Supporting Efficiency and Clean Generation Through Cap and Trade Programs

Committee on ERE

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Overview

- Cap and trade programs
- EPA Clean Air Interstate Rule
- Implications for efficiency and clean generation

Command and Control Programs

- Specific emission limit set for each plant.
  - Emission rate or technology requirement
- Each plant must meet specific limit.
- Each plant bears its own costs.
- Total emissions can increase as new plants are built.
- Implementation and enforcement can be complicated.

Allowance Trading Programs

- Establish emissions tonnage cap for affected sector.
- Distribute emission allowances equal to the cap.
- Each plant must hold allowances equal to its emissions at the compliance deadline.
- Plants can buy or sell allowances.

Cap and Trade Compliance

- No specific limit for each plant.
  - Allocation is not a limit.
- Owner must find most cost-effective mix of emission reductions and trading.
  - All emission reduction options ok.
- Owner will make reductions that are cost less than the market price.

Implications of Cap and Trade

- Emissions are capped - won't go up or down.
- Compliance assurance is easier.
- Overall compliance costs are lower than under command and control.
  - May be higher or lower for individual plants.
  - Compliance costs are redistributed compared to command and control.

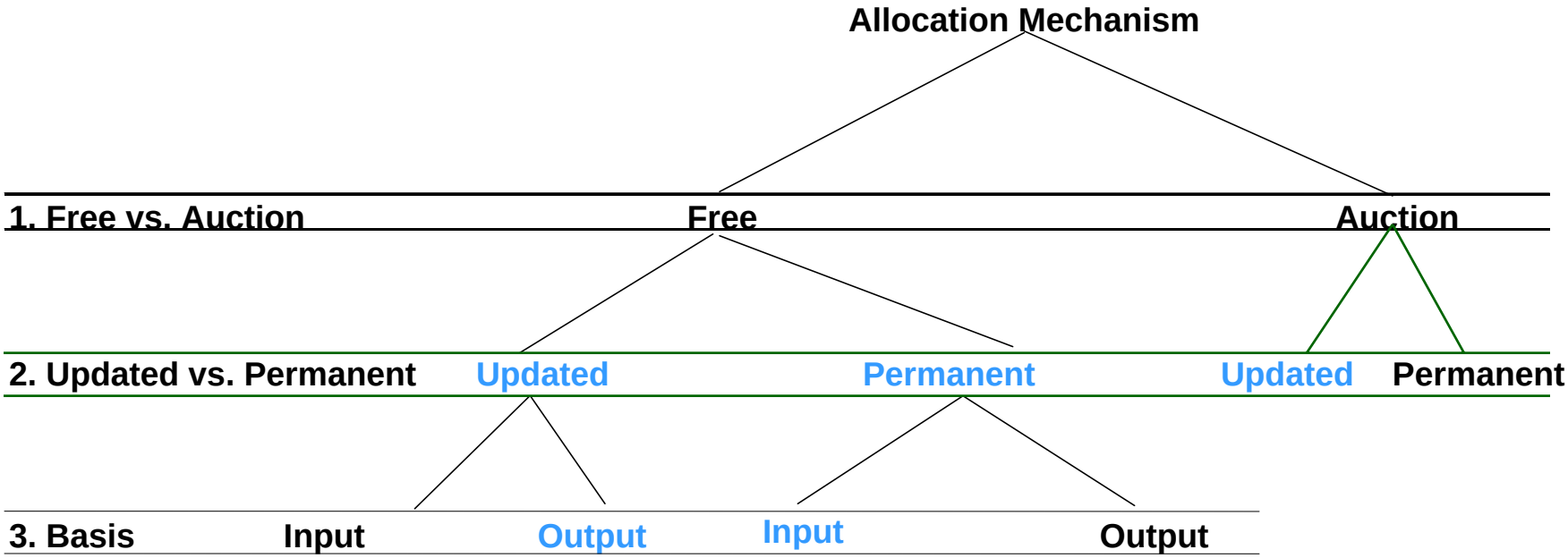
The Role of Allocation

- Emission allowances must be distributed at the beginning of the program.
  - Distributing the “chips” in the trading system.
- Allocation does not determine the near-term compliance strategy but does affect profitability of individual plants or companies.

Goals for Allocation

- Not create arbitrary winners and losers.
- Promote desirable policy outcomes.
  - Efficiency, clean technology, new technology, balanced energy mix, low cost.
- Transparent
- Not overly complicated.

Allowance Allocation Options



Another key parameter: Which plants receive allocations?

- **Fossil only**
- **Plus Renewables**
- **Plus Nuclear**

Auction

- Seen as most economically efficient.
- Unpopular with regulated community.
- Outcome depends on disposition of revenues.
  - If revenue not correctly recycled, compliance cost higher than command and control.

Grandfathering

- One-time permanent allocation to existing plants only. Typically input-based.
- Grandfathering rewards existing plants regardless of fuel, emissions or efficiency.
- New plants never get allowances/must purchase all.
  - Arbitrarily creates winners and losers.
  - Disincentive for new plants, especially new coal.

Output-Based, Updating

- Updating, output-based treats all plants the same.
- Creates internal incentive for new, cleaner, more efficient plants, including clean coal.
- Allocations respond to changes in generating mix.
- Output-based allows including efficiency and non-emitting generators.

Current Allocation Approaches

Acid Rain Program	Grandfathering based on heat input.
NO_X SIP Call	Mostly updating based on heat input.

Allocation Approaches in Proposed Bills

Clear Skies Act	Grandfathering transitioning to auction
Carper Bill	Mostly output-based updating with varying recipients
Jeffords Bill	Auction with output-based set-asides

Observations

- All plants have control costs.
- We're not good at predicting winners.
- Skewing allocations impedes the market's cost minimizing function.
- Support for new plants is critical, especially for coal.
- The linkage with restructuring and competition is very important.

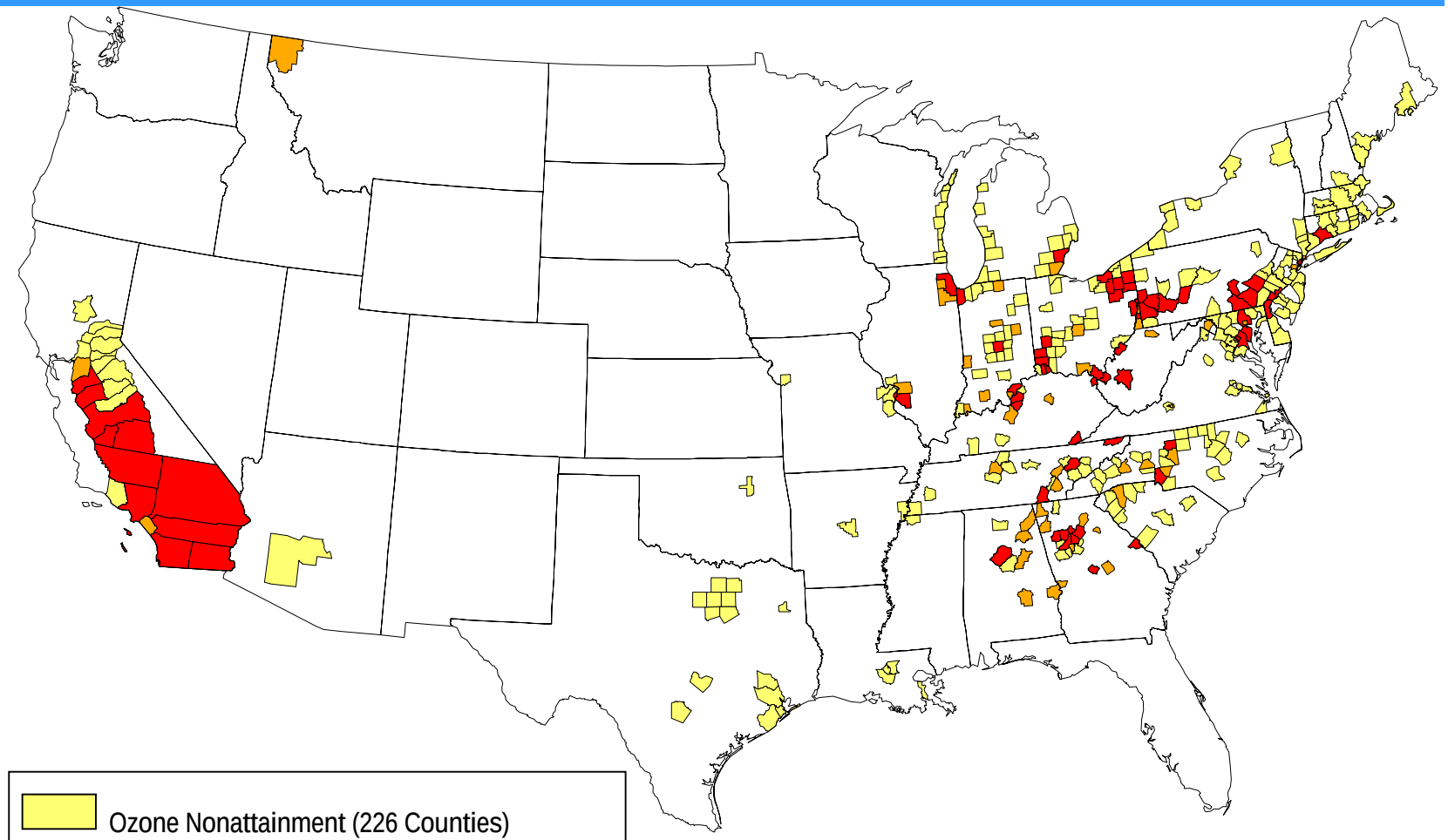
Clean Air Interstate Rule (CAIR)

- EPA proposes emission reductions from power plants to address the contribution of transported SO_2/NO_x emissions to ozone (smog) and fine particles ($PM_{2.5}$) nonattainment problems in the Eastern U.S.

Pollutants and Concerns

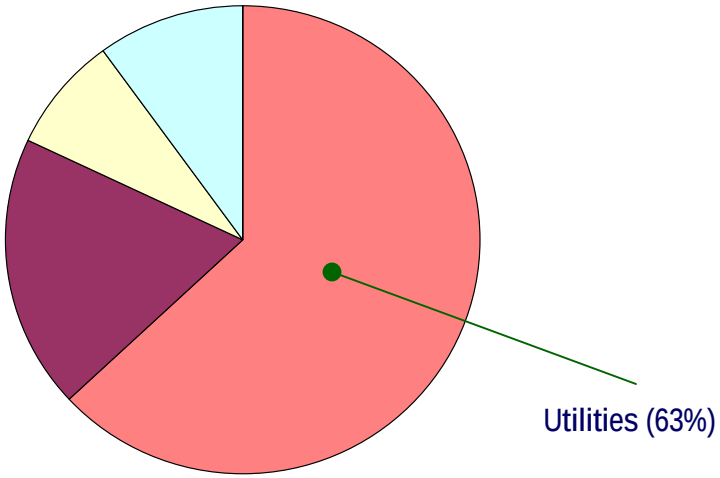
- Nitrogen Oxides contribute to the formation of both $PM_{2.5}$ and ground-level ozone.
- Sulfur Dioxide (SO_2) contributes to formation of $PM_{2.5}$.
- Ozone and $PM_{2.5}$ have been linked with premature death, serious illnesses such as chronic bronchitis and heart attacks, and respiratory illnesses such asthma exacerbations.
- NO_x and SO_2 are also linked with acid rain, eutrophication of water bodies including estuaries such as the Chesapeake Bay, and contribute to regional haze.
- Mercury has been linked to potential reproductive, immune and nervous system effects, with special concerns for pregnant women.

Counties With Monitors Exceeding the Ozone and $PM_{2.5}$ NAAQS in 2002

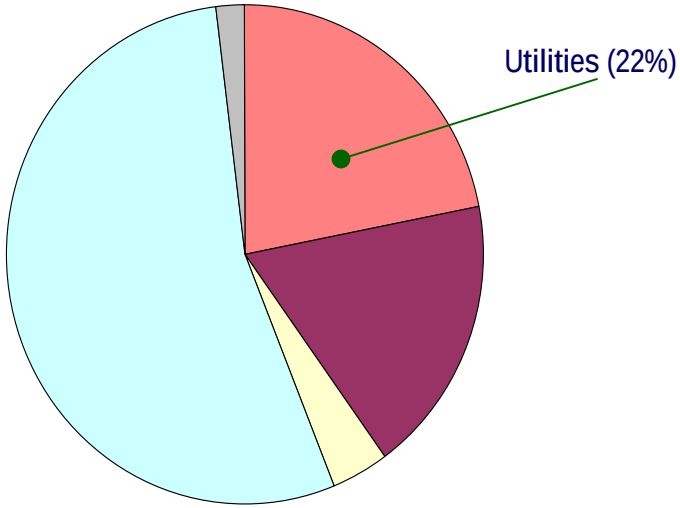


Power Generation Is a Major Source of Emissions

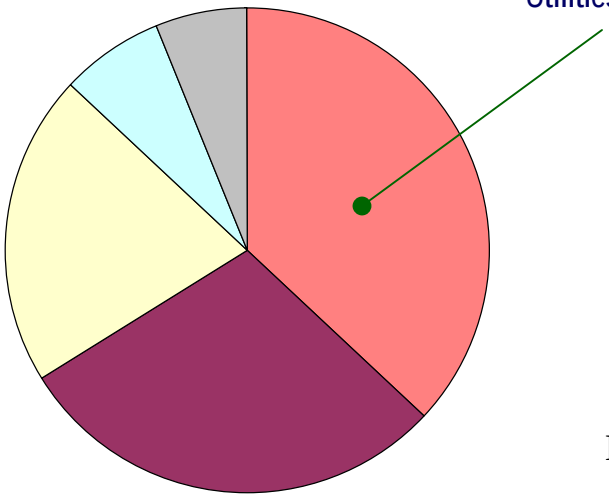
2000 Sulfur Dioxide



2000 Nitrogen Oxides



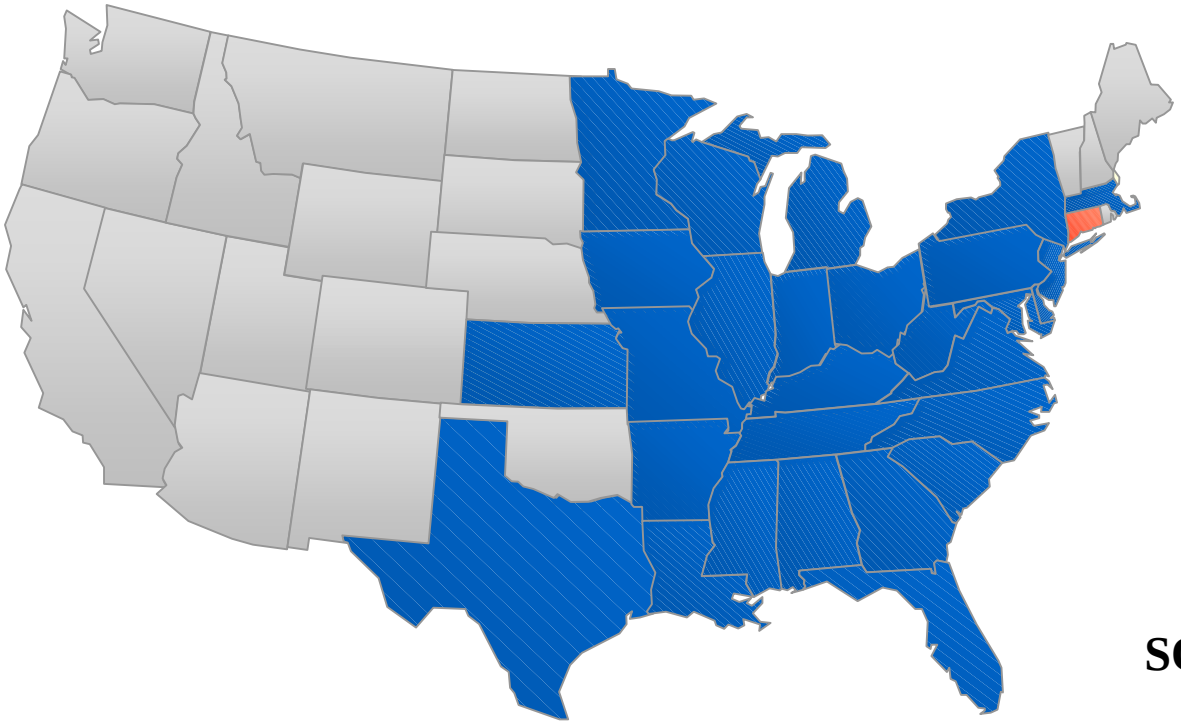
1999 Mercury



- Fuel Combustion-electric utilities
- Other stationary combustion *
- Industrial Processing
- Transportation
- Miscellaneous

* Other stationary combustion includes residential and commercial sources.

CAIR: Affected Region and Emission Caps



States controlled for both SO_2 and NOx

States controlled for ozone season NOx only

States not covered under the IAQR

EGU Emissions Caps*

(million tons)

	2010	**2015**
SO_2	3.9	2.7
NOx	1.6	1.3

**For the affected region.*

Allowance Allocation in CAIR

- SO_2 allocation maintained as in acid rain program.
- NO_x allocation left to states.
- EPA has developed model trading rule that includes model NOx allocation language.

NO_x Allocation in CAIR

- Fossil units only.
- Historical heat input for existing units.
- New units gradually brought into allocation based on converted generation output.
  - New = after 1/1/1998.
  - Output times a heat rate to get heat input.
  - Thermal output of CHP units converted to heat input.

Improving the CAIR Framework

- Allocate allowances to *all* new generators based on output.
- Allocate allowances to new demand-side efficiency measures.
  - Verified electricity reductions treated the same as generation in the allocation process.
- Provides continuing market-based economic support for all new clean generators and efficiency.

Key Findings - Allocation

- Output-based updating promotes construction of new, cleaner, more efficient plants.
- Grandfathering creates a disincentive to build new, clean efficient plants, especially new coal plants.
- Updating is likely to reduce compliance cost by promoting cleaner plants.
- Output based allocation is the best way to provide proper credit for CHP.

Conclusions

- Allocation is a key part of cap and trade program design.
- Updating output-based allocation to all generators will encourage efficiency and new, clean generation while still rewarding well-controlled existing plants.
- The CAIR rule can be modified to incorporate these concepts.

For More Information

- *Analysis of Output-Based Allocation of Emission Trading Allowances*
- Provides background on the design and operation of allowance trading programs.
- Compares the distribution of allowances under three allocation approaches.
- Analyzes the implications of these allocation approaches.
- Available at: http://www.nemw.org/uschpa/index.html