

Allocation of CO₂ Emission Allowances in The Regional Greenhouse Gas (RGGI) Cap and Trade Program

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RGGI Background and Status

- Initiated by invitation from Gov. Pataki in April 2003.
- Staff working group started meeting in August 2003.
- Goal to develop strategy to reduce GHG emissions in region using an emissions cap and trade approach.
- State agency heads had first meeting in April to begin discussing elements of a proposal.
- Draft proposal for key elements of RGGI released in August.
- State agency heads are working on an agreement on elements of a final model rule.
- Final RGGI model rule will need to be approved and implemented at the state level.



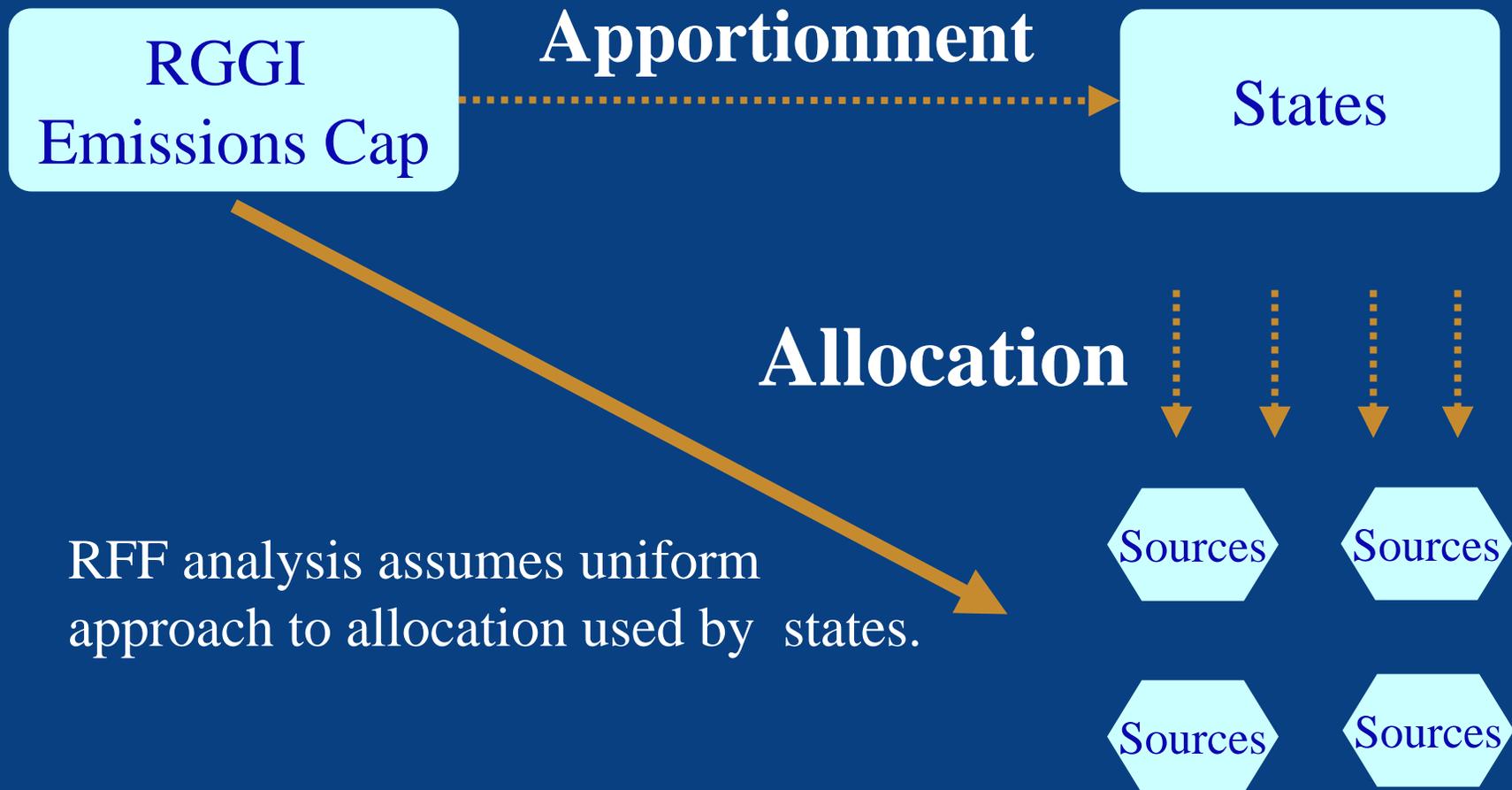
Staff Working Group Draft Proposal on Key Elements of RGGI

- Program to start in 2009 and applies to all generating units over 25 MW that sell to grid.
- Stabilize emissions at current levels through 2015.
- Program review in 2015.
- Ramp down to 10% below current levels by 2020.
- State apportionment based on emissions and other factors.
- States responsible for allocation to sources. Encouraged to have a 20% for public benefits purpose and 5% for strategic purposes.
- Banking and early reduction credits allowed.

Goals of Our Analysis

- 1) Measure **cost** of various approaches to initial distribution of allowances. We do not consider costs outside the electricity sector.
- 2) Describe **distributional consequences** between consumers and producers, and among producers.
- 3) Identify ancillary effects and other considerations.

Initial Distribution of Allowances





Three Bookend Approaches to Allocation

	Historic	Updating	Auction
Input (Btu)	<ul style="list-style-type: none"> • Title IV SO₂ • Some states for NO_x 	<ul style="list-style-type: none"> • Dutch NO_x trading • Some states for NO_x 	<ul style="list-style-type: none"> • Spectrum • VA for NO_x
Output (MWh)	<ul style="list-style-type: none"> • Some states for NO_x 	<ul style="list-style-type: none"> • Lead phase-out • Some states for NO_x • Sweden NO_x tax 	

✓ Common formula across fuels, sources?

Why RGGI is Different

- Impact of allocation on costs of regulation depends on how electricity prices are determined.
- Our earlier work on allocation for hypothetical national CO2 cap and trade program spanned states with cost-based pricing and market pricing of electricity.
- Under cost-based pricing opportunity cost of allowances granted for free is not reflected in electricity prices.
 - This creates a gap between price effects of an Auction and a Historic approach.
- RGGI region relies predominantly on market-based pricing of electricity which eliminates the gap.

Scenarios

Policy: Start at 2008 baseline CO₂ emissions and phase down by 20% by 2025 in nine state region. *This policy is much more ambitious than RGGI draft proposal.*

Three bookend approaches to allocation:

Auction: Revenues have value in analysis.

Historic Generation: Allocation to all incumbent emitters based on 1999 shares of generation.

Updating: Allocation to emitters based on generation from 2 years previous.

About a dozen derivative approaches and combinations are also explored.

General Conclusions First...

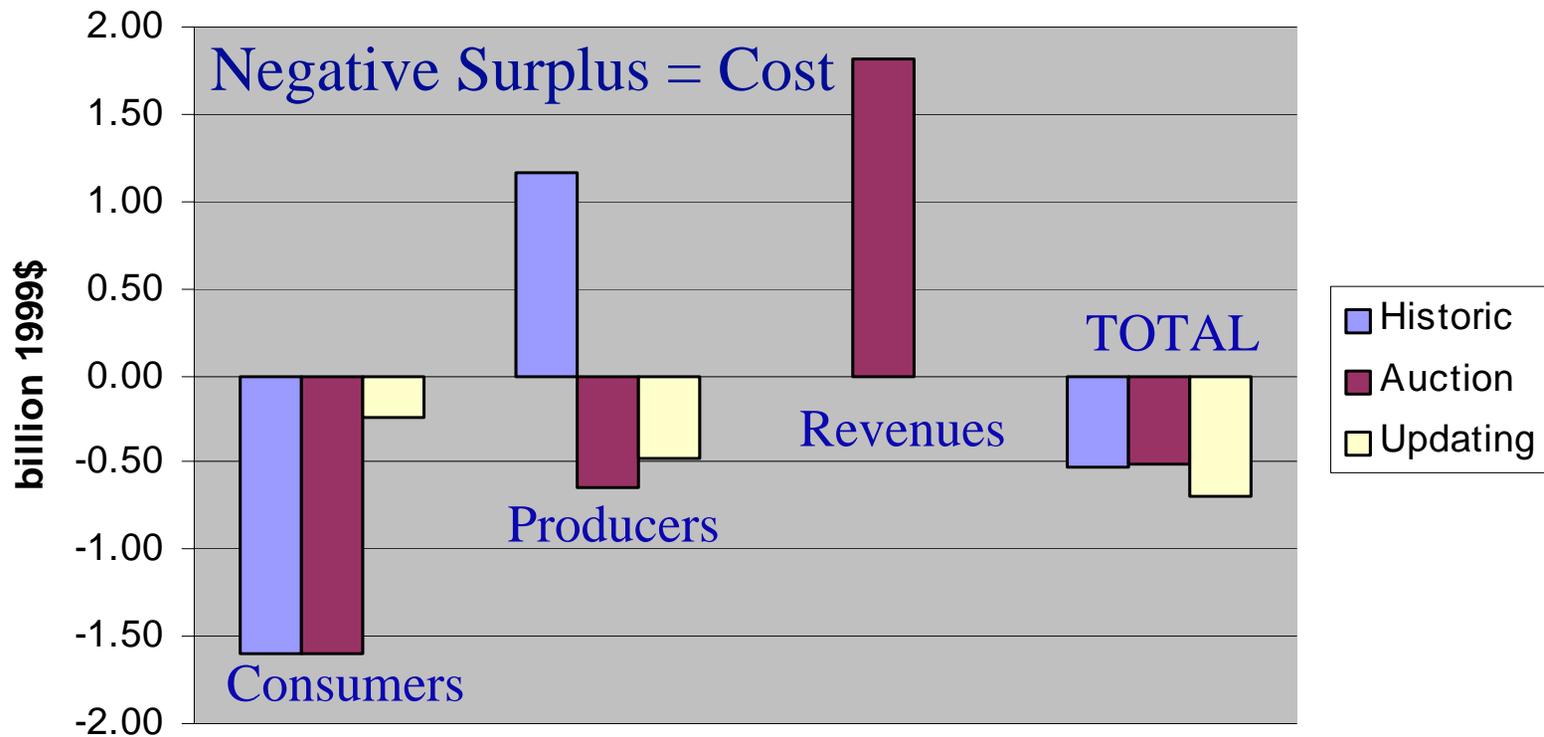
- ✓ Due to electricity deregulation, **Auction** and **Historic** approaches yield the **same electricity price**, and the **same social cost**. We do not look at costs outside electricity sector (doing so would favor an Auction).
- ✓ **Updating** yields a slightly **lower electricity price** and more generation in the region, but at a **higher social cost**. Updating yields **lower emissions of SO₂, NO_x, mercury** in region.
- ✓ Allowance value is at least four times the social cost.
- ✓ The initial distribution of allowances determines which producers and consumers bear the cost of the program.

1) Economic Efficiency

- Generally, the Auction and Historic approaches are similar because of competitive pricing in northeast electricity markets.
- The Auction and Historic approaches are more efficient than the Updating approach.
- Substantial variety exists among Updating approaches, with some approaches also relatively efficient.

A Look at the Economic Efficiency of the Bookends Approaches, 2025

Change in Surplus Within RGGI from Baseline



Additional Cases

- Transmission Constraints
- High Natural Gas Prices
- Renewable Policies
 - ✓ None of these potential outcomes increase the cost of RGGI relative to the respective baselines.
 - ✓ Tighter gas or transmission constraints benefit producers in the aggregate. These constraints have a greater impact on electricity price than does the RGGI program.
- Mixed Cases
 - ✓ Combining approaches generally leads to intermediate results.

2) Allowances as Compensation

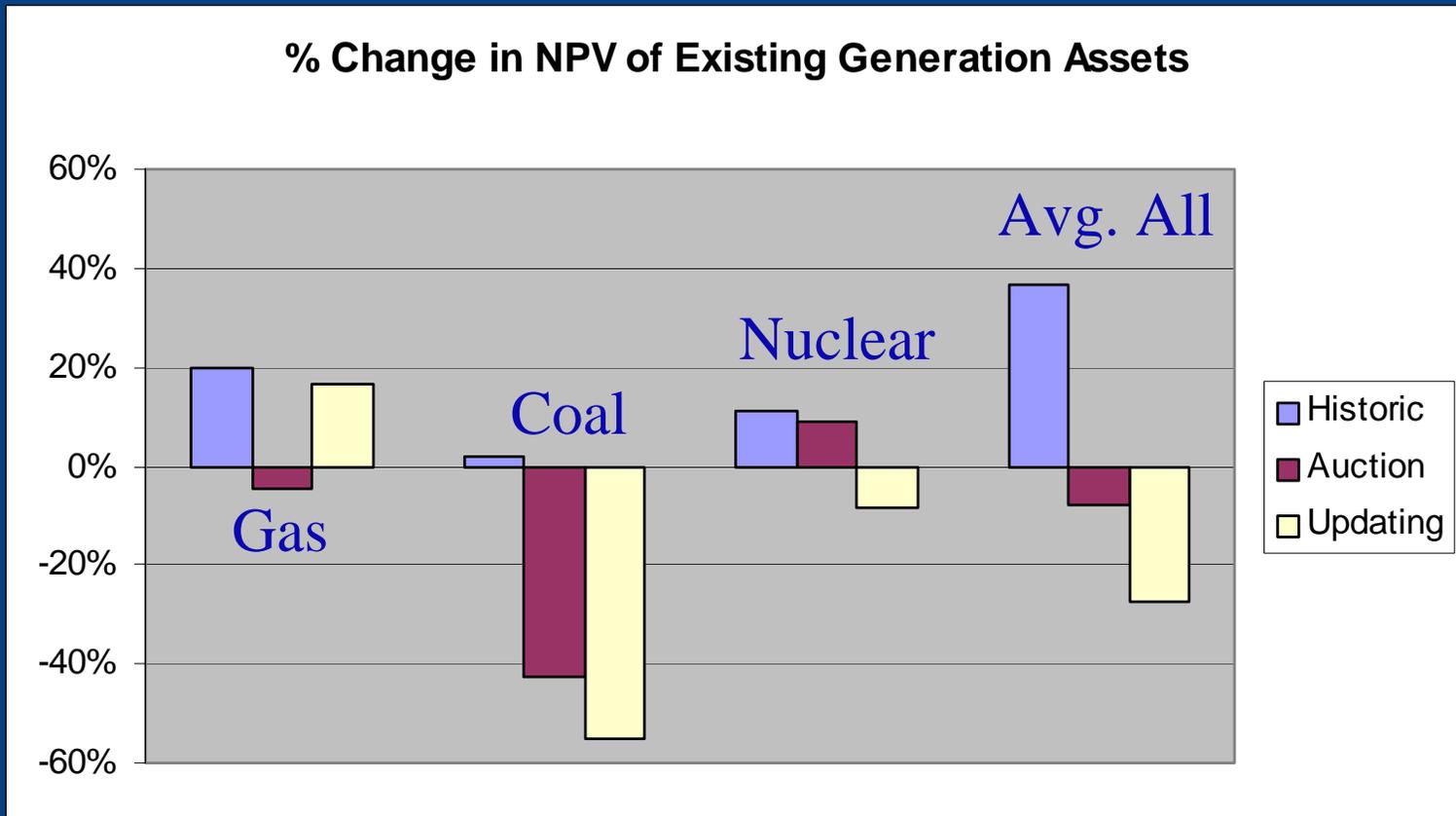
Compensation is justification for free distribution.

→ How much compensation is sufficient?

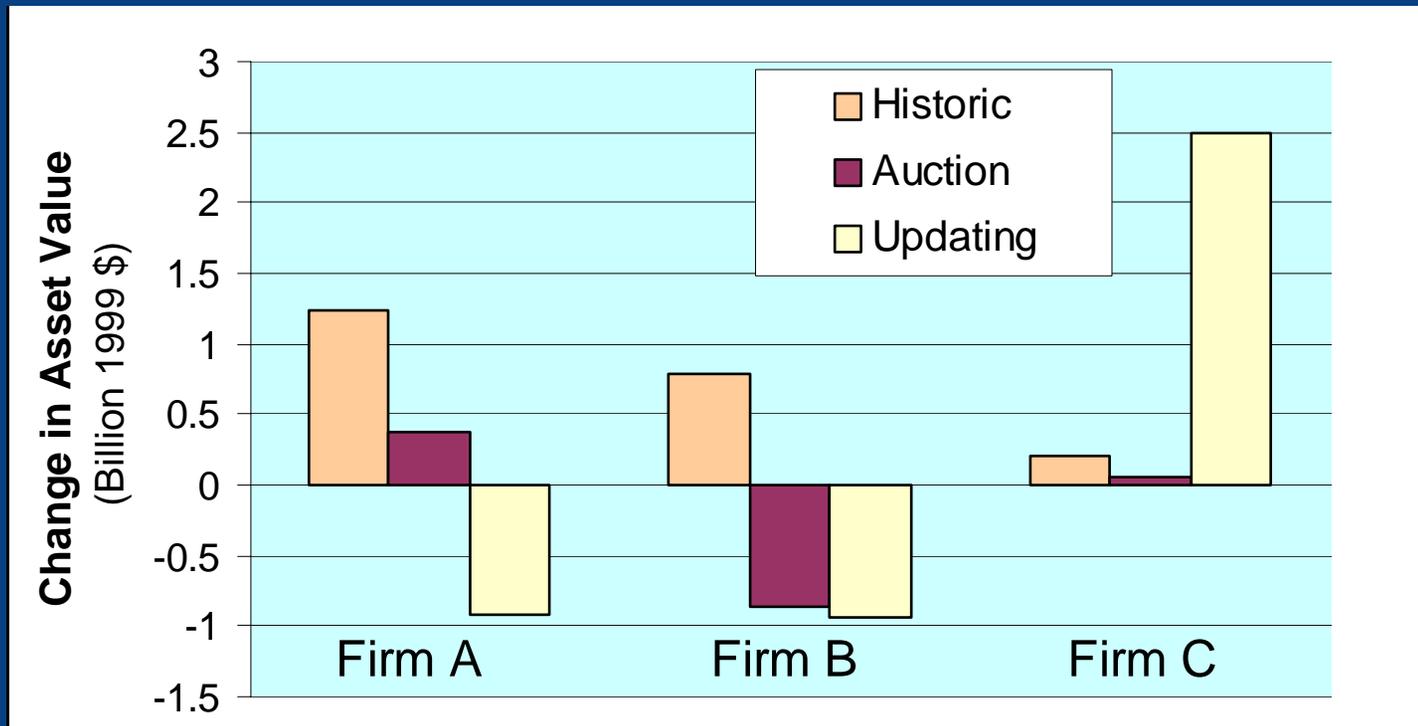
- Firms charge consumers for using emission allowances, whether the allowances were received for free or at a cost.
- Fixed price contracts mitigate the ability to pass through costs in the short run.
- Are other segments of the economy/society also candidates for compensation?

A Look at the Distributional Effects of the Bookends for Existing (1999) Assets

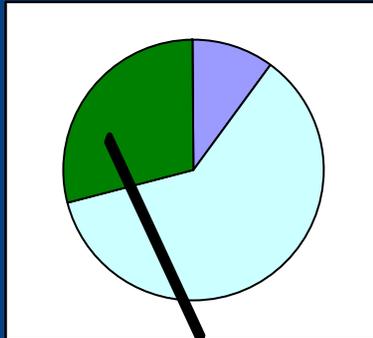
Existing coal is much better off under historic allocation



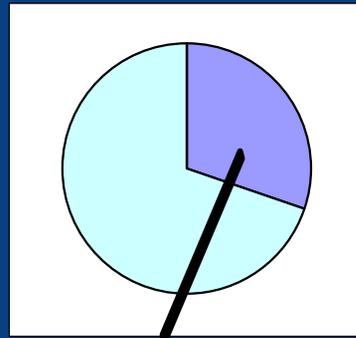
Shareholder Value for Three Firms: Effects on Assets in RGGI Region



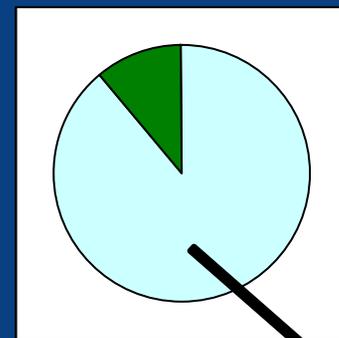
Capacity Mix



Nuclear & Renewable

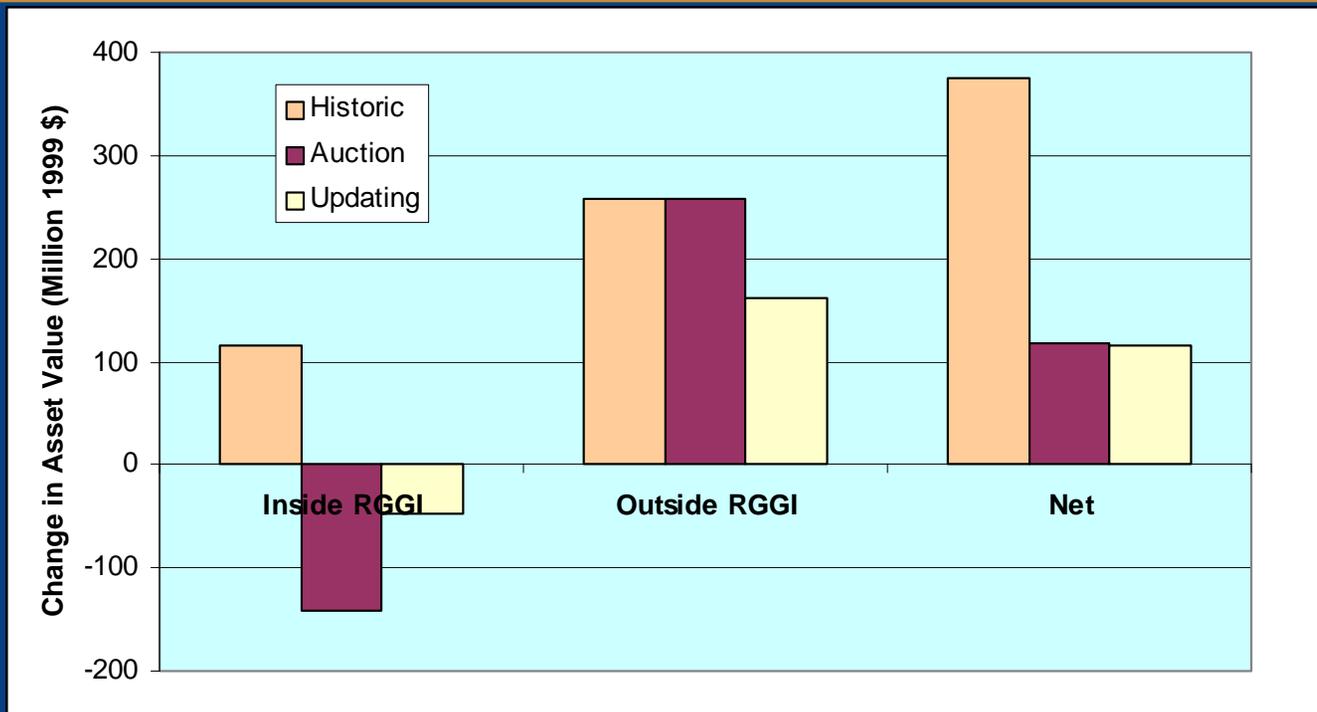


Coal

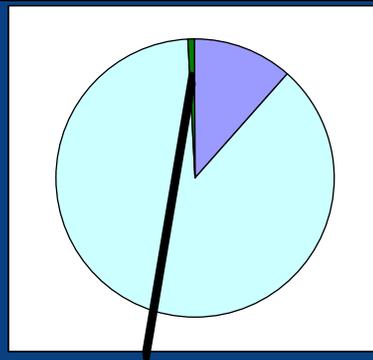


Gas & Oil

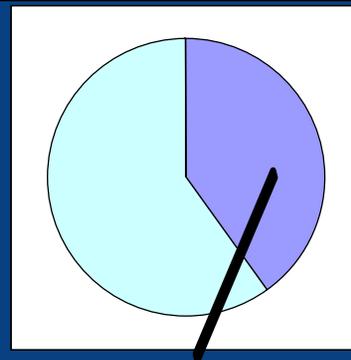
Shareholder Value for Firm D: Effects on Assets in and out of RGGI Region



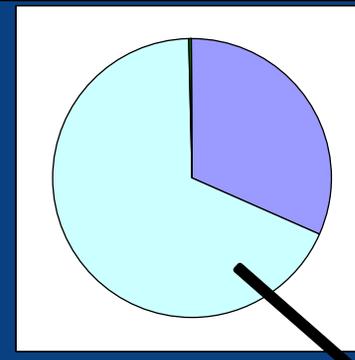
Capacity Mix



Nuclear & Renewable



Coal



Gas & Oil

Fixed Price Contracts in RGGI

- Approximately no change in wholesale marginal cost.
- Retail price is a weighted average of contract price and market price.
- Overall, reduction in predicted increase in retail price due to RGGI is as much as 13% → lower retail prices.
 - Asset values of 3 nuclear units unaffected by RGGI.
 - The NYPA hydro not really relevant.
 - Revenues of a lot of smaller PURPA contracts unaffected by RGGI.

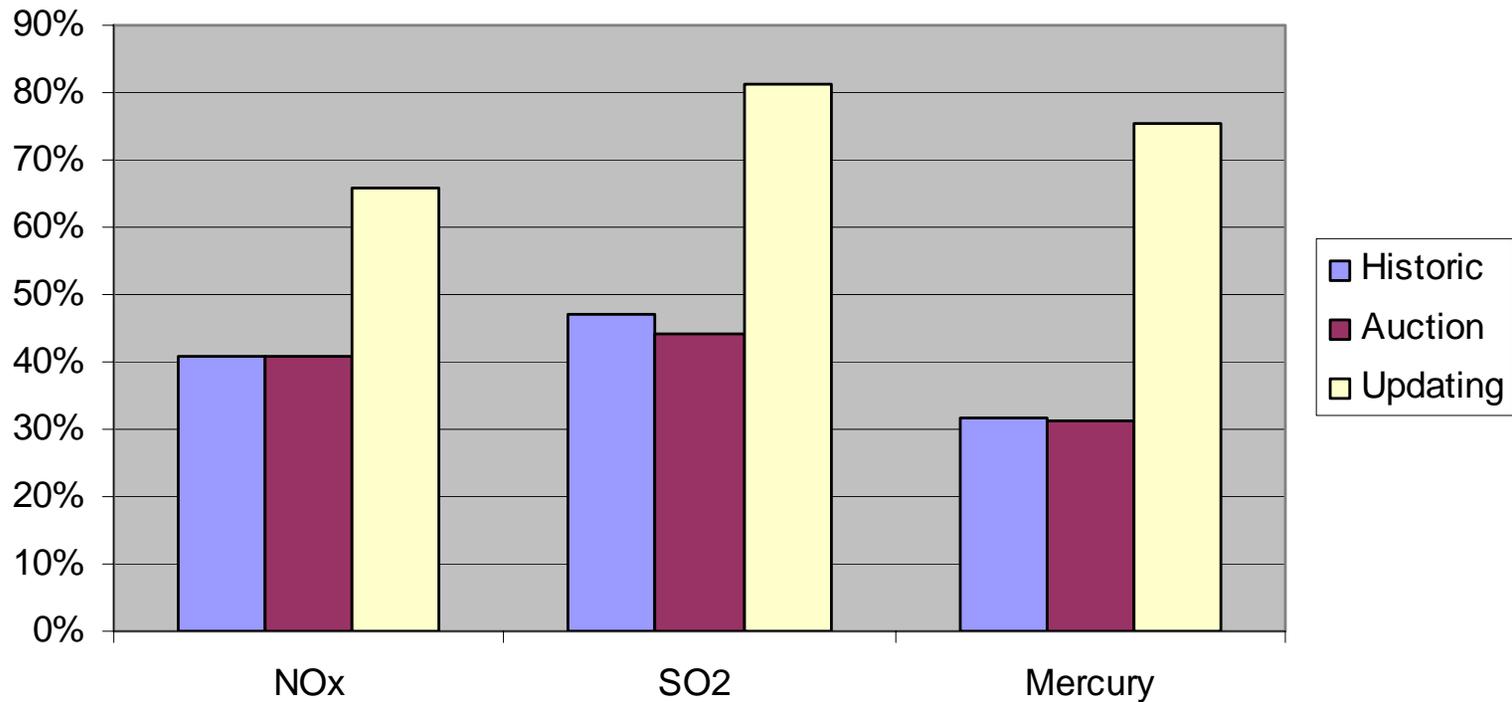
3) Other considerations...

Conventional Pollutants

- Expected emission reductions in the region are accelerated under RGGI policy. In the region emissions fall by roughly 40-45% under Auction and Historic approaches, and by 65-81% under Updating.
- Capping CO₂ emissions has the effect of lowering compliance cost for conventional pollutants (NO_x, SO₂, Hg) within RGGI.
- Nearly \$200 million in savings under Auction and Historic by 2025.
- Over \$400 million in savings for Updating by 2025.

Emissions Reduction

% Reduction in Emissions from Baseline for RGGI 2025



Closing Observations

- ✓ Auction, Historic are most **efficient** but Updating leads to lower **electricity prices**.
- ✓ Change in shareholder value depends on the **portfolio** of assets. A firm may have facilities that lose and that gain value, inside and outside of the region.
- ✓ Cost of the RGGI policy is not sensitive to **high natural gas prices or transmission constraints**.
- ✓ Combining approaches generally leads to intermediate results.
- ✓ We suggest the emphasis given to compensation versus efficiency can differ between the **short run and long run** for RGGI planners.

For More Information

www.rff.org/rggi