Power Sector Carbon Reduction: Cap and Trade Options

Oregon Carbon Allocation Task Force

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Power sector carbon management- 5 basic options

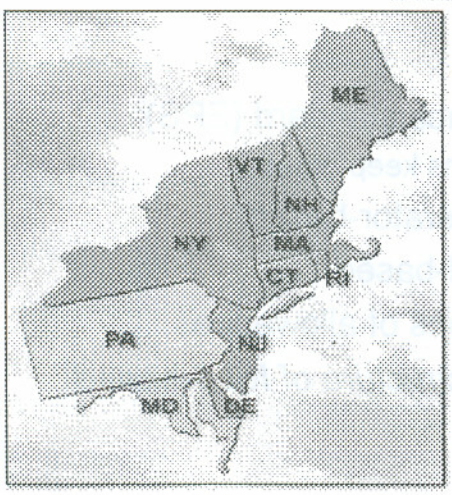
- Carbon tax
  - Politically unlikely
- Emissions performance standard (EPS)
  - With growth, emissions keep growing
- Cap and trade – generator-based
- Cap and trade – load-based
- Auctions vs. allocations of allowances

*Focus today is on the structure of **load-based cap and trade***

What is cap-and-trade?

- Set a fixed limit on OVERALL emissions, not each single source, declining over time.
- Create a new kind of currency (tradable allowances) for quantities of emissions.
  - "Carbon credits are just another form of money"
- Sell or give out allowances
- Require power marketers (or emitters) to retire allowances to match "their" emissions in each time period.
- Permit trades in an allowance market
- Examples: US acid rain and NOx programs

The Northeast Regional Greenhouse Gas Initiative (RGGI)



- 9 states engaged
- 2 states (PA, MD) are observing
- Begun 2003,
- MOU and Model Rule -- coming soon (fall 2005)
- State-by-state adoption 2006
- Launch 2009

What are we trying to achieve? key program goals

- Meaningful cap, lower emissions
- Minimize power system cost impacts
- Fairness for generators, LSEs, and customers
- A ***real*** cap: stop "leakage" due to uncapped coal-by-wire
- In-state economic development and no discrimination against in-state resources
- Fluid carbon market, low transaction costs
- Structure that supports expansion of the cap system

To achieve these goals, Oregon needs

- A "hard" cap, not an emissions rate
- Enhanced end-use efficiency to reduce power costs and minimize generator windfalls
- Support for renewables and voluntary green pricing
- Cap must cover imports
- Realistic number of regulated entities
- Tradable credits ("strong currency")
- No extra benefits to sources to stay outside the system

A cap-and-trade system focused on load-serving entities meets these needs.

Elements of a Load-Side System

Basic rule: LSEs must have credits to cover the emissions associated with their sales to retail customers? Steps:

- Measure historic emissions associated with electricity *serving the state* (or region) –
  - All sources, wherever located -- both in-state and imports
- Set "hard" emissions caps to lower impact in stages
- Distribute allowances ("carbon credits") to LSEs
- LSEs spend credits as needed to match their portfolio of sources
  - can sell excess credits from RE & EE choices
- Ongoing: tracking and enforcement systems

Rationale for a load-side cap and trade system

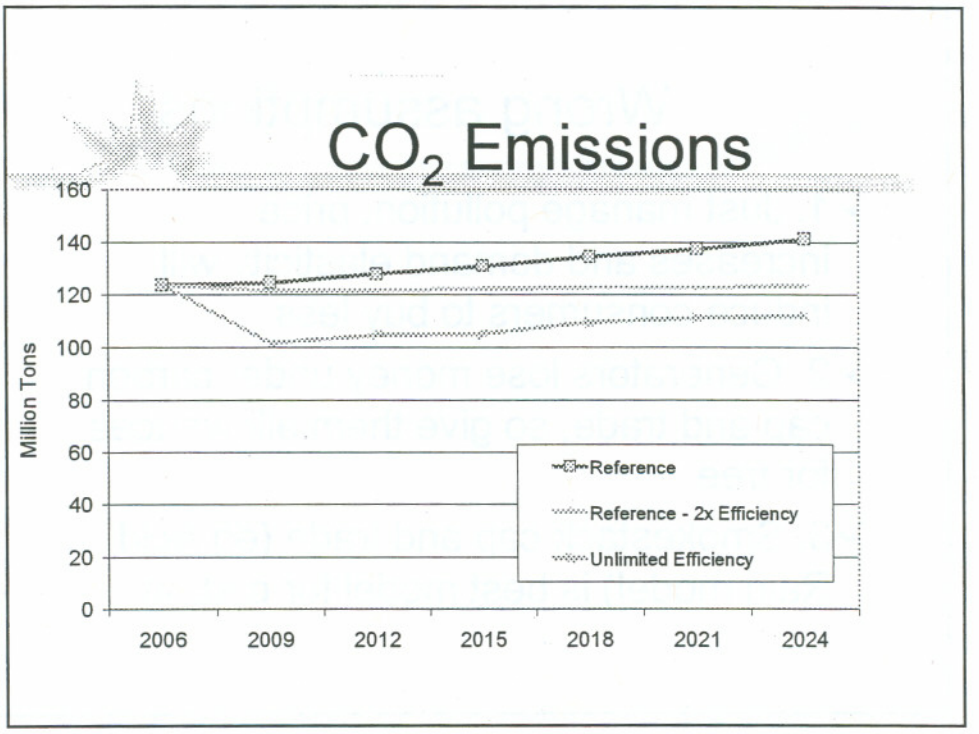
- Carbon is not like SOx and NOx
  - No "carbon scrubber"
  - The most effective solutions are efficiency and the portfolio decisions of power *buyers*
- Lower cost to consumers (no generator windfall from free allocation to emitters)
- LSEs – manageable number
- Avoids leakage projections, debates, fixes

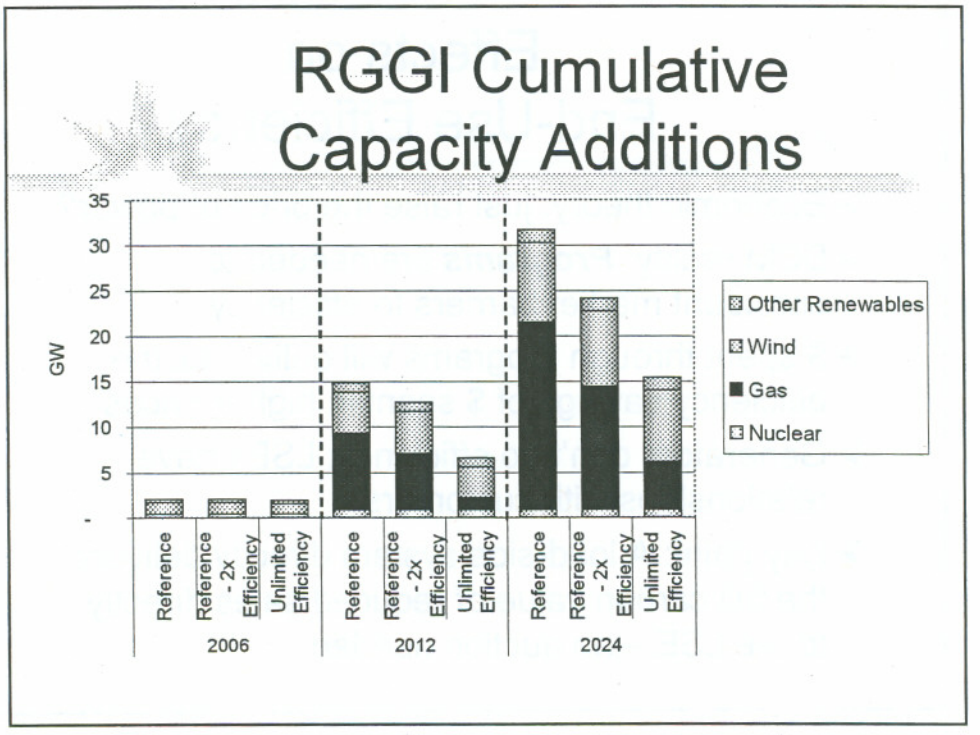
Wrong assumptions

- 1. Just manage pollution, price increases and demand elasticity will induce consumers to buy less
- 2. Generators lose money under carbon cap and trade, so give them allowances for free
- 3. Smokestack cap and trade (eg Acid Rain model) is best model for carbon

Effects on End-Use Efficiency

- Economic theory: just raise the price of power?
- DSM reality: ***Programs*** are needed to surmount market barriers to efficiency
- $ spent through programs will deliver 5x the efficiency savings of $ spent in higher prices
- Generators don't do efficiency; LSEs have relationships with customers
- Key point: A load-side system directly delivers the full carbon value of reduced sales directly to the LSE – no auction needed


CO_2 Emissions
Million Tons
160
140
120
100
80
60
40
20
0
2006
2009
2012
2015
2018
2021
2024
Reference
Reference - 2x Efficiency
Unlimited Efficiency


RGGI Cumulative Capacity Additions
GW
35
30
25
20
15
10
5
-
Reference
Reference - 2x Efficiency
Unlimited Efficiency
2006
2012
2024
Other Renewables
Wind
Gas
Nuclear

Wrong assumptions

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Avoiding the "Generator Windfall" Problem

Smokestack cap-and-trade raises a big debate:

- Generators argue that they should not have to pay for something they previously received for free.
- Consumer advocates see a big windfall to generators
  - Gen can charge consumers for using emission allowances, whether the allowances were received for free or at a cost.
  - Gen receives higher clearing prices
- *Load-side cap-and-trade resolves this debate by putting giving consumers the allowances*

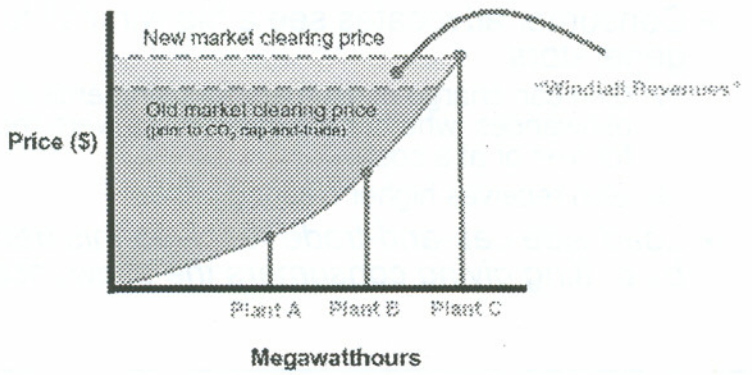
Generator windfall problem (1)

- Unless power output is rate regulated, generators will charge the market value of allowances used or sold, even if received for free
- This is the whole point of cap and trade economics !
- Generator economics (10% carbon reduction & all allowances are allocated for free):

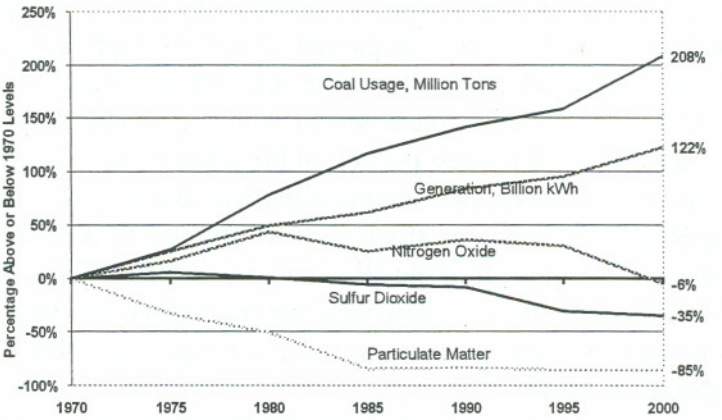
  (price boost x 100%MWH) – (cost of allowances for 10%MWH) = net new profit from carbon program.

The generator windfall problem (2)

Theoretical representation of "windfall revenues"
A fossil unit on the margin increases the market clearing price (i.e. the price paid to all generating units dispatched) to reflect the cost of CO_2 compliance



Emissions from Coal Generation Decreased by 1/3 While Coal Use Tripled



Source: U.S. EPA and Energy Information Administration.

RFF study on RGGI allocations

"Who wins and loses from the policy varies across the different approaches to allocation. Producers in the RGGI region gain substantially under a historic approach and in the aggregate
they are better off than in the absence of the program."

"Producers outside the region tend to benefit considerably due to the higher electricity price in the RGGI region..."

"Consumers both inside and outside the region are adversely affected under all approaches to allocation [but less under some approaches than under others.]"

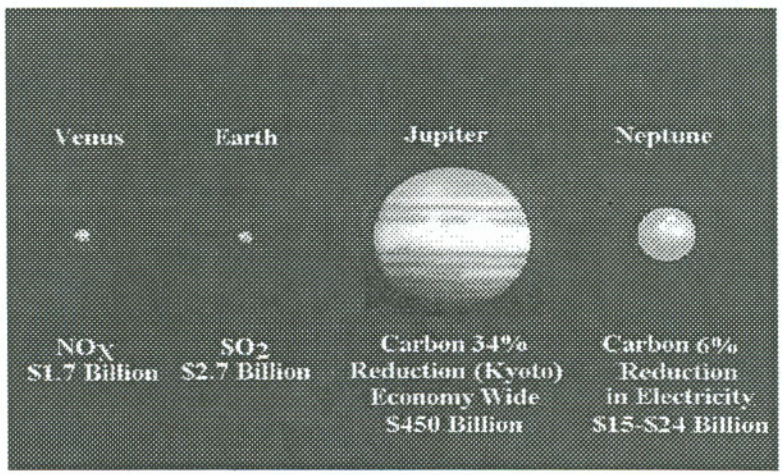
Source: *Allocation of CO2 Emission Allowances in the Regional Greenhouse Gas Cap-and-Trade Program*
Dallas Burtraw, Karen Palmer and Danny Kahn
Version: December 24, 2004 • DRAFT Report

How much do generators need?

"Most of the costs of a limit on carbon emissions – perhaps 80 percent or more – would be passed on to consumers through higher prices... Generally, free allocations are seen as a way to compensate producers rather than consumers or workers. Producers would have to receive only a modest portion of the allowances to offset their costs from a cap on carbon emissions, because they would be expected to pass a large share of those costs on to consumers. Thus, a decision to give all of the allowances to selected firms (such as fossil-fuel suppliers or electricity generators) would more than compensate them for their costs and could provide them with substantial profits."

Source: "Issues in the Design of a Cap-and-Trade Program for Carbon Emissions," Congressional Budget Office, Nov. 25, 2003

Carbon reduction is big business



If the Acid Rain model is not the answer, what do we do?

- Efficiency is *the* low-cost, low-carbon resource
  - SO: design to maximize efficiency
- Generator windfall is inequitable, weakens the cap
  - SO: design to minimize the windfall
- Imports can "bust" the cap
  - SO: count and capture imports

Benefits of a load-based system (con't)

- Combats leakage: states (and groups of states) can regulate all LSE *purchases*, but not out-of-region generation per se
- Aligns responsibility and opportunity –
  - Low-cost carbon management requires enhanced energy efficiency – LSEs can do this
  - Direct connection to LSE allows PUC to return savings to ratepayers
  - Load-side C &T avoids debate over generator windfalls
- Regardless of what the East does, the West needs a load-side system
- Why give ***added*** incentives to coal states to stay out of the system?

Part II

Load-side system architecture

Allocating credits to LSEs: On what basis?

- (A) Historic ***emissions*** from sources serving load for each LSE
  - PRO: no LSE badly hurt
  - CON: rewards past pollution; weaker incentives to improve
- (B) Historic ***power sales*** of each LSE (MWH x Oregon's average tons per MWH)
  - PRO: rewards LSEs that have cleaner profiles, gives them room for growth
  - CON: "winner" and "loser" LSEs at the beginning
- (C) Compromise formulas are also possible

Allocation Choices: RGGI example

State	Emissions	Generation MWH	Consumption
NJ	10%	18%	21%
MA	18%	12%	15%
VT	.4%	1.8%	1.6%
CT	10%	10%	9%

Potential Measures – Percent of Total RGGI Cap

State	Emissions RGGI Units 2000	Heat Input RGGI Units 2000	Fossil Generation RGGI Units 2000	All Generation 1999-2001 Avg.	Total Consumption 1999-2001 Avg.	Population 2000	Gross State Product 1999-2001 Avg.
Connecticut	9.6%	9.2%	8.3%	9.6%	8.9%	8.1%	9.1%
Delaware	5.8%	4.8%	3.1%	2.0%	3.2%	1.9%	2.1%
Massachusetts	17.6%	19.4%	18.1%	12.2%	15.1%	15.1%	15.8%
Maine	3.0%	3.2%	2.3%	4.8%	3.5%	3.0%	2.1%
New Hampshire	4.2%	3.3%	2.7%	4.8%	3.0%	2.9%	2.6%
New Jersey	10.3%	8.7%	15.7%	18.1%	20.9%	20.0%	20.1%
New York	46.7%	47.2%	46.1%	44.5%	41.5%	45.1%	45.1%
Rhode Island	2.4%	4.0%	3.6%	2.1%	2.2%	2.5%	2.0%
Vermont	0.4%	0.3%	0.2%	1.8%	1.6%	1.4%	1.0%

Source: Derek Murrow, Environment Northeast, "Apportioning the Regional Cap Among States: Allocation Options and Equitable Solutions" RGGI Allocation Workshop, Boston, October, 14, 2004

Load-side system includes power imports

- Coal imports must be covered
  - Western geography, grid structure
  - Could easily swamp in-state reductions
  - Level playing field for power suppliers
  - Tends to bring other states into the system
- Legal authority? Yes
  - Neutral application -no discrimination against out-of-state power
  - Resource procurement precedents

Dealing with imports (2)

- How to ***count*** imports? Choices:
  - (1) Assign plant-specific emissions to each purchase
  - (2) To avoid "greenwashing" -- assign the average system emissions rate of the exporting system
  - (3) Mixed: default to system average or worse, except for specific cases OR wants to encourage, eg:
    - New renewables selling into the capped region
    - Long-term bilateral contracts
    - Long-standing hydro imports
- Can we track and tag imports? Yes
  - National experience with RPS and disclosure rules
  - Follow the money
  - WREGIS – like GIS, GATS in the East

Renewables under load-side cap and trade

- (1) The carbon value of renewables is automatically flowed through to LSEs
  - Meaning: they can sell the released credits
- (2) Voluntary green markets:
  - Under a cap, reductions in emissions in one area are offset by increases elsewhere
  - Thus, NO CARBON CLAIM can be made
  - Solution:
    - Voluntary green sales have to lower the cap
    - Needed: "Take it off the top" or accelerate the cap decline
- Note: "leakage" undermines all carbon claims under generation cap and trade

Legal Issues

- Does OR have authority to regulate power imports? (yes)
  - Historic portfolio and preapproval precedents
  - No discrimination against out-of-state power
- Should "choice" customers be included?
  - Yes – In general, cap should apply to all power sales
  - Yes - Load of *migrating* customers should be covered
- Should public power be included? Issues:
  - Legal authority of state agencies
  - Should environmental standards apply to all power sales?
  - Allocation based on load (not historic emissions) can reward clean mix and cushion future changes

Cap architecture -- topics for another day

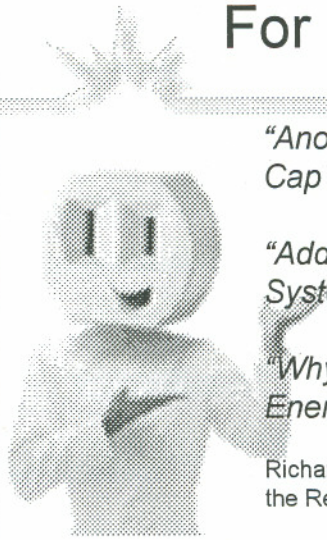
- Models and predictions
- Shape of the curve – how fast to decline?
- Circuit breakers and accelerators
- Should LSE allowances be updated?
- Measurement methods
- Possible flexibility devices
  - Multi-year compliance periods
  - Pros and cons of offsets
  - Banking and borrowing
  - Early reduction credits
- Non-compliance and alternate compliance options

RGGI Model Rule "Bricks"

The Model Rule
(w/Technical Support Document)

- Applicability: 25 MW+
- Regional Emissions Cap
- State Allowance Budgets
- New Source Allowance "Pool"
- Opt-In Provision
- Compliance Period
- Banking
- Early Action Credits
- Offset Provisions
- Penalties & Enforcement
- Monitoring & Reporting

For more information…



"Another Option for Power Sector Carbon Cap and Trade Systems – Allocating to Load"

"Addressing Leakage in a Cap-and-Trade System: Treating Imports as a Source"

"Why Carbon Allocation Matters – Issues for Energy Regulators"

Richard Cowart, Regulatory Assistance Project – Memos for the Regional Greenhouse Gas Initiative (RGGI)
--Posted at www.raponline.org

Email questions to *RAPCowart@aol.com*