A Critical Comparison of Allowance Allocation Methods under a Carbon Cap and Trade Program

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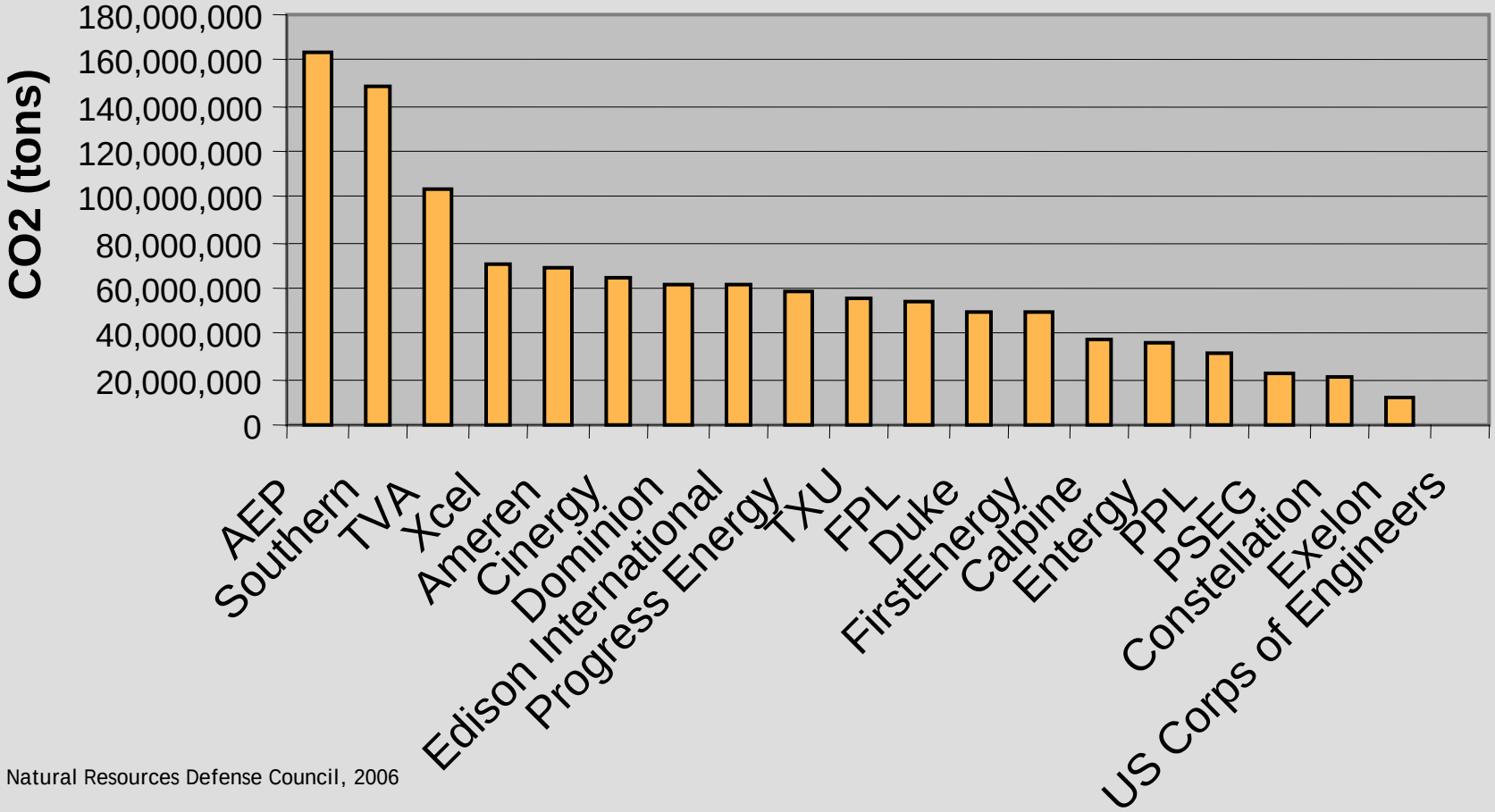
CO2 Emissions of Top 20 Generators (2004)



Source: Natural Resources Defense Council, 2006

U.S. Cap and Trade Programs to Date

- Acid Rain (SO2)
  - Grandfathered Allocation
  - 2.8 % Allowance Auction
- 22 State SIP Call (NOx)
  - State Emissions Cap
  - State Allowance Allocation
- Houston Galveston (NOx)
  - Grandfathered Allocation
- Clean Air Interstate Rule (SO2 and NOx)
  - State Emission Cap
  - State Allowance Allocation (FIP Default)
- Regional Greenhouse Gas Initiative (CO2)
  - State Emission Cap
  - State Allowance Allocation

Two Fundamental Allowance Allocation Methods

- **Free Allocation (Gifting)** the Distribution of Allowances at No Cost to Firms Affected by the Regulatory Program,
  - "Grandfathering" (where Allowances are Allocated Based on Emissions Prior to the Start-Up of the Regulatory Program)
  - "Generation Performance Standard" (which Allocates Allowances Based on Post-Start-Up Electric Output, Measured Either as of a Certain Date or on the Basis of a Periodic Updating).
- **Auction** Under which the Government Sells Allowances to the Highest Bidder and Uses the Revenues for Programs of its Own Choosing
- **Regulated Markets** Less Affected by Allowance Allocation Method Because Cost to Generator is Passed-Through to Ratepayer Through Traditional Cost-of-Service Regulation

Auctions

- Pros
  - Generates Income for Government Purpose (e.g. Distribution to Consumers or Funding Energy Efficiency Projects)
  - Non-discriminatory and Generally More Favorable to Lower Emitting Generators (i.e., Gas Combined-Cycle Requires Half as Many Allowances per MWh Compared with Coal)
- Cons
  - Increased Program Cost Over Free Allocation
    - Higher Transaction Costs
    - More Broker Fees
    - Cost of Capital
  - Highest Cost to Consumer since Generators Will Have to Recover Allowance Costs
    - Consumers Will Also See Upward Pressure on Uniform Clearing Price (Some Generators Benefit From Free Rider Effect)
  - Unproven Track Record in Emissions Cap and Trade

Gifting

- Pros
  - Provides Economic Certainty to Generators
  - Minimizes Transaction Expenses and Capital
  - Supported by Regulated Community in General
  - Allocation Method for Current Successful Cap and Trade Programs (Acid Rain, NOx SIP Call)
  - Fewer Allowances in Play Reduces Potential of Finance Companies Inflating the Market
  - Lowest Cost to Consumer:
    - Generators Not Forced to Recover Costs in Bid Price
    - No Upward Pressure on Market Clearing Price (no Free Rider Effect)
- Cons
  - Perception of Windfall to Generators Since Allowances Have Market Value
  - Allocation to Sources Tends to Favor Less Efficient Generation (e.g., Acid Rain, CAIR FIP, Some CAIR States)

Variants of Gift Allocation

- Grandfathering
  - Allowances Allocated to Sources Operating During Baseline Year(s)
  - Sources Receive Allowances in Perpetuity
  - New Units Would Need to Purchase Allowances from Grandfathered Units
- Updating
  - Allowances Allocated to Sources Based on Recent Activity (Sliding Baseline)
  - Ensures that Allocation Reflects Market Changes
  - Input Based (Allowances Allocated Based on Heat Input [MMBtu])
  - Output Based (Allowances Allocated Based on Electrical Output [MWh])

Comparison of Allocation Methods – Example Program

- 2012 CO2 Cap 10% Less than 2004 Emissions
- Allowances Cost $5/Ton
- Deregulated Market
- Auction Example Does Not Incorporate Transaction Cost or Lost Opportunity Cost Recovery
- Free Allocation Example Assumes no Lost Opportunity Cost Recovery

Impact on Typical Fossil Generators

Plant	A	B
Fuel	Gas	Coal
Heat Rate (Btu/kwh)	7,000	10,500
CO2 Emission Rate (lb/MWh)	1,000	2,000
Annual Generation (MWh)	3,000,000	1,500,000
Annual CO2 (tons)	1,500,000	1,500,000
Generation Cost ($/MWh)	$49	$32

Plant A is a 540 MW CCGT with 63% CF
Plant B is a 190 MW PC with 90% CF

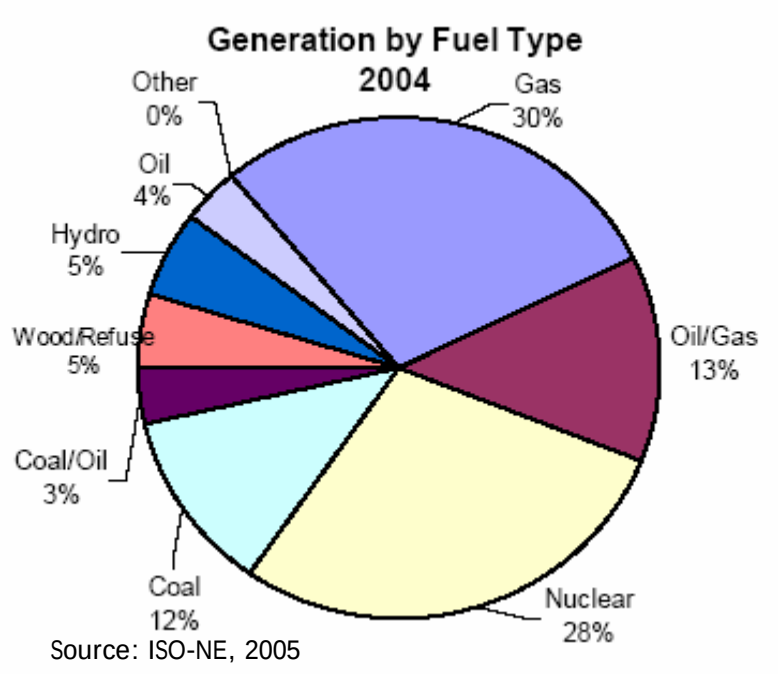
- Annual Compliance Costs for Each Plant would be $750,000 for Gift Versus $7,500,000 for Auction

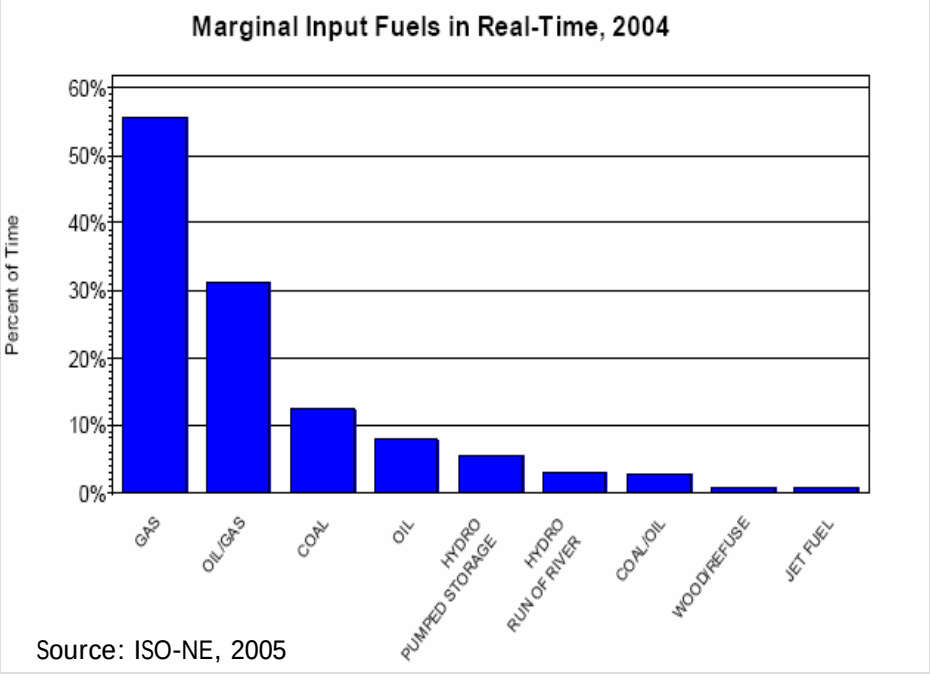
- Gift Increases Clearing Price by $0.25 if Gas on Margin and $0.50 if Coal on Margin - Auction Increases Clearing Price by $2.50 and $5.00
- Assumes Competitive Market (i.e. if Plant Attempts to Integrate Opportunity Cost then it may not Dispatch)

		Compliance Cost		Revised GenCost	
Plant	GenCost	Gift	Auction	Gift	Auction
A	$49	$0.25	$2.50	$49.25	$51.50
B	$32	$0.50	$5.00	$32.50	$37.00

All Units $/MWh

Impact on Market – ISO New England





- Deregulated Market
- 131,753,000 MWh Net Energy to Load in 2004 (50,066,000 MWh was Non-Fossil)
- When fossil is on Margin (>90%) Nuclear, Hydro and Wood/Refuse Get Clearing Price

Allocation	Auction Revenue	Allowance Cost	GenStack Revenue	Free Rider Impact
Gift	$0	$20,421,750	$32,938,250	$32,938,250
Auction	$408,435,000	$408,435,000	$658,765,000	$250,330,000

Conclusions

- Allocation (Gifting) is Least Cost Option for Generators and Consumers
- Auction Provides Revenue Benefits to State Agencies but Results in Highest Cost to Consumers
  - Overall Program Cost Increases Above Actual Allowance Cost Due to Impact to Market Clearing Price
- If RGGI States Choose an Allocation Methodology, it Should Incorporate an Updating Baseline to reflect More-Recent Market Conditions and Prevent Windfalls to Companies Owning Shut-Down Generating Units
  - Should be Fuel-Neutral and Output-Based to Encourage Efficient Generation
- Whichever Path is Chosen, it Should be Implemented Consistently Across the RGGI Region in Order to Avoid Competitive Distortions in the Market