# Talking Points on ICI Boilers

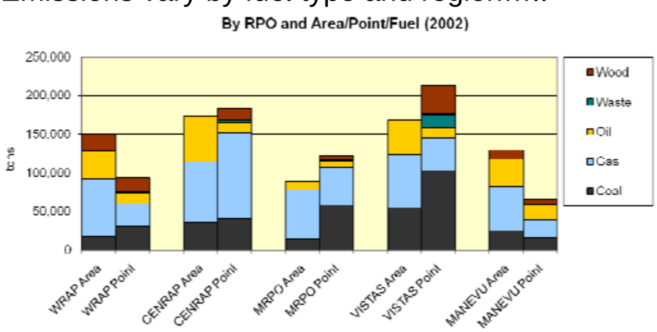
**Introduction**
National reductions in NOx and $SO_2$ emissions are needed to help states meet the 1997 national ambient air quality standards (NAAQS) for ozone and $PM_{2.5}$, the 2006 $PM_{2.5}$ NAAQS, the 2008 8-hour ozone NAAQS, and to make further progress for reducing regional haze.

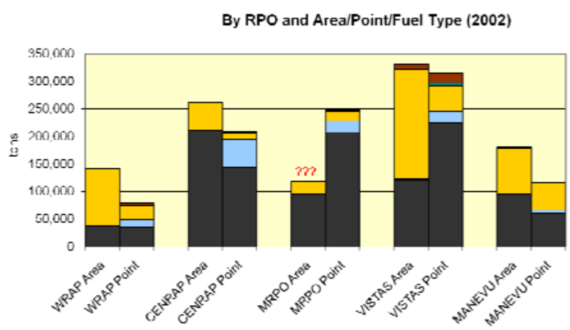
In December 2005, Environmental Commissioners from Northeast and Midwest States initiated a state collaborative process. Their goal was to coordinate control programs to meet the current NAAQS and to prepare for addressing the upcoming, tighter NAAQS. Pursuant to the state collaborative discussions, a staff-level workgroup was formed in 2006 to develop a recommendation on industrial, commercial, and institutional (ICI) boilers.

Federal action to reduce NOx and $SO_2$ emissions from ICI boilers is appropriate for the following reasons: (1) ICI boilers are an important source of NOx and $SO_2$ emissions, (2) reductions in ICI boiler emissions are cost effective, and (3) reductions in ICI boiler emissions are expected to provide regional and local air quality benefits (i.e., many ICI boilers are located in, or near, urban/industrial nonattainment areas and have shorter stacks compared to EGUs).

**Emissions from ICI Boilers**
According to EPA's National Emissions Inventory (NEI), ICI boilers emit 6% of total NOx emissions (1.4 million tons in 2002) and 13% of total $SO_2$ emissions (2.0 million tons in 2002). ICI boilers represent the third largest source sector of NOx emissions (after mobile sources and electric generating units [EGUs]) and the second largest source sector of $SO_2$ emissions (after EGUs).

Emissions vary by fuel type and region.....




ICI point source emissions are dominated by units > 100 MMBtu/hr, whereas ICI area source emissions are assumed to be associated with units < 100 MMBtu/hr. Although total area source emissions exceed total point source emissions in EPA's National Emissions Inventory (NEI), EPA's area source emission estimates are uncertain (e.g., NEI values may not agree with state emissions inventories), thus the need for more accurate national emissions data for individual ICI boilers in the 25 MMBtu/hr to 100 MMBtu/hr size range.

**Regional Differences and Perspectives**
A challenge with preparing a recommendation for federal action on the national scale are the difference between regions of country with respect to regulatory history, boiler population, boiler size distribution, fuel types combusted, and emissions distribution (i.e., one size does not fit all).

In the case of the OTC States, ICI boilers are primarily oil- or natural gas-fired and emissions are distributed over a wide range of boiler sizes (e.g., for Pennsylvania, 65% NOx and 40% $SO_2$

is from boilers < 100 MMBtu/hr). Additionally, the Phase II NOx limits for gas and oil units reflect limits established in the OTC Addendum to Resolution 06-02, adopted by the Commission on November 15, 2006, and the Phase II $SO_2$ limits for oil units reflect a course of action by the Northeast/Mid-Atlantic states to pursue the adoption and implementation of a strategy to reduce the sulfur content of fuel oil to meet regional haze reasonable progress goals for the MANE-VU Class I areas.

In the case of the LADCO States, coal-fired ICI boilers are important (60% of NOx and 90% of $SO_2$ total ICI sector emissions) and emissions are concentrated in the larger boiler sizes (88% NOx, 93% $SO_2$ from boilers > 100 MMBtu/hr). Air quality modeling by LADCO indicates measurable improvement in ozone and $PM_{2.5}$ concentrations from the recommended emission limitations for units > 100 MMBTU/hr[1], but little additional benefit from the limits for units < 100 MMBtu/hr.

**Workgroup Recommendation**
After extensive review of technology-based control options and associated costs, the Workgroup developed a 3-part recommendation for federal action on ICI boilers: (1) performance-based NOx and $SO_2$ emission limitations, (2) boiler tune-ups[2] (units $\geq$ 25 MMBtu/hr), and (3) emissions reporting (units $\geq$ 25 MMBtu/hr). A two-phase control program is recommended to maximize compliance flexibility for sources, with Phase I compliance dates in the 2012-2015 timeframe, and Phase II compliance dates in the 2015-2018 timeframe.
NOx control options consist of:

- Units < 100 MMBtu/hr - combustion tuning in Phase I and combustion modifications and/or the installation of low-NOx burners in Phase II
- Units > 100 MMBtu/hr– combustion modifications and/or installation of low-NOx burners in Phase I, and, for coal-fired units, post-combustion controls in Phase II

$SO_2$ control options consist of:

- Oil-fired units: Lower sulfur fuel oil
- Coal-fired units: Lower sulfur fuel and/or combustion modifications in Phase I, and post-combustion controls in Phase II

Analysis of expected control costs indicate NOx cost effectiveness values ranging from $2,000 - $7,000 per ton (for 100 MMBtu/hr units) to $500 - $2,000 per ton (for 750 MMBtu/hr units), and $SO_2$ cost effectiveness values ranging from $2,000 - $8,000 per ton (for 100 MMBtu/hr units) to $1,000 - $2,000 per ton (for 750 MMBtu/hr units). These values are comparable to (or slightly higher than) many existing federal control programs.

[1] Annual and daily PM2.5 concentrations were reduced by as much as 0.3 ug/m$^3$ and 1 ug/m$^3$, respectively, in urban nonattainment areas.
[2] An alternative to boiler tune-ups is to require boiler owners/operators to manage combustion using continuous combustion monitoring, plus fuel and combustion air flow trim equipment.