

**Section A:**  
**Program Elements in the Clear Skies Act**

# Caps and Timing for the Electric Power Sector under the Clear Skies Act

**2004: The NO<sub>x</sub> SIP call (summertime NO<sub>x</sub> cap in 19 Eastern States + D.C.)**

2004

**2008: Clear Skies NO<sub>x</sub> Phase I (2.1 million ton annual cap assigned to two Zones with trading programs)**

2008

**2010: Clear Skies Hg Phase I (26 ton annual cap with a national trading program)**

2012

**2010: SO<sub>2</sub> Phase I (4.5 million ton annual cap with a national trading program)**

**2018: Clear Skies NO<sub>x</sub> Phase II (1.7 million ton annual cap assigned to two Zones with trading programs)**

2016

**2018: Clear Skies Hg Phase II (15 ton annual cap with a national trading program)**

2020

**2018: Clear Skies SO<sub>2</sub> Phase II (3.0 million ton annual cap with a national trading program)**

# Affected Sources

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## Factors Considered in Defining Coverage:

- Since 1990, there have been dramatic changes in the electric power industry associated with the emergence of competitive markets for electricity generation.
  - Most new generation comes from non-utility generators.
  - Many existing “utility” plants are being purchased by Independent Power Producers (IPPs) and operate as non-utility wholesale power suppliers.
  - Applicability of the program should recognize the emergence of competitive markets.
- The need for emissions reductions from the electricity generating sector was balanced with the desire to not discourage combined heat and power (CHP).
- The program includes units generating significant amounts of electricity that compete in the electricity generation market.

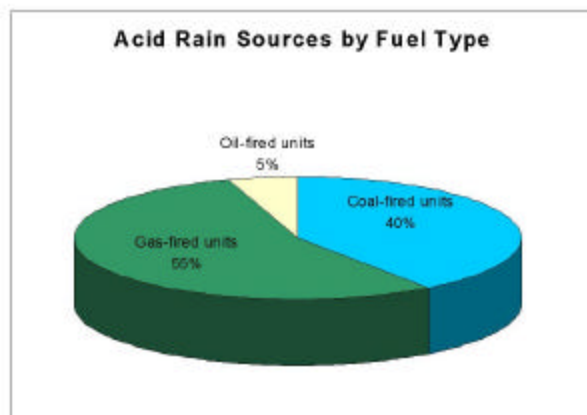
## Definition of Affected Units:

- For SO<sub>2</sub> and NO<sub>x</sub>, the program will cover all fossil fuel-fired boilers and turbines serving an electric generator unit with a nameplate capacity greater than 25 MW and producing electricity for sale, except cogeneration units that produce for sale less than 1/3 of the potential electrical output of the generator that they serve.
- For mercury, the program will cover all *coal-fired* units serving an electric generator with a nameplate capacity greater than 25 MW; the same exclusion for cogenerators applies as for NO<sub>x</sub> and SO<sub>2</sub>.
- For new units, there would not be a generator size cut-off, except for new gas-fired units under 25 MW. New units would have the same cogeneration exception as existing units.

# Affected Sources

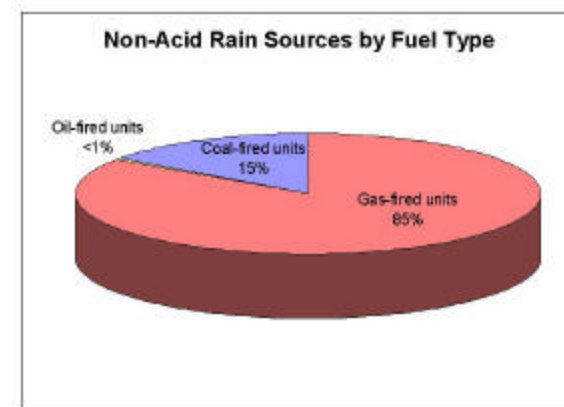
- Sources covered under the Clear Skies Act would include the 2,792 Acid Rain Program electric generating units.
- As many as 400 additional electric generating units, currently not in the Acid Rain Program, may be covered by the Clear Skies Act.
  - This number was used in EPA analysis, which includes all electric generating units with firm sales contracts to the electric grid -- likely over-estimates the number of units, since cogeneration units that sell less than one-third of their generation are excluded.
  - As many as 340 cogeneration facilities could be covered by the Clear Skies definition. (This may be an over estimate of affected cogeneration units since our analysis did not apply the cogeneration exclusion - electric sales data collected at facility level and not unit level, so it is difficult to identify cogeneration who would be excluded.)
  - about 286 of cogeneration units are gas-fired units, 48 are coal-fired, and 5 are petroleum coke-fired
  - potentially 70 units may be eligible for cogeneration exclusion (based on facility-level sales)

In 2000, Acid Rain sources emitted about 11.2 million tons of SO<sub>2</sub> and 5.11 million tons of NO<sub>x</sub>.



Source: EPA 2000 Scorecard

In 2000, non-Acid Rain sources emitted about 90,000 tons of SO<sub>2</sub> and 160,000 tons of NO<sub>x</sub>.



Source: NEEDS 2000 database

# The Clear Skies Sulfur Dioxide (SO<sub>2</sub>) Program

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- **Under Title IV of the CAAA, SO<sub>2</sub> emissions from the electric power sector are reduced about 50% from a 1980 emissions level of 17.5 million tons when a 8.95 million tons emission cap goes into effect in 2010.**
- **The Clear Skies Act establishes a new 4.5 million ton SO<sub>2</sub> cap in 2010 and then lowers the cap to 3.0 million tons in 2018.**
  - Clear Skies maintains the annual, national trading program established under Title IV.
  - Existing SO<sub>2</sub> allowances dated 2010 and later removed from accounts and replaced with a proportionately smaller amount of Clear Skies allowances.
  - SO<sub>2</sub> allowance allocations gradually replaced by auction over 52 years.
  - The Western Regional Air Partnership's (WRAP) 2018 SO<sub>2</sub> emissions milestone for power generators in 9 States would be honored through a backstop cap-and-trade program.

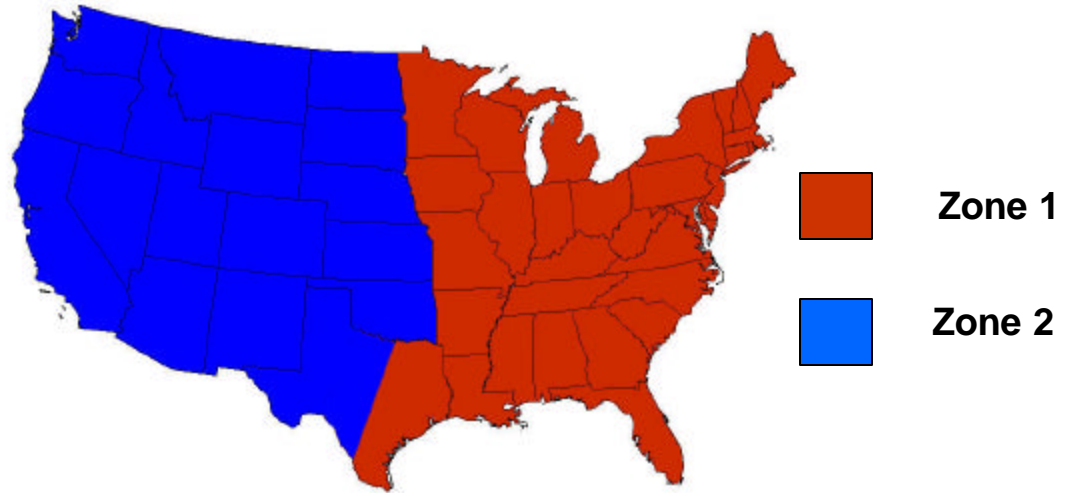
# The Clear Skies SO<sub>2</sub> Program

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- **Why a national program?**
  - **The human health and environmental effects to which SO<sub>2</sub> emissions contribute are of national concern. Emissions of SO<sub>2</sub>:**
    - Contribute to fine particulate (PM<sub>2.5</sub>), which in aggregate is associated with premature mortality, chronic bronchitis, respiratory and cardiovascular related hospital admissions, and asthma attacks.
    - Cause PM<sub>2.5</sub> NAAQS non-attainment, regional haze, and acid rain.
  - **Atmospheric transport of emissions can pose problems in neighboring States.**
  - **Most of the plants that would be subject to the Clear Skies Act are currently participants in the national Acid Rain SO<sub>2</sub> Program.**
    - Building off the existing SO<sub>2</sub> trading program minimizes disruption of the existing allowance market and ensures lower costs for power companies and customers.
    - Current banked allowances would increase their value and sources would continue to have an incentive to reduce their emissions early.

# The Clear Skies Nitrogen Oxides (NOx) Program

- The Clear Skies Act has two trading zones for NOx.



NOx Caps under the Clear Skies Initiative									
	2000 Emissions			2008 Caps			2018 Caps		
	Total	Zone 1	Zone 2	Total	Zone 1	Zone 2	Total	Zone 1	Zone 2
Caps (Tons)	<b>5.1 million</b>	4.17 million	934,000	<b>2.1 million</b>	1.58 million	538,000	<b>1.7 million</b>	1.16 million	538,000
Effective Emissions Rate (lb/mmBtus)	<b>0.40</b>	0.41	0.34	<b>0.17</b>	0.16	0.20	<b>0.14</b>	0.12	0.20

**Notes:** Values for 2000 represent actual emission levels, rather than the caps.  
 Alaska and Hawaii are not included in EPA's model of sources connected to the continental U.S. electricity grid.

- Significant NOx reductions are required in the East to protect human health and address serious environmental issues. Less stringent reductions are required in the West, and are primarily aimed at maintaining good visibility. Therefore, the Clear Skies Act creates two trading zones. There would be no trading between the two zones to ensure that the different air quality goals can be met.

# The Clear Skies NOx Program

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- **The Zone boundaries are established based on the nature, magnitude, and source of environmental concerns.**
- **All the States in Zone 1 either have ozone/PM<sub>2.5</sub> non-attainment concerns or contain sources that contribute to other States' ozone/ PM<sub>2.5</sub> nonattainment.**
- **Zone 2 includes:**
  - **States participating in the WRAP process:** Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming.
  - **Oklahoma, Kansas, and Nebraska:** These states do not appear to contribute to ozone or PM<sub>2.5</sub> non-attainment areas.
  - **The Western portion of Texas:** Texas was divided between Zone 1 and Zone 2 to reflect the State's Air Quality regulations and Electricity Industry Restructuring Legislation.
- **As with SO<sub>2</sub>, during the first phase the EPA Administrator will review new scientific, technology, and cost information; if necessary, EPA can recommend that Congress adjust the Phase II NOx cap.**



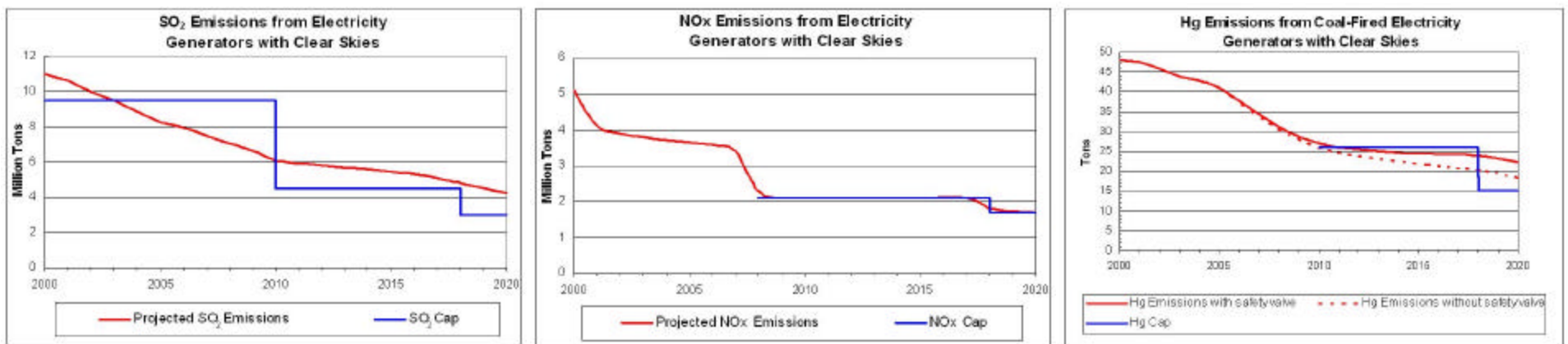
# The Clear Skies Mercury Program

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- **Mercury deposition is a nationwide issue:**
  - Currently 44 States have fish advisories.
  - Clear Skies emissions reductions may allow States to remove advisories or provide less restrictive advice for some water bodies.
- **Power generation is the largest remaining man-made source of mercury emissions in the U.S. (approximately 37% of total).**
  - In 2000, coal-fired power generators emitted 48 tons of mercury. The Clear Skies Act will cut mercury emissions from coal-fired power generators by 69% when fully implemented.
- **The Clear Skies Act establishes a national, annual cap of 26 tons in 2010, and then lowers the cap to 15 tons in 2018.**
  - Under Clear Skies, the primary reductions in mercury emissions will be in the ionic form, the form of mercury that is prone to deposit close to its source.
  - During the first phase, the EPA Administrator will review new scientific, technology, and cost information; if necessary, EPA can recommend that Congress adjust the Phase II mercury target.
  - As is the case currently, States can require facility-specific reductions to address local concerns.

# Projected Emissions from Electric Generating Units

- The Clear Skies Act will result in significant over-compliance in the early years, particularly for SO<sub>2</sub>, because sources are allowed to bank excess emissions reductions and use them later. The use of these banked allowances for compliance in the later years of the program (e.g., 2020) results in SO<sub>2</sub> and mercury emissions initially above the second phase cap, gradually declining to the cap level.
- Based on current technological capabilities, the cost of mercury removal is expected to reach the safety valve price (\$35,000/lb) by 2010. However, technological improvements could decrease the cost of mercury control over time and cause prices to remain below safety valve levels. EPA saw scrubber costs drop and performance improve during the 1990s when the power sector faced regulatory controls for SO<sub>2</sub>. There is no significant change in projected SO<sub>2</sub> and NO<sub>x</sub> emissions when Clear Skies is modeled without the safety valve.



**Note:** Projected emissions data for SO<sub>2</sub>, NO<sub>x</sub> and mercury are from IPM.

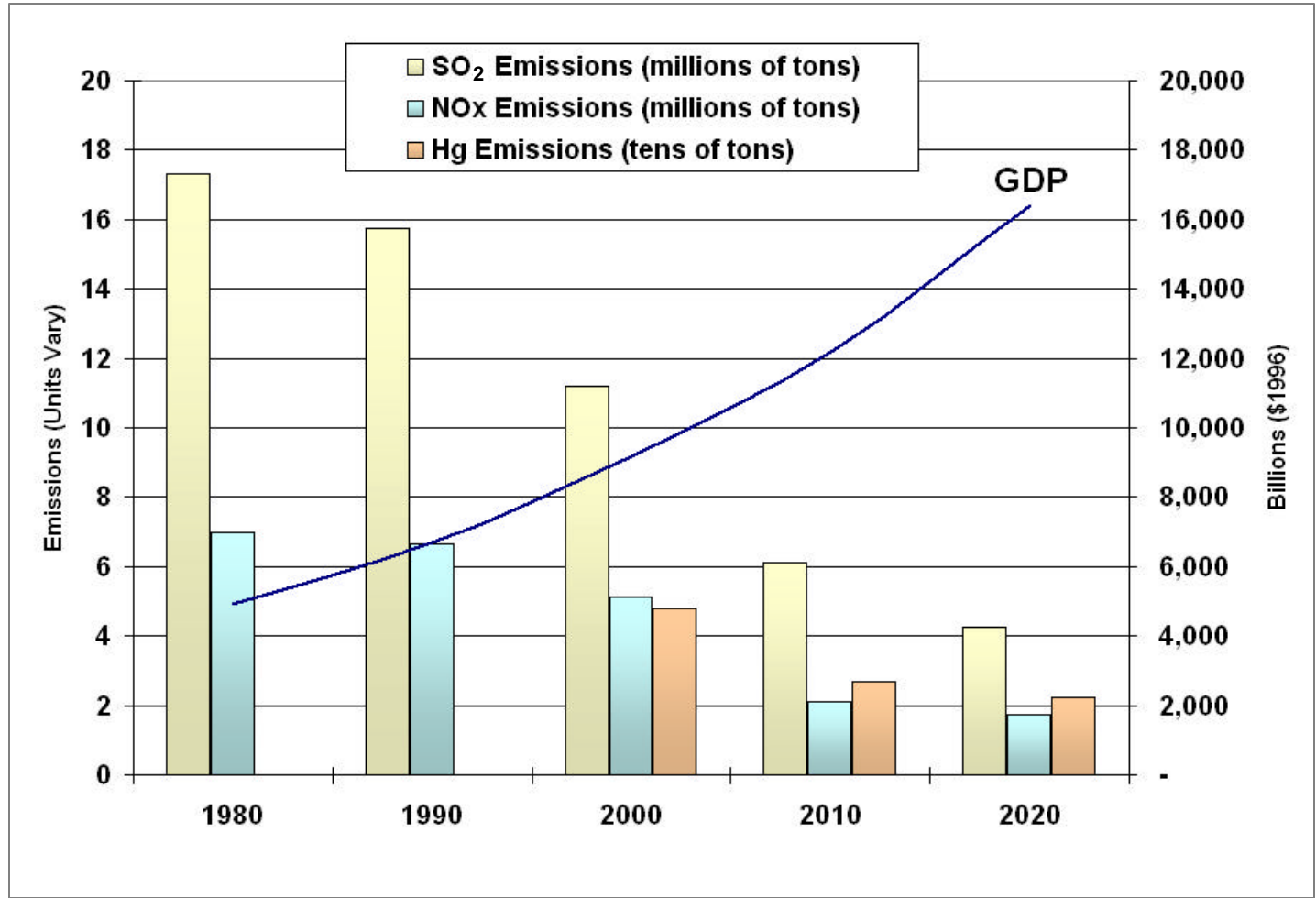
**Note:** The analysis presented represents EPA's estimates. EIA's modeling would likely show different impacts.

# Clear Skies Safety Valve Provision

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- Under the safety valve mechanism, the price of allowances is capped, meaning that if the allowance price exceeds the "safety-valve," EPA will borrow allowances from the following year auction to make more allowances available at that price.
- The purpose of this provision is to minimize unanticipated market volatility and provide more market information that industry can rely upon for compliance decisions.
- The safety valve mechanism ensures the cost of control does not exceed a certain level, but also ensures that emissions reductions are achieved.
- The future year cap is reduced by the borrowed amount, and the emissions reductions are achieved.
- The Clear Skies Act "safety valve" provisions are \$4,000 a ton for SO<sub>2</sub> and NO<sub>x</sub> and \$35,000/pound for mercury.
- Current Clear Skies modeling suggests that the mercury safety valve price will be reached, however, we believe that this is a conservative cost estimate since technology will likely advance and the cost for mercury control will decrease over time.

# Economic Growth and Environmental Improvement



Sources: 1980 - 1999 emissions data are from the National Air Pollutant Emissions Trend Report (EPA, March 2000). Projections for SO<sub>2</sub>, NO<sub>x</sub> and mercury are derived from the Integrated Planning Model (IPM). GDP data for 1980, 1990 and 2000 is from the Bureau of Economic Analysis, U.S. Department of Commerce. The GDP projection for 2010 is from OMB's Analytical Perspectives Report for 2003, Table 2-1. The 2010 to 2020 projection follows EIA's assumptions in AEO 2001 of 3% growth per year.