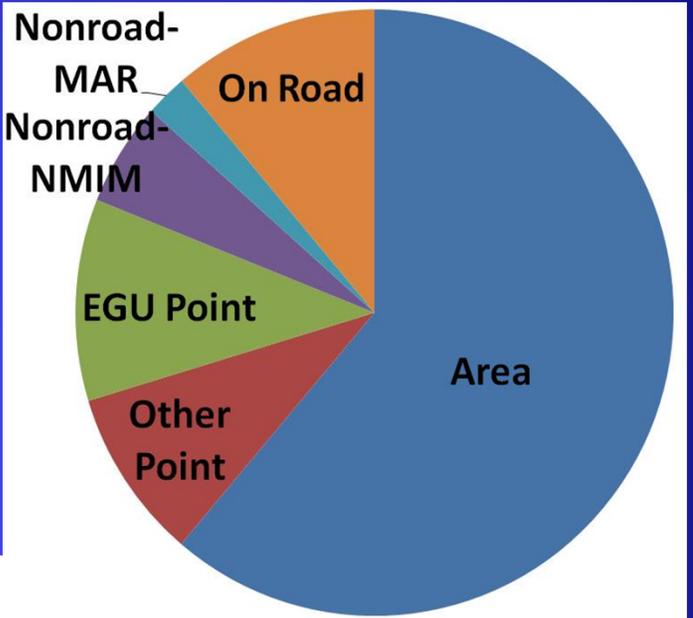
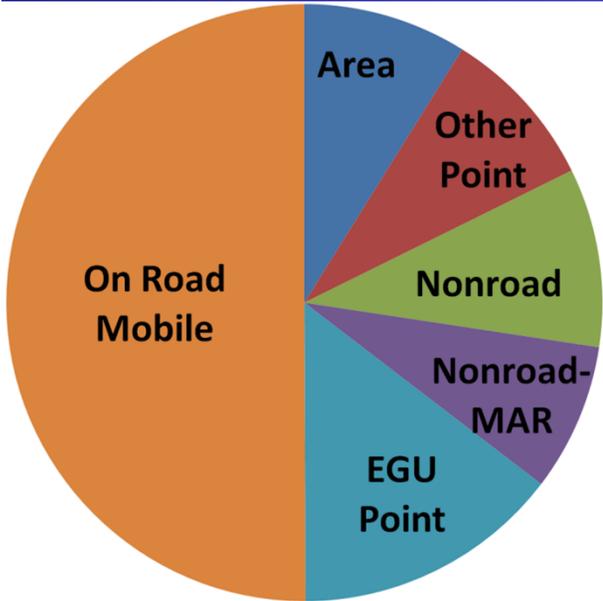


# Background

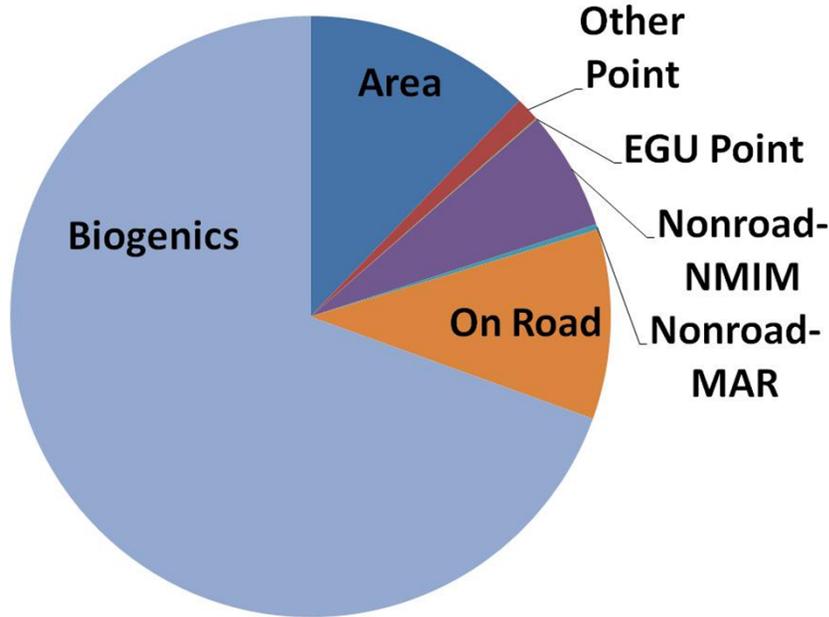
- Sources of Emissions
- CAA Planning Requirements
- Ozone: Good news, bad news
- Regulatory focus



# 2007 Emissions OTC+VA Region

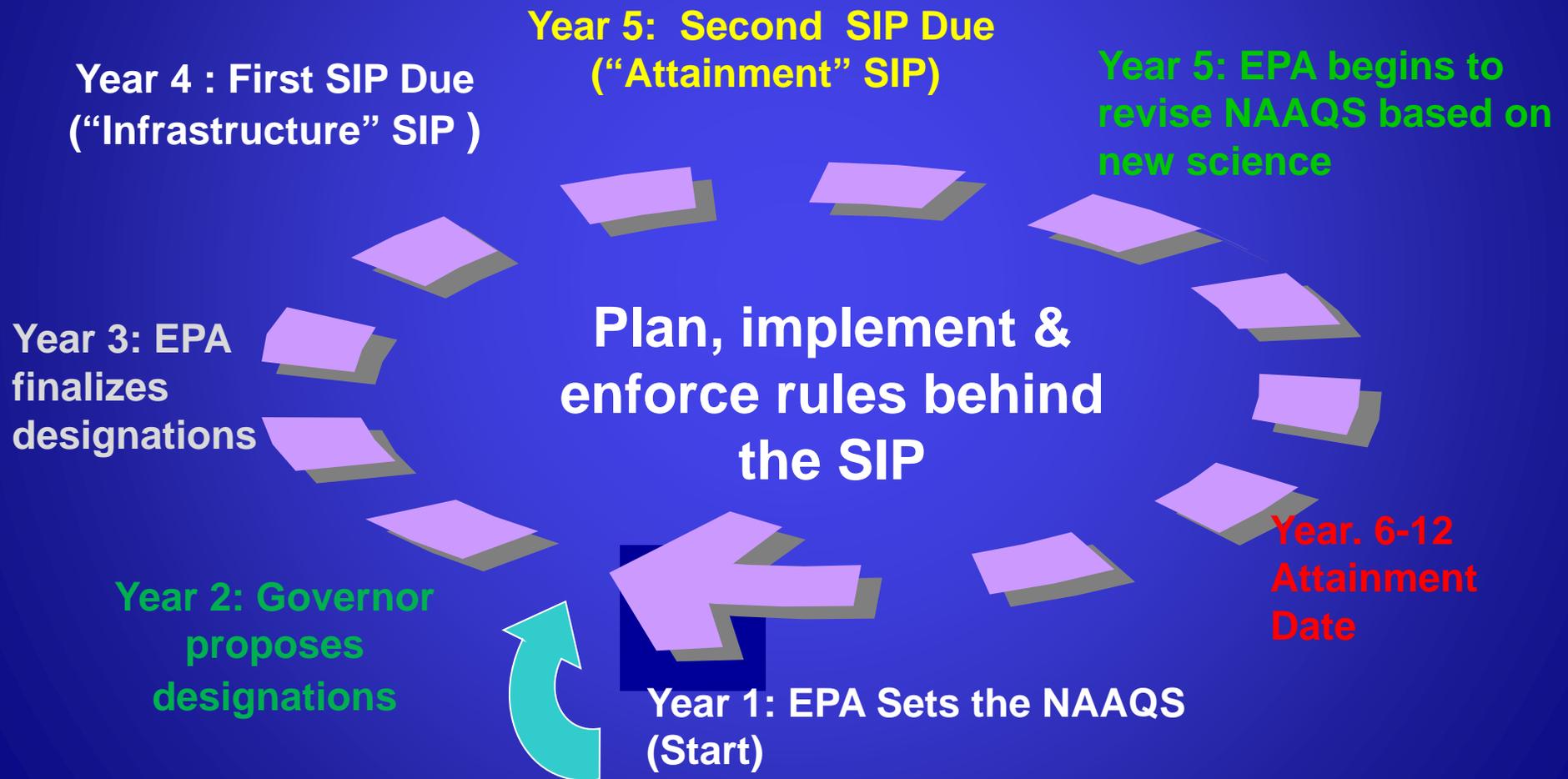


**VOC**  
8.0 MILLION TPY



Mobile emissions are draft and subject to change (Preliminary MOVES run)

# The Clean Air Act Planning Cycle



# Background - NO<sub>x</sub>

- Oxides of Nitrogen (NO<sub>x</sub>) -- precursor pollutant to ozone (i.e., smog) and fine particulates (PM<sub>2.5</sub>)
- EPA's National Ambient Air Quality Standard (NAAQS) for ozone drives NO<sub>x</sub> reductions
- EPA must review each of the 6 NAAQSs every 5 yrs and update if warranted by best science
  - Ozone, NO<sub>2</sub>, SO<sub>2</sub>, PM, CO and Pb



# High Electric Demand Day - Update

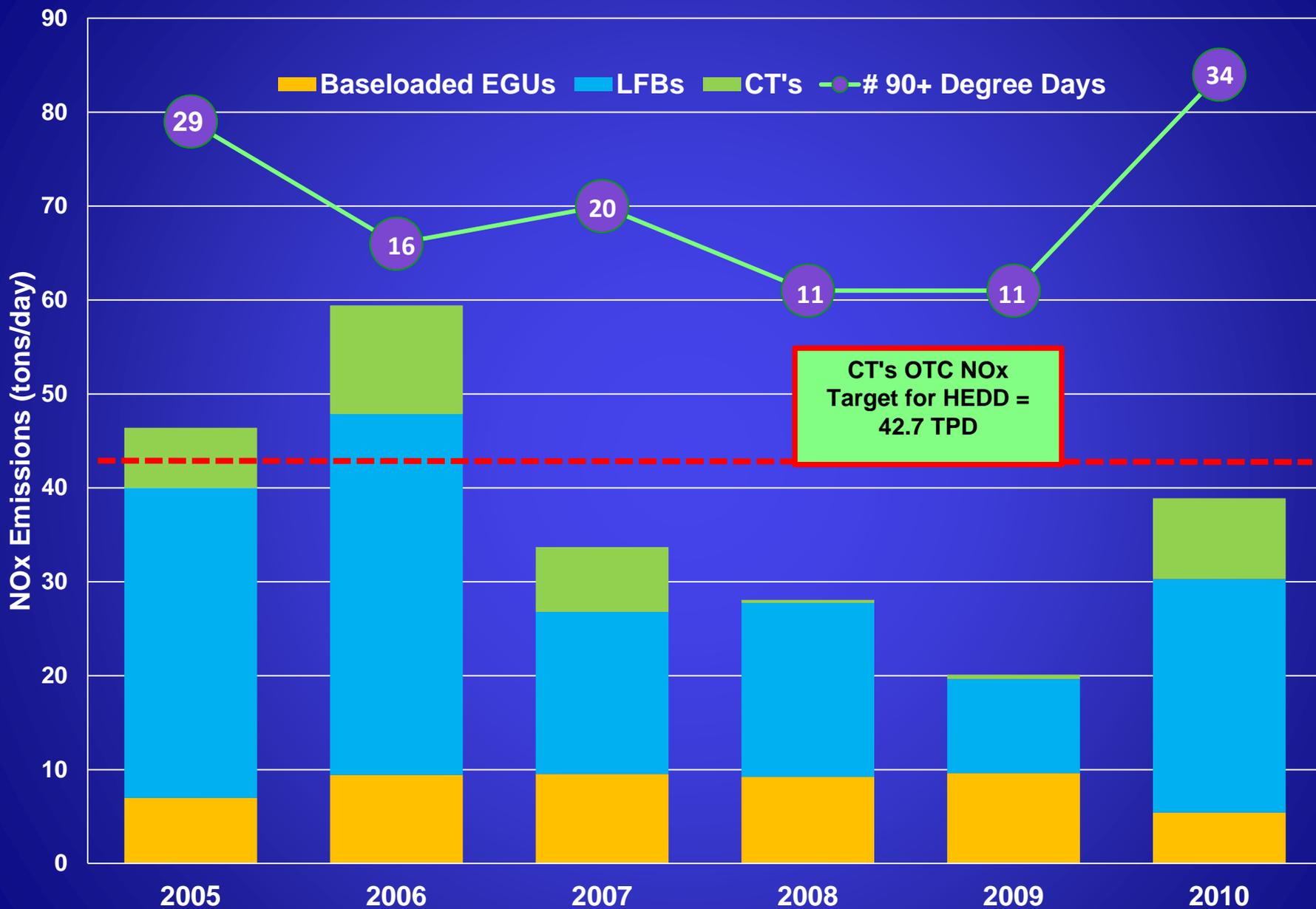
- HEDD problem

- Older, uncontrolled (or not optimally controlled) load following boilers or combustion turbines used to meet peak demand several days per year

- Results thus far:

- 2007-10 average of about 30 tons per day NO<sub>x</sub> on HEDD, about 35% reduction from 2005 baseline
- CT continues to meet HEDD regional commitment – even during extreme weather (e.g., summer of 2010, 34 days  $\geq 90^\circ$ )
- Close call in 2010, 2011 data not available

# Connecticut's High Electric Demand Days (HEDD)

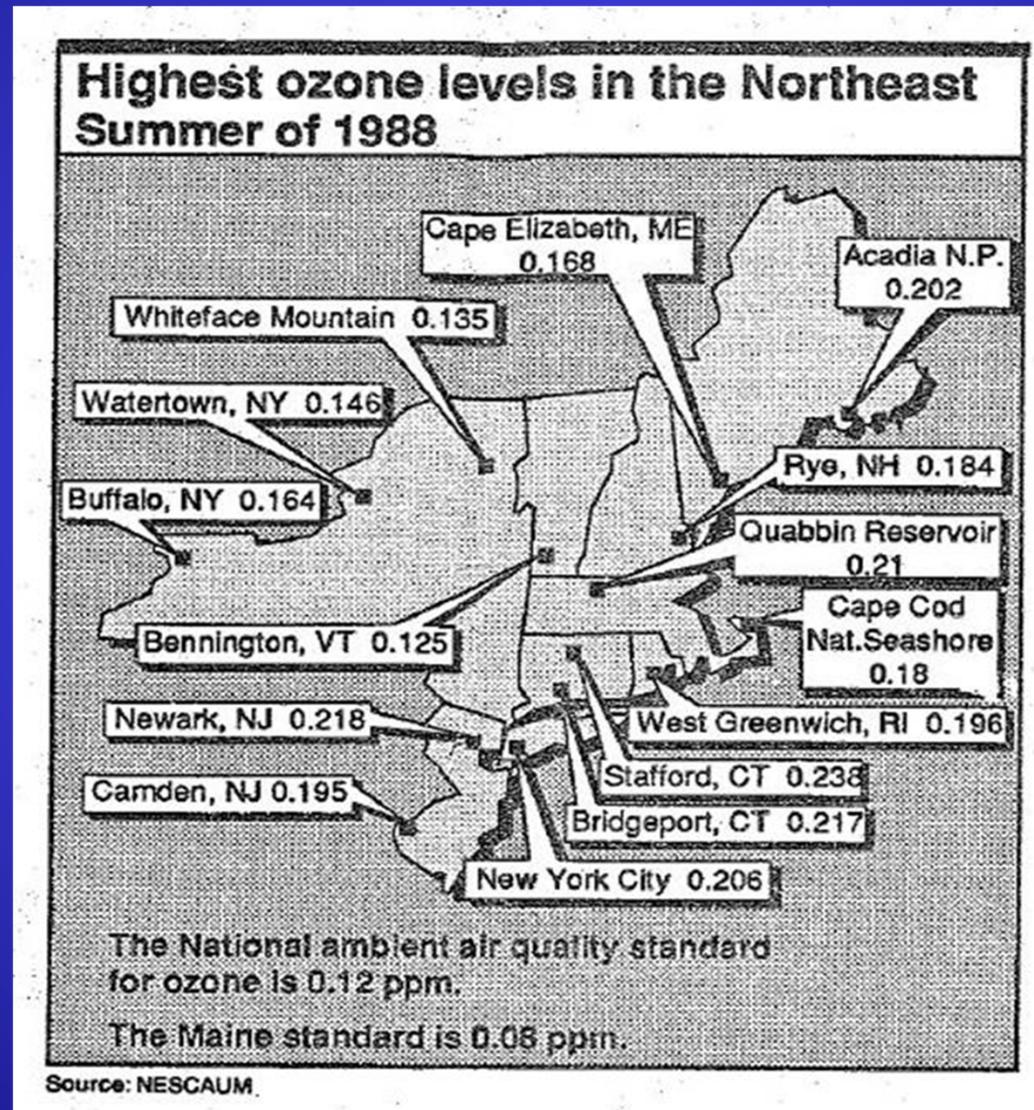




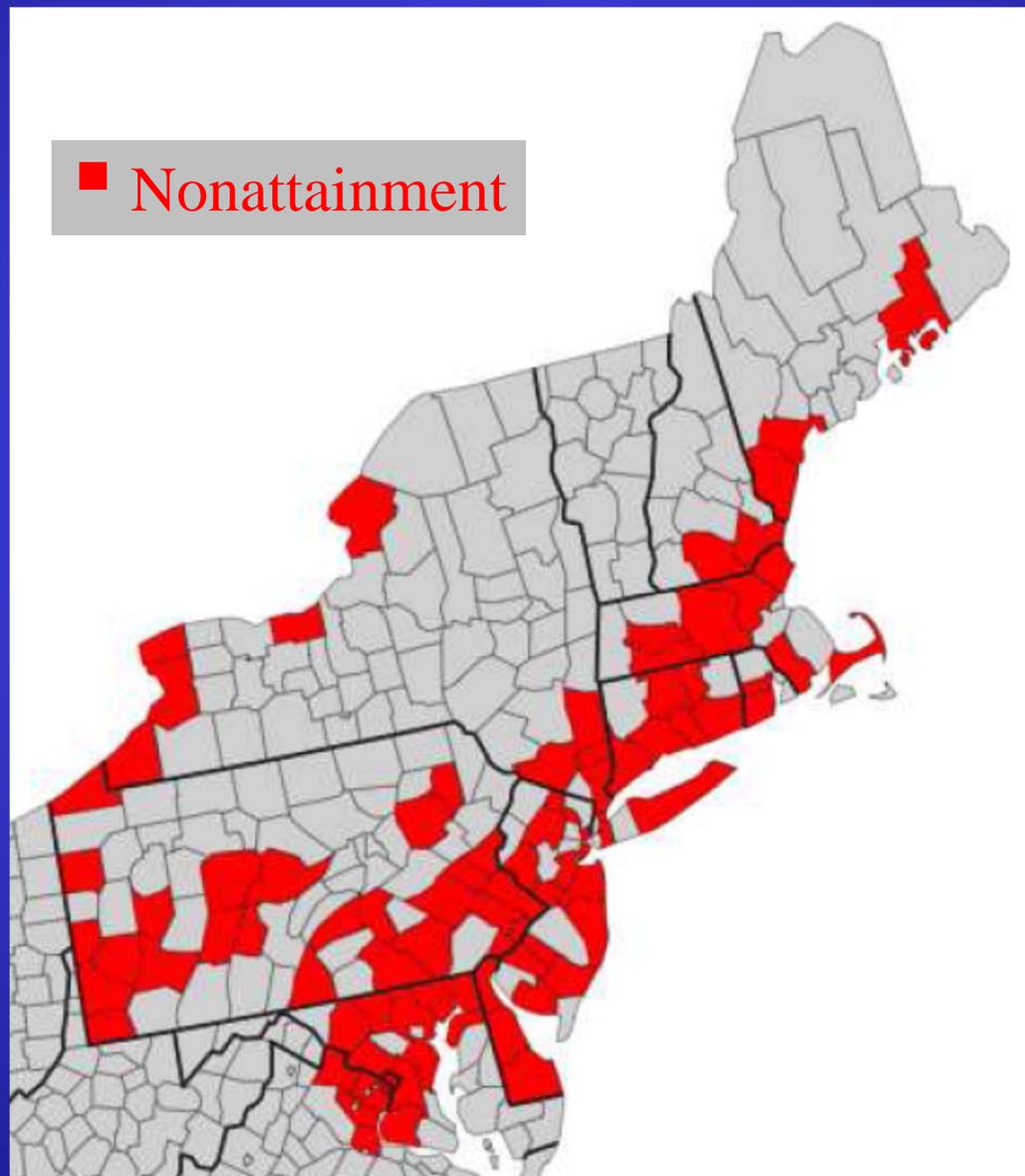
# The Ozone NAAQS

- The current ozone NAAQS? It's a long story....
  - 1990 CAA ozone standard (1 hr 120ppb) revised by EPA in 1997 (8 hr 85ppb)
  - EPA revised again in 2008 (8 hr 75ppb), finalized but never implemented due to litigation and self imposed reconsideration
  - Sept. 2011 - EPA halts reconsideration; 75ppb is legal standard, being litigated and no implementation guidance issued for states
  - Next CAA required review in 2013 (with implementation in 2018-20 )

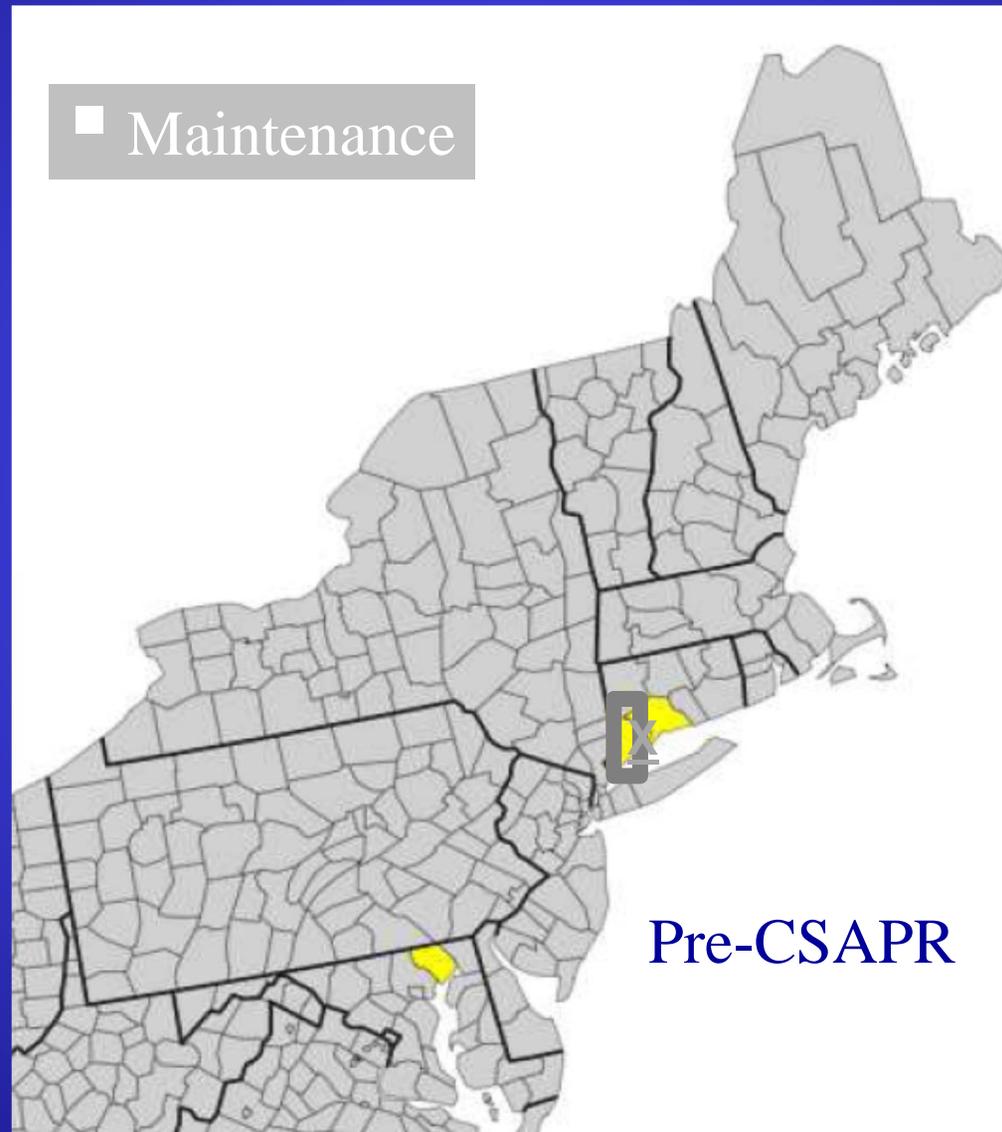
# Ozone Levels before CAAA & OTC



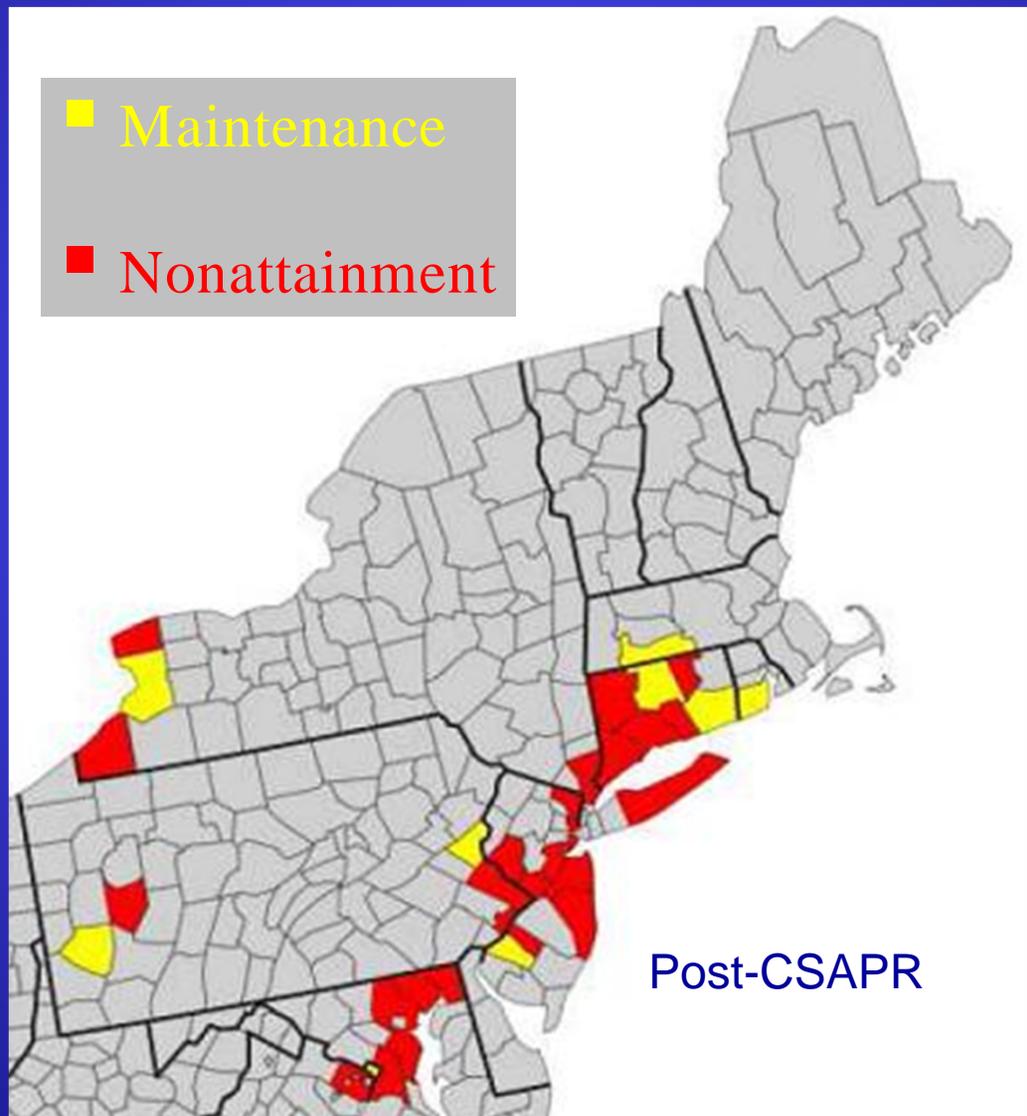
# 2000 Nonattainment 0.085 ppm NAAQS



# Projected 2012 0.085 ppm NAAQS

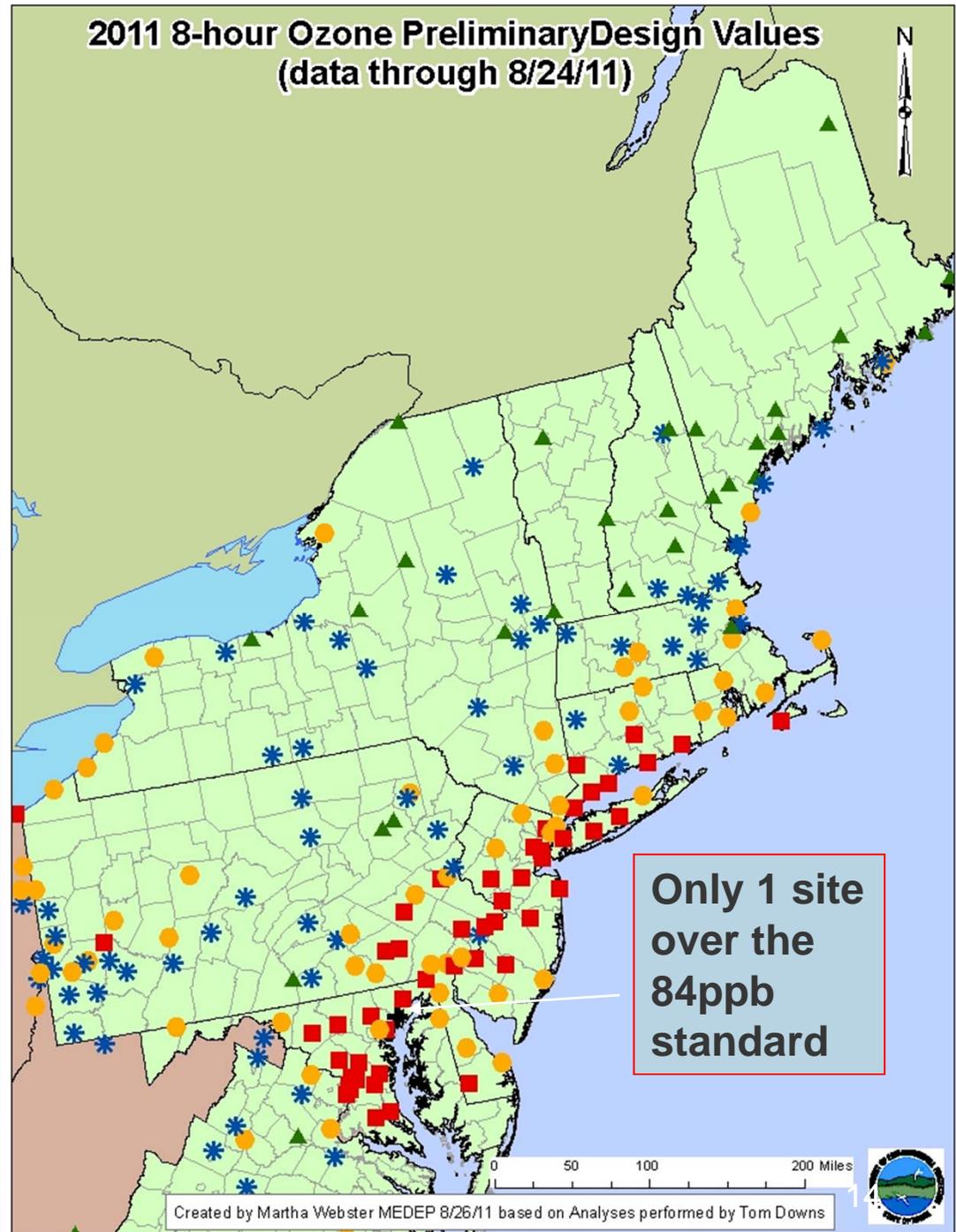


# Projected 2014 0.075 ppm NAAQS

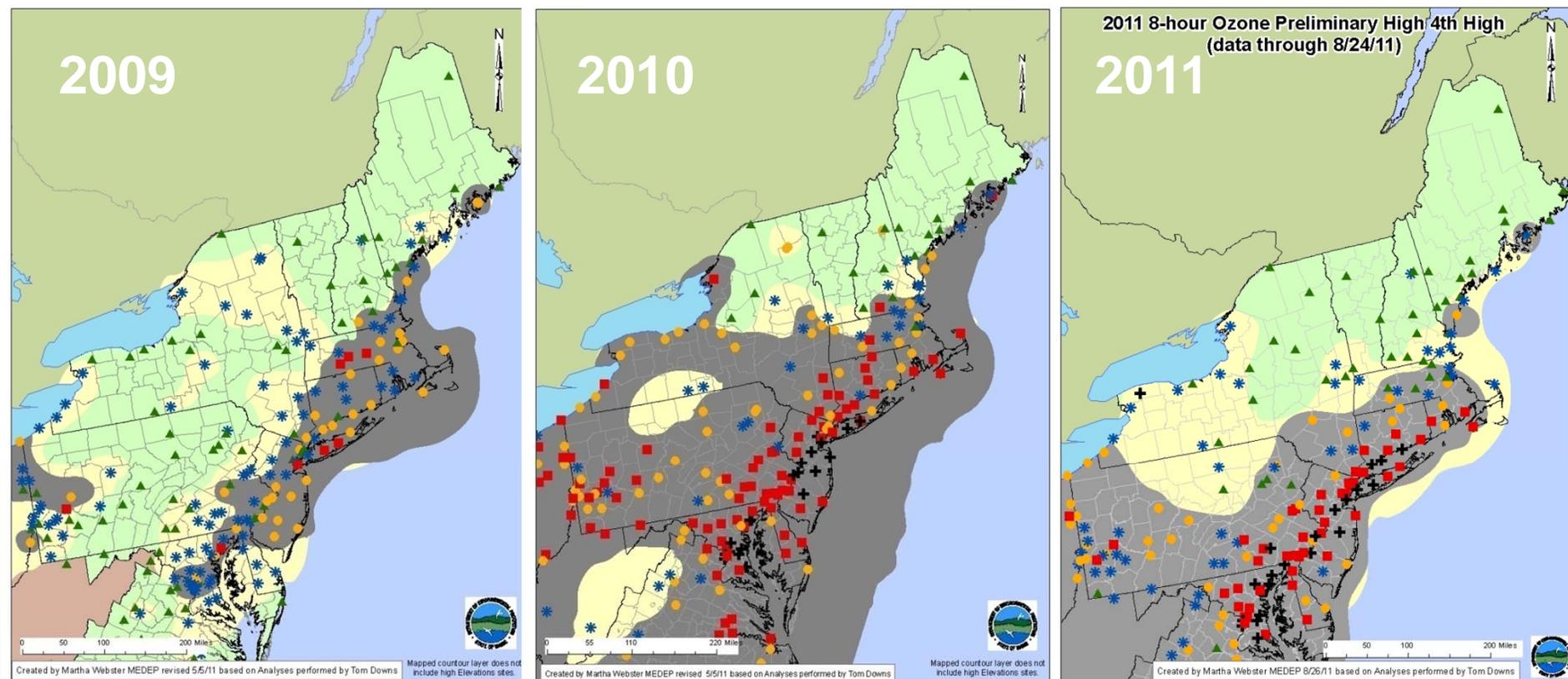


# Preliminary 2009-2011

## Design Values in the OTR



# Annual 4<sup>th</sup> High Ozone Values for the 3 Design Value Years – 2009, 2010 and 2011

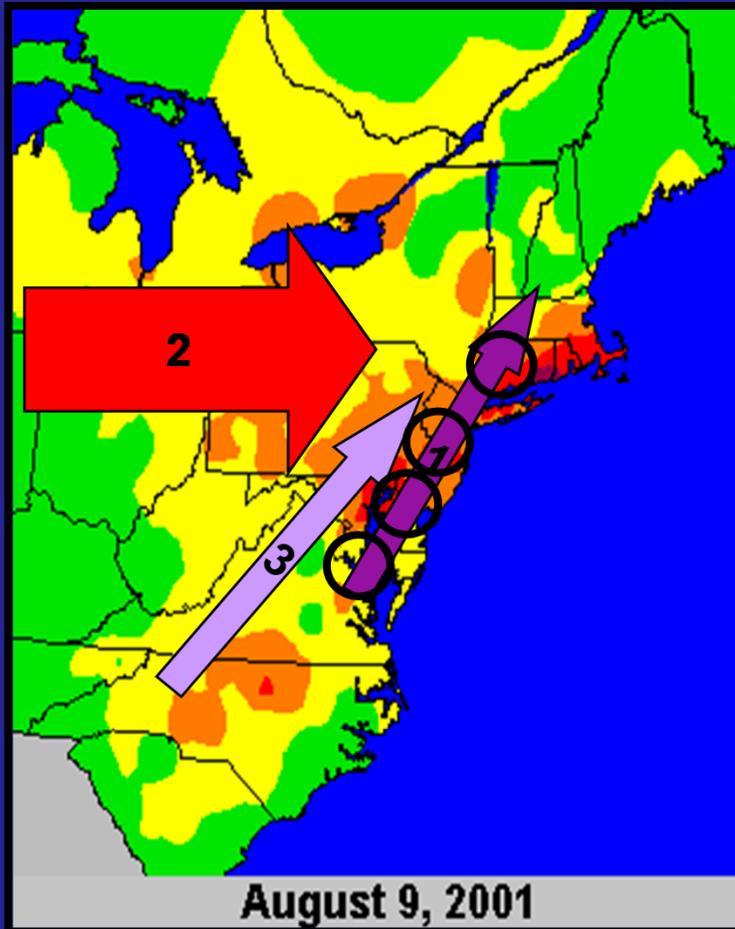


Grey shaded area highlights general areas greater than 70 ppb ozone



# Interstate Air Pollution

## *Four Distinct Parts*



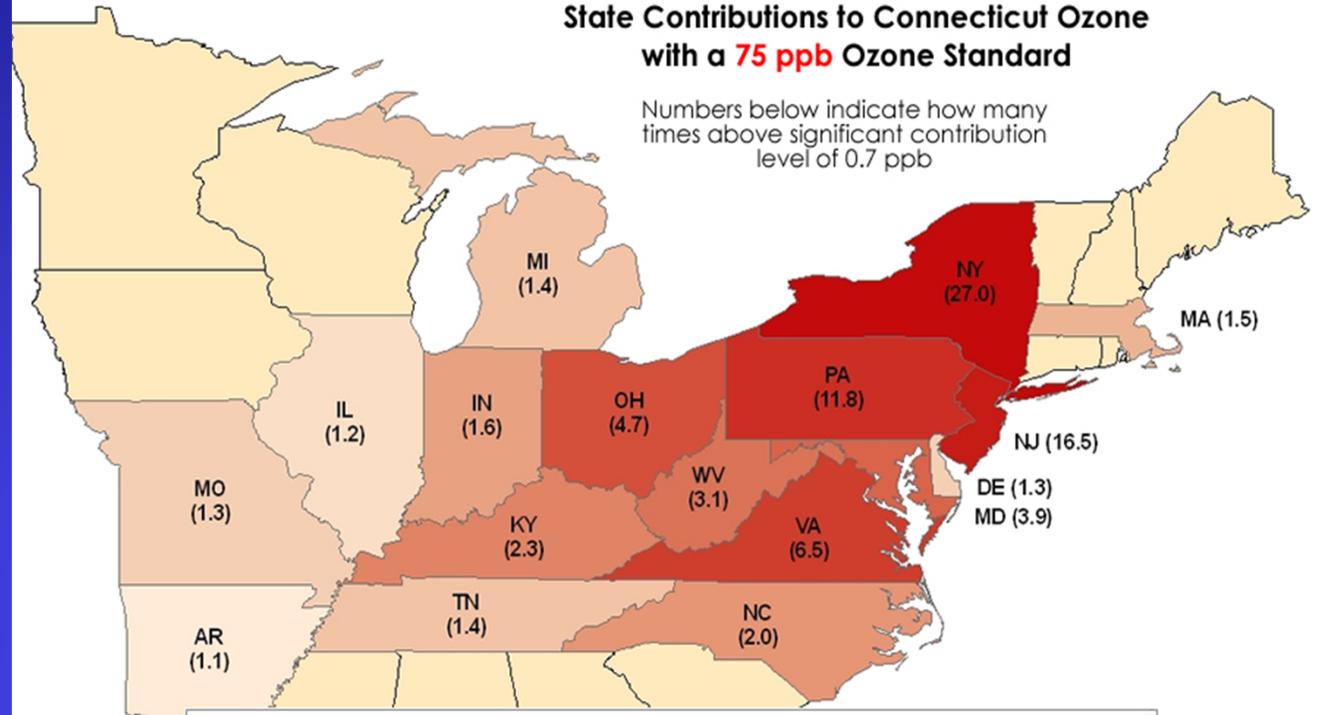
- Local emissions in Nonattainment Areas (NAAs)
- Three types of transport
  - 1 Short range
    - “Ground level” transport
    - VA to MD to PA to NJ to NY to CT to MA.
  - 2 Long range (synoptic scale)
    - “Aloft” transport
    - 100s of miles
    - Generally from W or NW
  - 3 Low Level Night-Time Jets
    - “Aloft” transport at night
    - 100s of miles
    - SW to NE along the Atlantic

Connecticut not named as a contributing state under 85ppb ozone standard

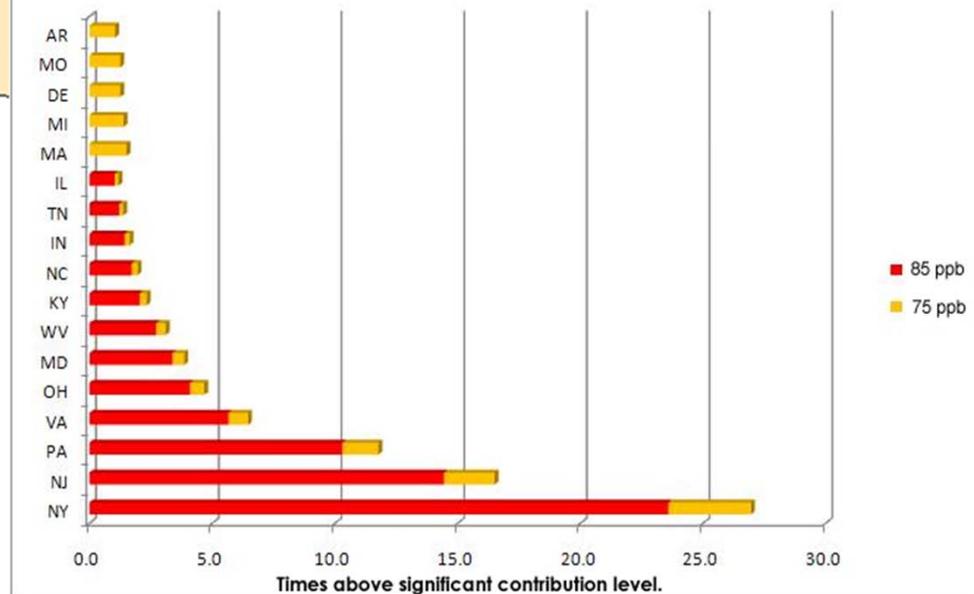
Connecticut would be named as a contributing state under 75ppb or lower ozone standard (next slide)

### State Contributions to Connecticut Ozone with a 75 ppb Ozone Standard

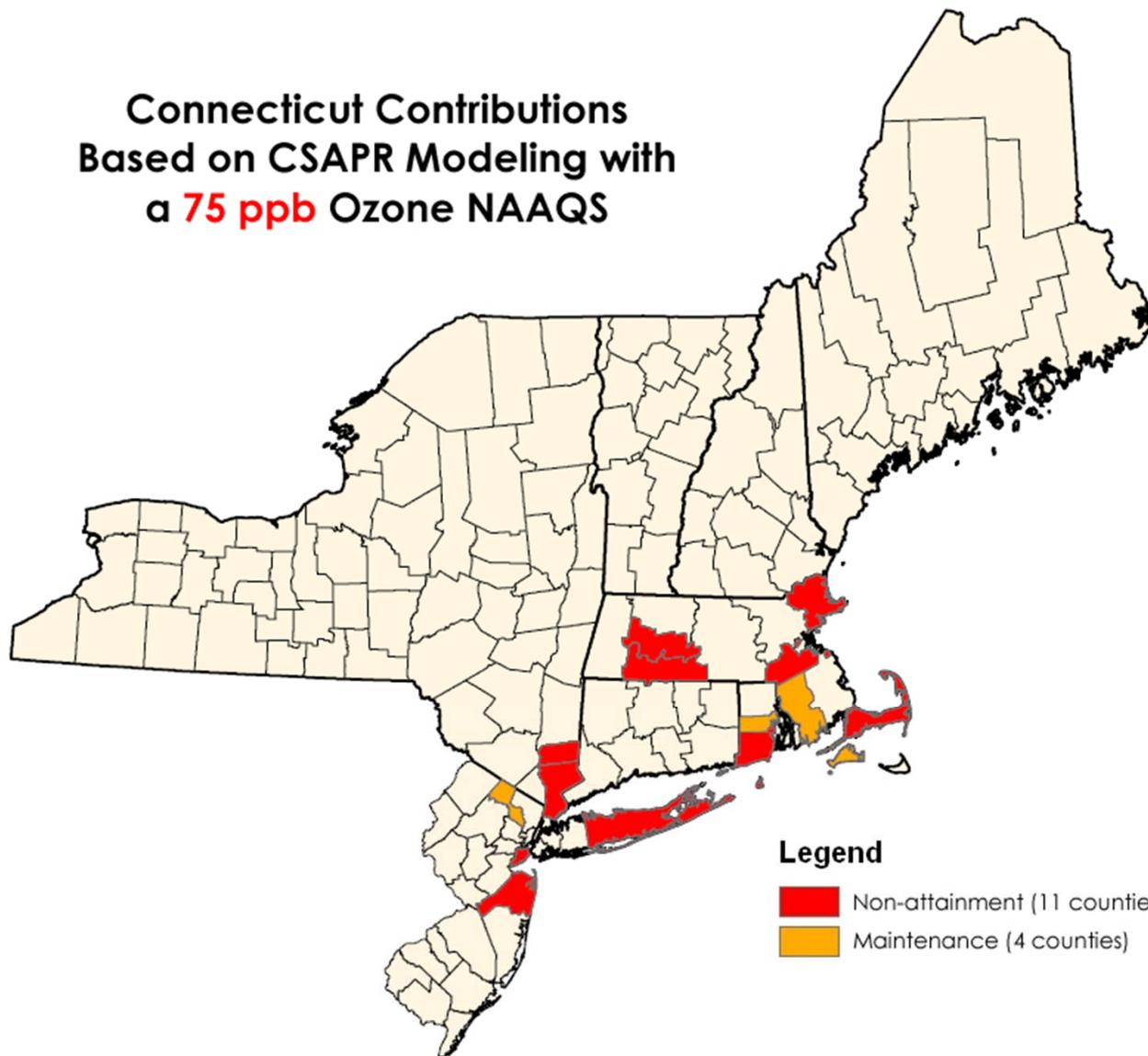
Numbers below indicate how many times above significant contribution level of 0.7 ppb



### State Contributions to Connecticut Ozone with an 85 and 75 ppb standard



Connecticut Contributions  
Based on CSAPR Modeling with  
a **75 ppb** Ozone NAAQS



# Background – SO<sub>2</sub>

- Sulfur Dioxide (SO<sub>2</sub>) – a harmful air pollutant and precursor to fine particulates (PM<sub>2.5</sub>)
- Unlike NO<sub>x</sub>, most SO<sub>2</sub> emissions from stationary source fuel combustion
- EPA's 2010 1-hr SO<sub>2</sub> NAAQS (75 ppb) may drive new reductions

# Background– HAPs

- EPA required to adopt maximum achievable control technology (MACT) standards
  - Requirement for utility steam generators triggered by EPA’s “appropriate and necessary” finding under the CAA for this source category
- MACT is based on newest top performing emission control technology used in practice

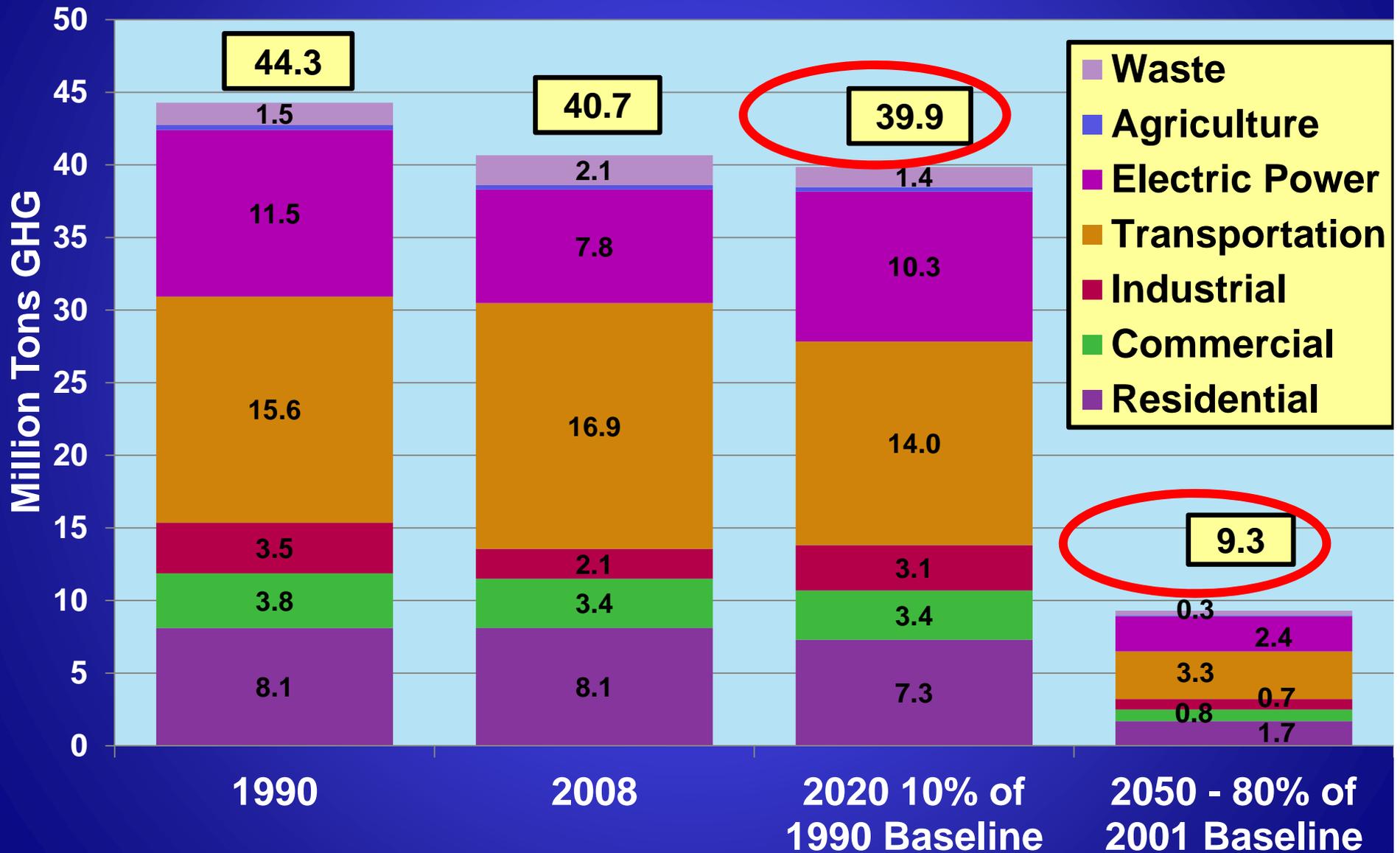
# Background - CWA sec. 316(b)

- Proposed rule applies to power generating facilities:
  - That are NPDES point sources with greater than 2MGD total design using “waters of the United States” in one or more cooling water intake structures, even if:
    - Cooling water intake structures are not located at the facility, or
    - Discharges to manmade cooling ponds are later reused for cooling purposes; and
  - At least 25% of the withdrawn water is used exclusively for cooling purposes.
- Proposed rule eliminated option for Best Technology Available (BTA) compliance through species restoration and established BTA entrainment standard based on closed-cycle cooling only for new units

# Background – Allowance Costs

- Several cap and trade programs require the use of credits or allowances
  - For SO<sub>2</sub> – CAA Title IV, Acid Rain Program
  - For NO<sub>x</sub> – CAIR and CSAPR; CT and MA state specific programs for CSAPR; or NO<sub>x</sub> RACT unit specific trading
  - For CO<sub>2</sub> – RGGI
- An allowance is the right to emit 1 ton of the named pollutant
- Current caps are not overly restrictive resulting in sufficient supply of allowances at low cost

# CT's GHG Emissions & Reduction Targets



# IRP Base Case Assumptions and Study Plan



# Environmental Base Case Assumptions - Overview

- Preliminary base case assumptions
  - Reflect current state and federal environmental standards
- Final base case assumptions
  - Reflect anticipated state and federal mandates and associated compliance requirements on New England electric generating sector

# Environmental Base Case Assumptions – Overview (cont'd)

- For final base case
  - Identify likely requirements and assess impacts
  - Solicit input from state regulators in MA, NH and ME
  - Review ISO-NE's 2011 Regional System Plan
- For informational purposes, the IRP report will also describe
  - The status of EPA/DEEP environmental rules and potential impacts on electric sector
  - Other key changes since last IRP

# IRP Base Case Assumptions & Study Plan

- Based on environmental observations
- Project Connecticut and ISO-NE power sector emissions
  - For CO<sub>2</sub>, NO<sub>x</sub>, and SO<sub>x</sub> for the Base Case through 2022
  - Include 90/10 sensitivity for bounding

# IRP Base Case Assumptions & Study Plan (cont'd)

- Compare Base Case to historical emissions
  - Compare emissions since 2007 and explain trends
  - Compare power sector emissions to other sectors
  - Show improvement in total emissions from all sectors over the last few decades
- Compare Base Case to alternative resource strategies
  - Identify strategies that reduce emissions with least resource cost and rate impact

# Observations – NO<sub>x</sub>

- Future NO<sub>x</sub> requirements uncertain
  - EPA must provide further direction on ozone NAAQS
  - Last IRP projection of future NO<sub>x</sub> emission rates of 0.125 -- 0.07 lbs/mmBtu do not reflect current thinking within EPA or DEEP
- EPA must focus on interstate air pollution transport and mobile sources to cost effectively address NO<sub>x</sub>
- DEEP will watch HEDD emissions, but no new rates planned at this time
- Ozone levels are variable depending on
  - Emissions (economic activity) and
  - Meteorology (hot summer v. cooler, rainy summer)

# HEDD - Environmental Performance

- Regardless of federal NO<sub>x</sub> drivers, HEDD units remain a concern
- Energy market forces resulted in reduced dispatch of HEDD units
- Environmental standards available as backstop

# Observations – SO<sub>2</sub>

- EPA final designation for CT due June 2012 (likely “unclassifiable”)
- Hybrid modeling/monitoring for compliance
- If noncompliance with SO<sub>2</sub> NAAQS, DEEP must adopt enforceable compliance options between June 2012 and 2013
- SIP revision due to EPA June 2013
- For attainment, DEEP must show monitored and modeled compliance and no violations of standard

# Observations – HAPs

- EPA proposed rule March 2011, and must finalize by Nov. 17, 2011 per Judicial order
- Proposed rule applies to oil and coal fired utility steam generators to reduce
  - Metals (mercury, arsenic, chromium and nickel)
  - Acid gases (hydrogen chloride and hydrogen fluoride)
  - Particulate matter and organic air toxics (dioxin)
- Affected sources have up to 3 years to comply, with option of 1 year extension
- Will drive emission controls at units without PM controls

# Observations – CWA 316(b)

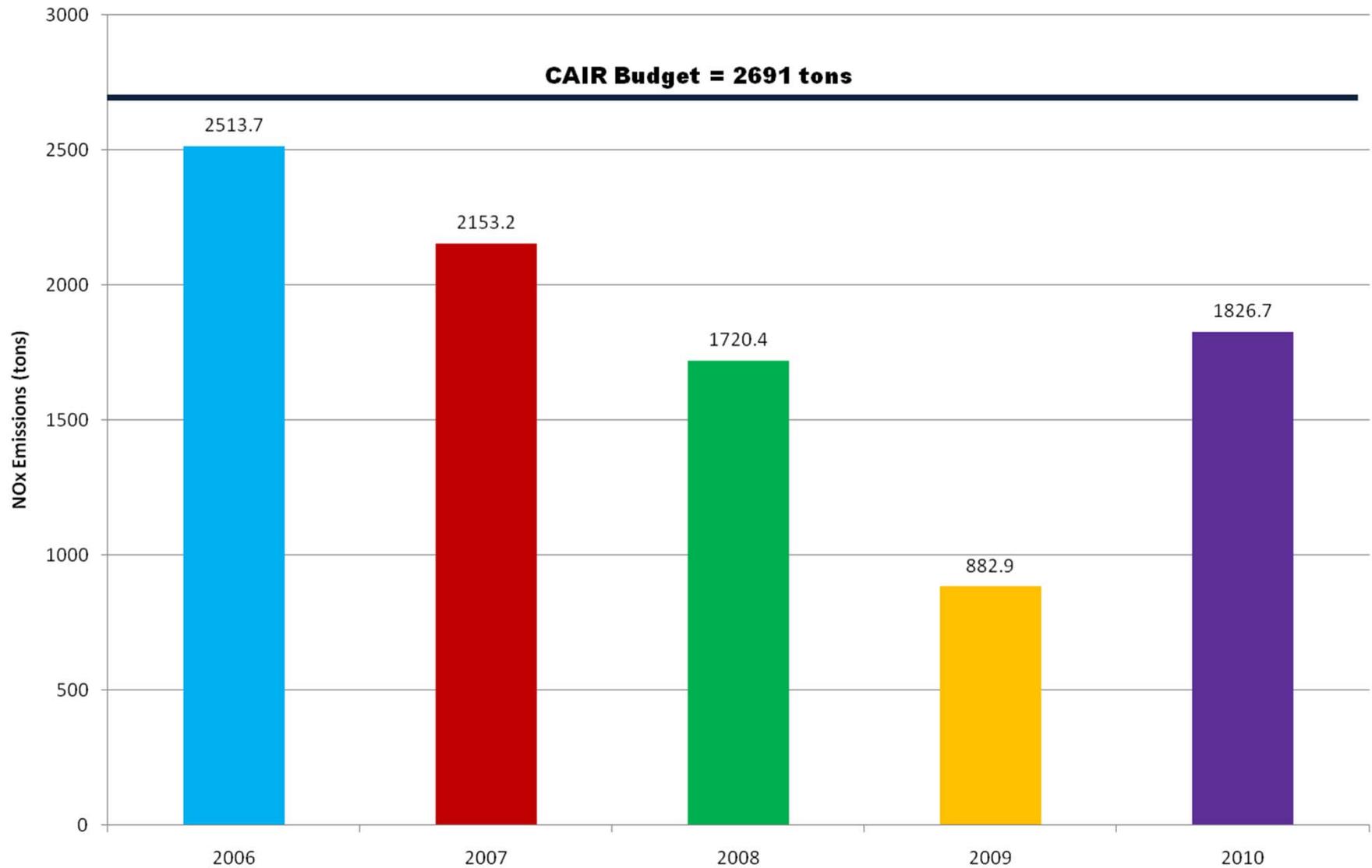
- Implementation likely through case by case state-issued NPDES permits
  - Flexibility mechanism
- Potential compliance extension (from 5-8 years) for impingement mortality and entrainment mortality requirements

# Observations – Allowance costs

## – Allowance cost assumptions

- CO<sub>2</sub> – assume RGGI only, at price floor through 2022.
- RGGI program review in 2012 may result in reduced cap/slightly higher costs in later years
- NO<sub>x</sub> – CT and MA out of CSAPR
  - EPA anti-backsliding will result in state specific caps
  - Emissions history shows cap not a binding constraint in CT, so assume zero price
- SO<sub>2</sub> -- with New England states outside CSAPR, only constraint is federal acid rain program. Assume zero price based on free allocations and no need to purchase from secondary market as current allowance surplus increases due to other states' reductions under CSAPR.

## Total Actual Ozone Season NOx Emissions for Connecticut CAIR Sources



Questions?