

The Initial Distribution of Tradable CO₂ Emission Allowances in RGGI: Compensation and Economic Efficiency

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RGGI Stakeholder Workshop

Boston

October 14, 2004

Partial funding provided by *The Energy Foundation*



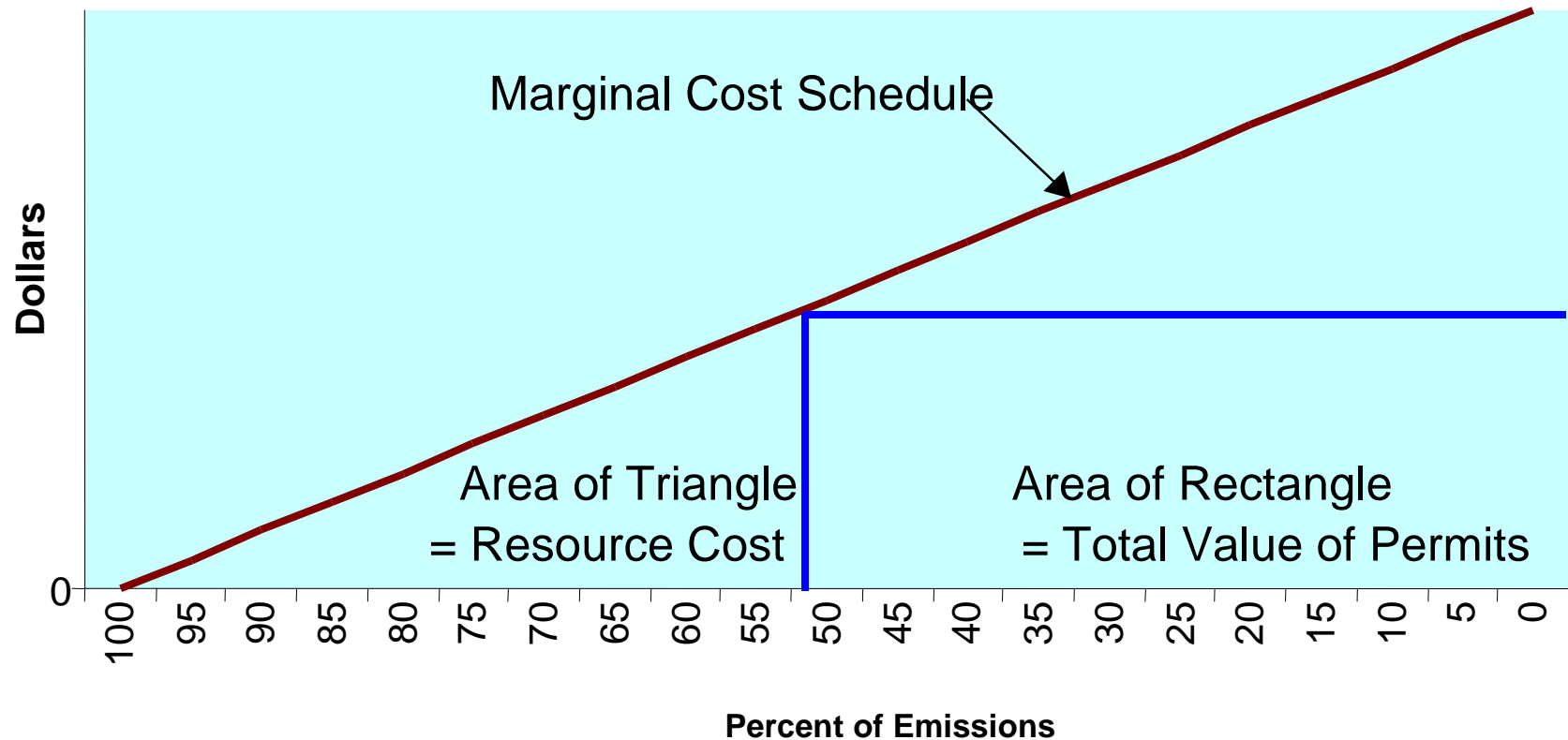
Introductory Points

- In June in NYC Burtraw and Palmer presented two criteria-compensation and economic efficiency:
 1. Distributional issues affect consumers *vis-a-vis* producers through electricity price changes, and producers through changes in value of various generation assets.
 2. Economic efficiency affects everyone and concerns cost-effectiveness and leakage.
- We suggested there are substantial distinctions between CO₂ and other conventional pollutants.
- We proposed that in the short run economic efficiency may be less important than political feasibility (compensation). In the long run economic efficiency is crucial.

1. Allowances as Compensation

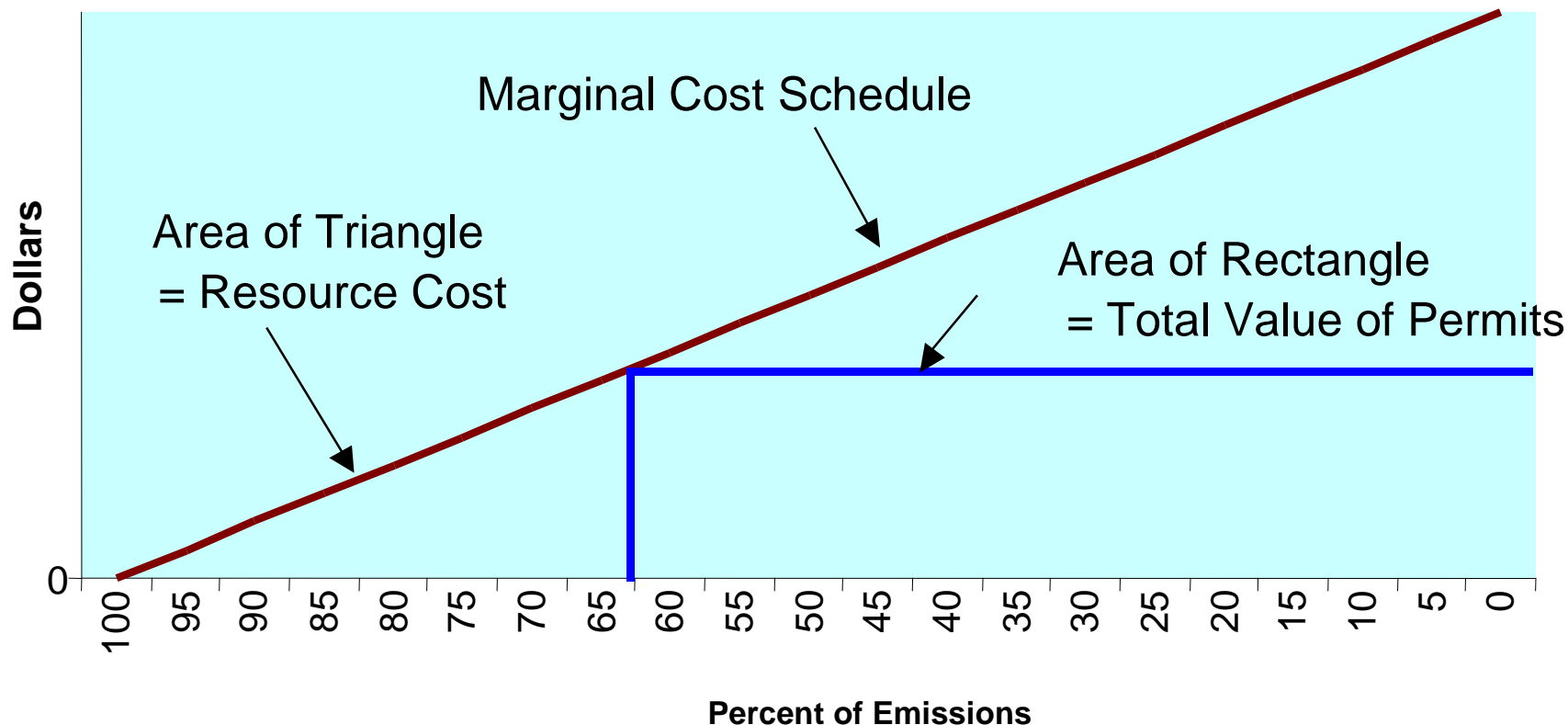
- Allowances have value for shareholders.
- Due to electricity deregulation in the northeast, allowance value is reflected in electricity price to an equal degree for auction or historic (*gratis*) approaches to distribution.
- Free distribution compensates industry for compliance costs, but more so with a historic than with an updating approach.
- Are other segments of the economy/society also candidates for compensation?

Compensation: The Previous SO₂ Trading Program Aimed at 50% Reductions



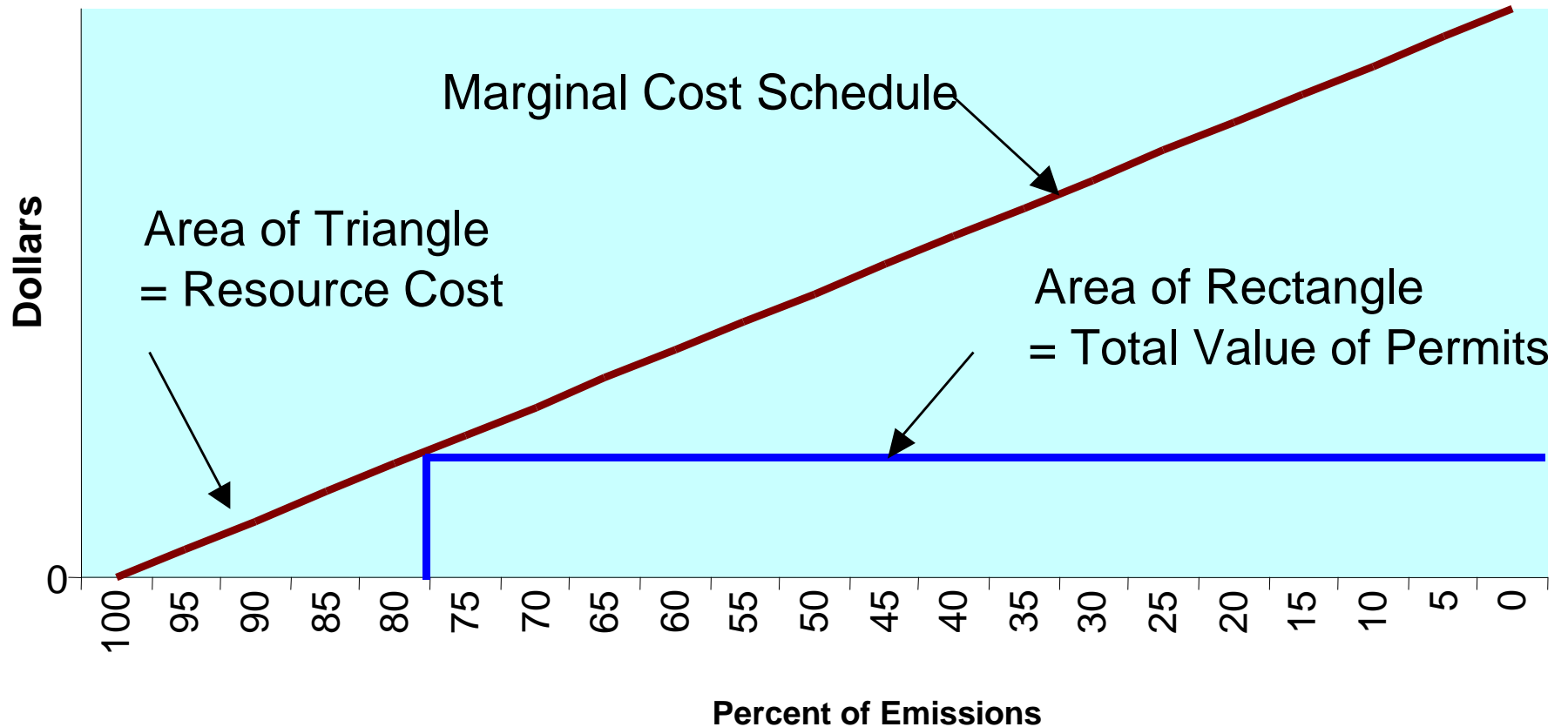
→ Value of permits = 2 times the cost of emission reductions

Why Carbon is Special...



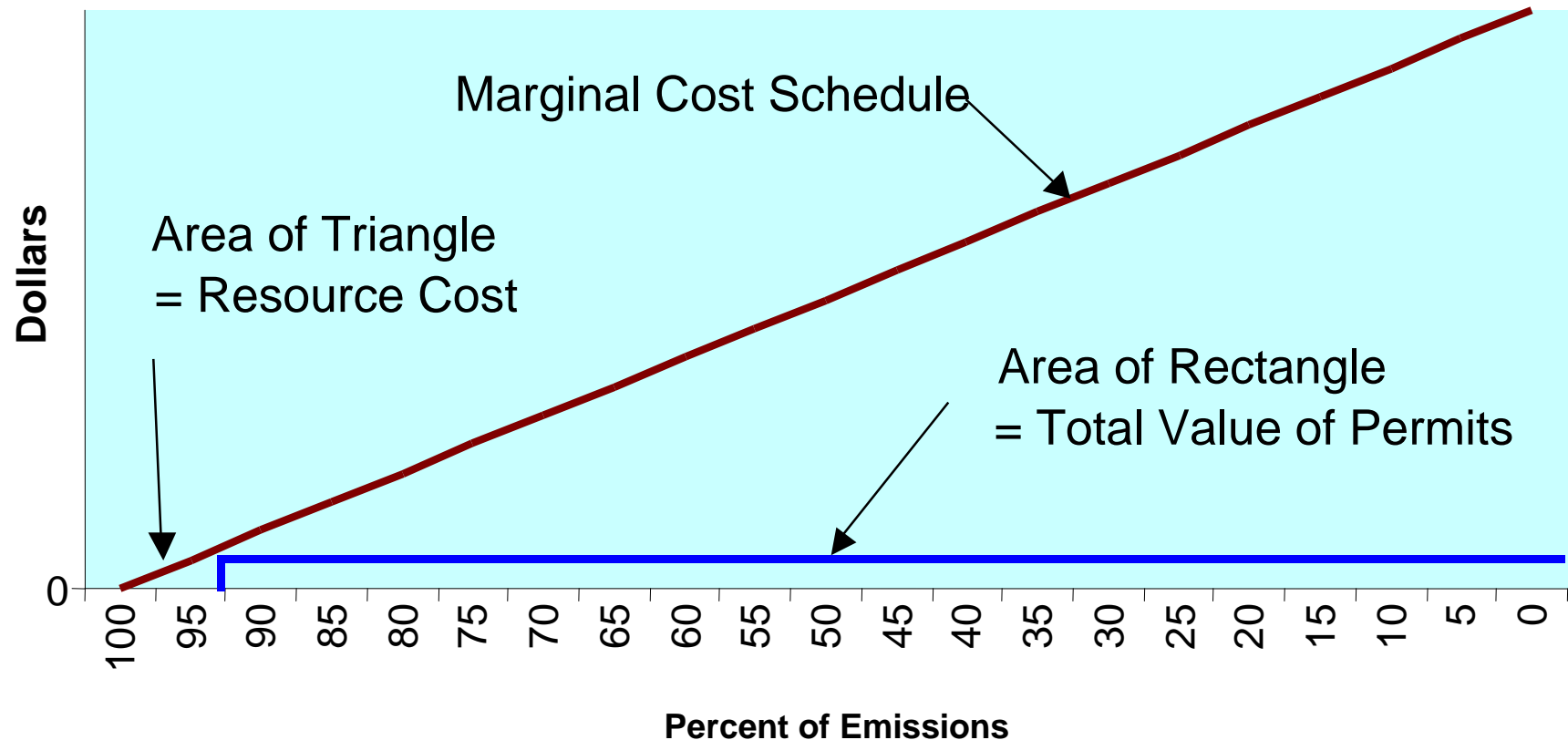
Value of Allowances vs. Compliance Cost Changes with
Emission Reduction Required

Why Carbon is Special...



Value of Allowances vs. Compliance Cost Changes with
Emission Reduction Required

Why Carbon is Special...



→ Value of Permits = 20 times Compliance Cost

Changes in Market Values of Existing Assets Depend on Changes in Revenues and Costs

- How is change in cost reflected in electricity price?
- Does change in revenues compensate / over-compensate for change in costs?

Answers depend on market equilibrium, that is, electricity price that balances supply and demand.

Calculating Compensation

- Calculate at *facility, business unit, firm* or *state* level?

Change in shareholder value depends on the **portfolio of assets** held by the firm.

There are paradoxes. Some firms may benefit under a public benefit allocation (auction) and do worse under some forms of free distribution.

2. Allocation and Economic Efficiency

- Economic efficiency requires that energy consumers see society's opportunity cost in prices.
- An “auction” and (in northeast) “historic grandfathering” are best at getting prices right. An auction has an additional efficiency advantage in raising revenues.
- Allocation to consumers or a public benefit allocation can promote efficiency if allocation is not a direct subsidy to electricity consumption.
- “Updating” has the political advantage and efficiency disadvantage of a *lower* electricity price, and it can be designed to reduce leakage. But it has less attraction in a national (or international) model.

Initial Experiments

- **Simulation model:** Highly parameterized national model of electricity sector.
- **Regulation:** Limited restructuring.
- **Scenario:** Start at 2008 baseline emissions and phase down by 20% by 2025.
- **RGGI:** Nine state region with MAAC power region split. All *new* plants in MAAC located outside of RGGI.

Three “book-end” approaches to initial distribution:

- **Auction:** Revenues have value in analysis.
- **Historic Generation:** Allocation to all incumbent generators based on 1999 shares of generation.
- **Updating:** Allocation based on all generation 2 years previous including new plants only in NY, NE.
(Not designed to minimize leakage.)

Results as Change from Baseline

2025	Auction	Historic (All)	Updating (All)
RGGI			
Electricity Price	+4.0%	+4.0%	+1.4%
Generation	-12%	-12%	-9%
Rest of Nation*			
Electricity Price	+0.3%	+0.4%	+0.4%
Generation (Share of RGGI Baseline)	+10.6%	+10.6%	+8.5%
CO ₂ Leakage Cumulative Average (2008-2025)	37%	37%	37%

*Includes MAAC outside RGGI

Change in Net Present Value of Existing Generation Assets

	<i>2008 Baseline Generation</i>	<i>Auction</i>	<i>Historic (All)</i>	<i>Updating (All)</i>
RGGI	<i>(Share)</i>	<i>(Thousand 1999\$/MW)</i>		
Gas	29%	+9	+32	+22
Coal	22%	-139	-61	-204
Nuclear	33%	+81	+169	+171
Avg ALL		+20	+69	+40
MAAC not in RGGI				
Gas	35%	+19	+24	+26
Coal	19%	+48	+46	+52
Nuclear	28%	+50	+48	+47
Avg ALL		+26	+25	+30

For comparison, in the Baseline the average NPV of gas assets in RGGI is -\$273; for coal \$434; for nuclear \$611; and average for all existing assets about \$165. (Thou. 1999\$ / MW).

Efficiency as Change from Baseline

Current Year 2025	Auction	Historic (All)	Updating (All)
RGGI			
Producers	-8.2%	+14.9%	-2.2%
Consumers	-2.8%	-2.8%	-1.0%
CO ₂ Revenues (1999\$)	[\$1.8 billion]	-	-
TOTAL	-1.3%	-1.4%	-1.6%
Rest of Nation*			
Producers	+4.3%	+7.8%	+6.2%
Consumers	-0.3%	-0.3%	-0.3%
CO ₂ Revenues	-	-	-
TOTAL	+0.1%	+0.1%	+0.1%

*Includes MAAC outside RGGI

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Concluding Observations

Several additional experiments to be included in final report.

In brief, we find:

- ✓ Allowance value is large compared to cost of mitigation effort.
- ✓ Consumers might be paying generators for some/all of the allowance value, depending on how electricity prices change.
- ✓ Auction and Historic Grandfathering are expected to have the same effect on electricity price. Updating will yield a slightly lower price.
- ✓ Change in shareholder value depends on the portfolio of assets.
- ✓ We suggest the emphasis given to compensation versus efficiency can differ in the short run and long run for RGGI planners.