

Air Pollution Policy Formation

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Overview

- Who participates in air pollution policy formation?
- What has driven focus on pollutants that are also radiative forcers?
- Types of air pollution regulations
 - General Types
 - Specific examples under the Clean Air Act (CAA)
- Policy drivers for various provisions of the CAA
- Drivers that impact real world results
- A closer look at historical power regulations
- Other examples

Who participates in air pollution policy formation?

- Federal legislative branch (e.g. Congress) – passes national laws (e.g. Clean Air Act (CAA) and subsequent amendments).
- Federal executive branch (e.g. EPA) – issues regulations consistent with the CAA
- States
 - Have specific responsibilities under the CAA
 - May also have State specific policies not driven by federal legislation
- Public (including affected companies, NGOs and individuals)
 - Comment on EPA rulemakings
 - Take EPA to court (both for things the agency does and for things the agency is obligated to do but hasn't)
 - Work with federal lawmakers on federal legislation
 - Work through state processes on State policy
- Judicial Branch
 - Act on concerns raised to the courts

Many Radiative Forcers Have Received Significant Attention Because of Their Other Environmental Impacts

- Ozone precursors
 - Pre 1990 biggest focus was on VOCs
 - Post 1990 focus on both VOCs and NO_x
- Direct particles and particle precursors
 - SO₂ and NO_x
- SO₂
 - As a PM precursor
 - Because of its direct health impacts
 - Also because of its impacts on environmental problems such as acid rain and visibility
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General Types of Air Quality Regulations

- Health Based Standards – levels are set directly related to health impacts
- Technology Based
 - Could be set based on specific technologies
 - Could be set based on data from best performing units
 - Could factor in cost or other types of considerations (i.e. energy or non-air quality environmental impacts)
- Environmental Impacts Based Standards – levels are set at levels to address non-health based environmental impacts

Treatment of New Vs Existing Sources

- Pollution control opportunities for new sources are generally less costly because they can be designed in from the start
- Significant differences in requirements between new and existing sources (i.e. grandfathering) can impact the economics of unit replacement
 - Could incentivize continued operation of older, less controlled plants over newer ones

Examples of Regulation Required Under the Clean Air Act

- Health-based standards
- State plans to achieve the NAAQS
- New Source Standards
- Hazardous Air Pollutant Standards
- Acid Rain Trading Program

National Ambient Air Quality Standards(NAAQS)

- Set for six pollutants
- Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly.
- Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.
- Law requires standards to be reviewed every 5 years to incorporate the latest health information

National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead		primary and secondary	Rolling 3 month average	0.15 $\mu\text{g}/\text{m}^3$	Not to be exceeded
Nitrogen Dioxide		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb	Annual Mean
Ozone		primary and secondary	8-hour	0.075 pp	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	PM _{2.5}	primary and secondary	Annual	15 $\mu\text{g}/\text{m}^3$	annual mean, averaged over 3 years
			24-hour	35 $\mu\text{g}/\text{m}^3$	98th percentile, averaged over 3 years
	PM ₁₀	primary and secondary	24-hour	150 $\mu\text{g}/\text{m}^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

State Plans to Achieve the NAAQS

- States are required to submit plans (State Implementation Plans, or SIPs) to meet each NAAQS
- Plans
 - Must contain certain minimum requirements
 - Can count on federal measures (such as mobile source controls)
 - Must also address contribution to downwind non-attainment areas
- States have broad flexibilities to take local concerns into account, but must achieve enough reductions to meet the standard

New Source Standards

- EPA is required to set emission standards for many types of new stationary sources of air pollution
- Also set standards for sources that reconstruct or make significant modifications
- Standards are set for all NAAQS pollutants and in limited cases other air pollutants
- Standards must consider cost, but be based on “best demonstrated system of emission reductions”
- Standards are revisited periodically

Hazardous Air Pollutant Standards

- Law requires EPA to develop regulations for large stationary sources emitting hazardous air pollutants identified in the Clean Air Act.
- Requires regulations for existing sources to be at least as stringent as limits being met by average of top 12 percent of units
 - Can require tighter limits but cost must be considered
- New sources must meet limits equivalent to best performing existing units
- EPA has discretion to subcategorize amongst units

Acid Rain Program

- Unlike many other provisions of the Act that provide the agency general rules to set standards, under the Acid Rain Program, Congress provided very specific parameters within which to address Acid Rain
 - Cap on SO₂ emissions
 - Trading and methodology for allocating allowances
 - Technology that should be applied for NO_x reductions with targets
 - Specific direction on use of continuous monitors
- While general focus was to address acid rain, has had very significant health impacts

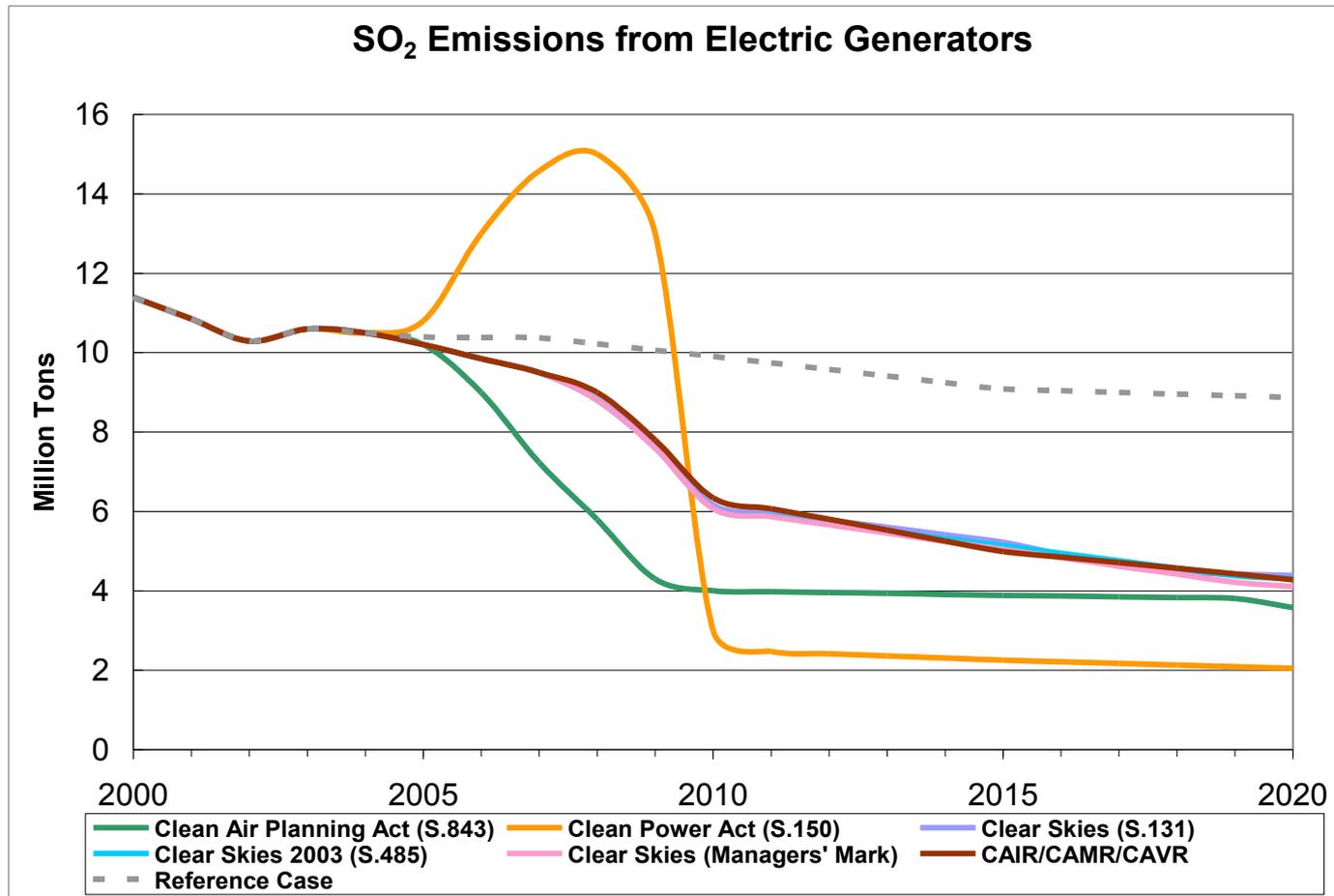
Drivers that Impact Real World Results

- Control technology improvements
- Changes in input supply (e.g. natural gas or coal supply changes)
- Changes in product demand (e.g. lowered electric demand projections due to energy efficiency improvements)
- Historically, EPA has generally over-predicted cost

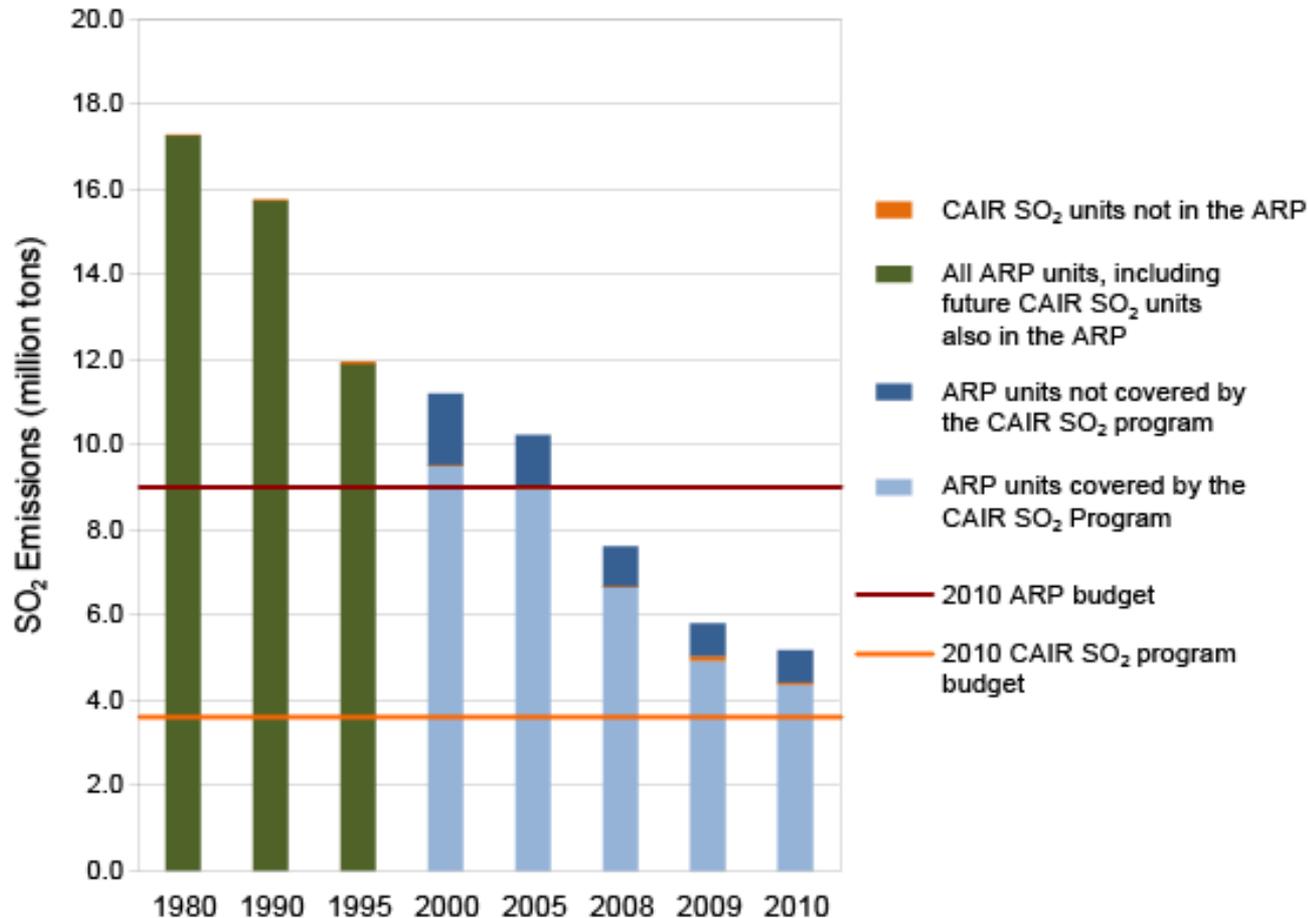
Power Sector In More Depth

- Legislative proposals of early 2000's vs. actual trajectory
- What has driven emission reductions since 1990?
 - Legislation and regulation
 - Technology advances
 - Market forces

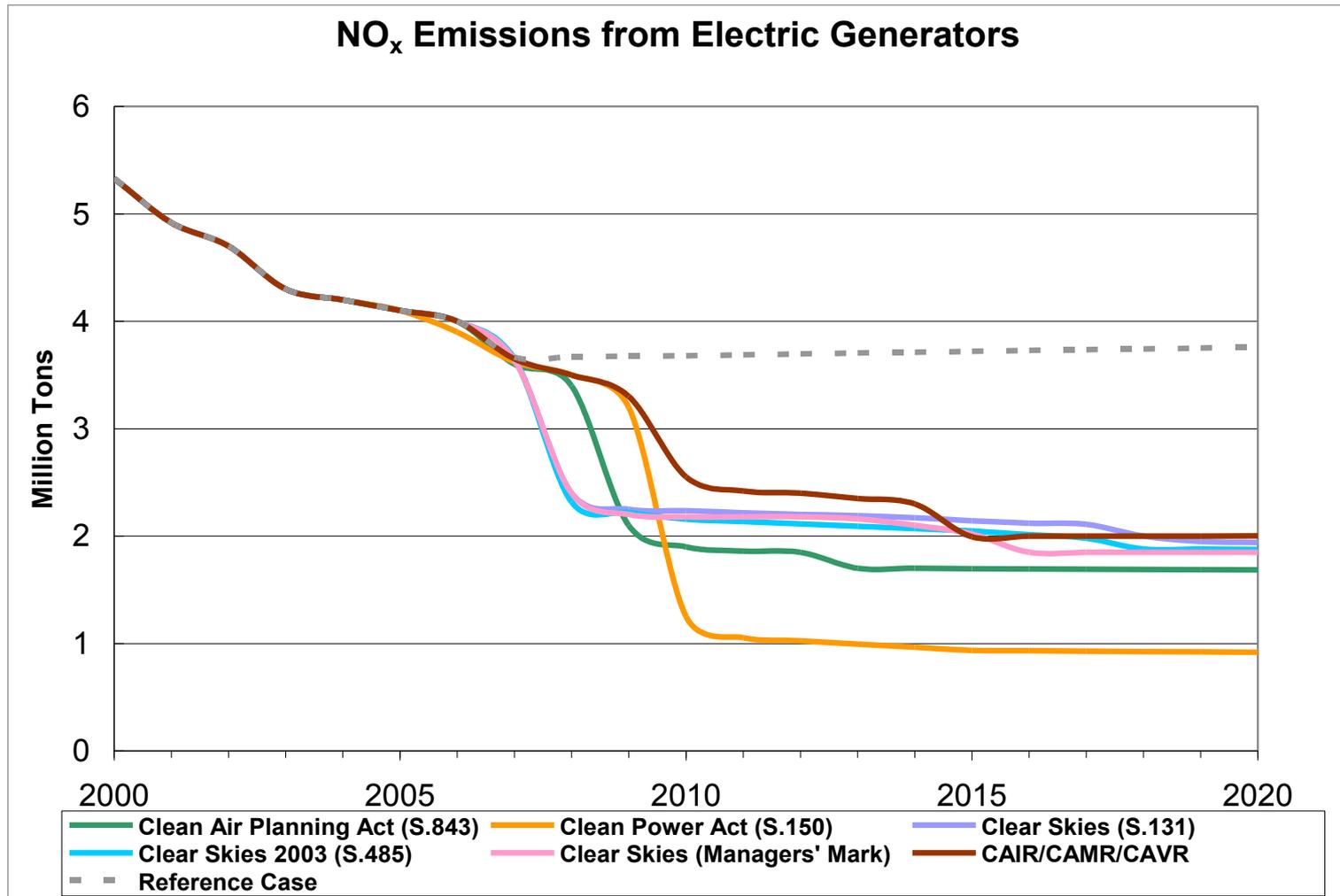
What SO₂ Policies Were People Considering in the Early 2000's?



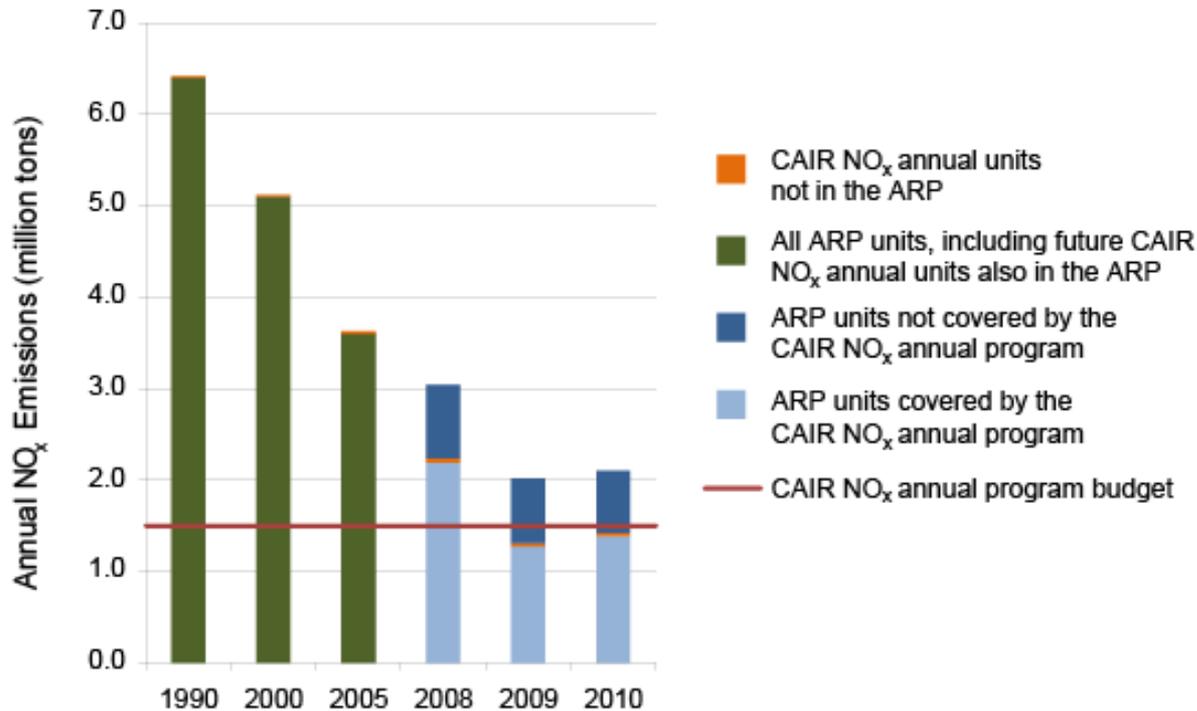
Where Are SO₂ Emissions Today?



What NO_x Policies Were People Considering in the 2000's?



Where Are NO_x Emissions Today?



Other Examples

- Industrial boiler NO_x Control in the 1990's
 - Emission inventory challenges made obtaining reductions difficult
- Mobile source regulations
 - Tend to be more technology forcing
- Infra red camera technology
 - Identified significant new sources of VOCs