

Comparative Cap and Trade Programs: U.S. SO₂ and NO_x, EU CO₂

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Resources for the Future

RGGI Stakeholder Meeting

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Overview of Presentation

- Introduction to Cap and Trade
- Overview of Programs
- How Programs Address Key Design Elements
- Conclusions and Lessons Learned

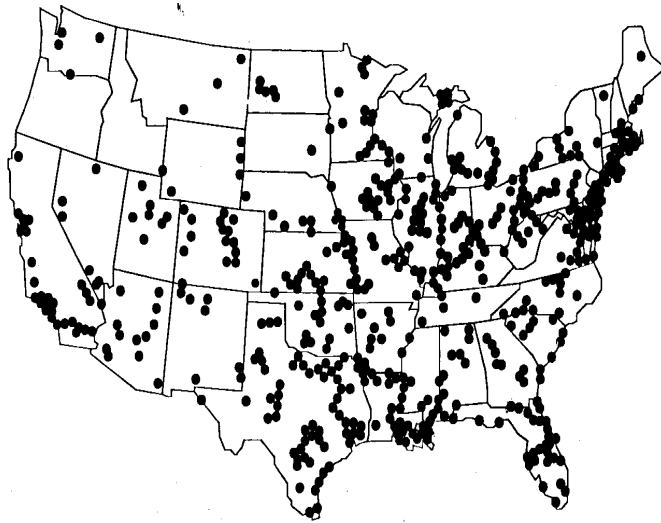
Cap & Trade

- Sets an environmental goal
- Provides incentives for innovation
- Refocuses government's role
 - Emphasizes emissions measurement
 - Enforces cap (holding sufficient allowances), avoids dictating *how* sources are to comply
 - Reduces administrative burden and cost while promoting greater environmental certainty

Guiding Principles

- Simplicity
- Accountability
- Transparency
- Predictability
- Consistency

SO₂ Trading Program

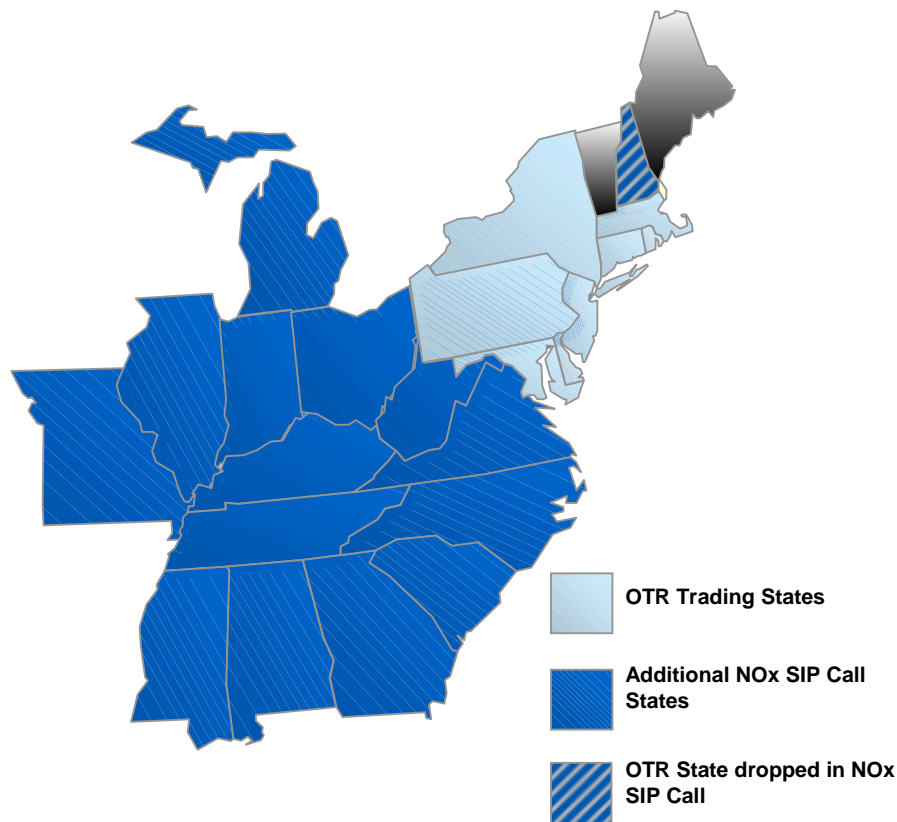


- **Problem:** Acid Rain
- **Scope:** National
- **Timing:** Two Phases: 1995 – 1999; 2000 -
- **Coverage:** 3,000 units
- **Sector:** Electric Power

Acid Rain Program Results

- Reductions began on time
- Reductions on target to meet goal
- Compliance is high (over 99%)
- No “hotspots” from trading
- Compliance costs are low (75% below estimate)
- Government role is focused
- Transaction costs are low
- Incentives for innovation are continuous

NO_x Trading Programs



Source: EPA

- **Problem:** Ozone
- **Scope:** Regional
 - OTC – 9 States
 - SIP-Call – 21 States
- **Timing:** 1999-2003 (OTC);
2004 - (SIP Call)
- **Coverage:** 1150 units (OTC); 2400 units (SIP-Call)
- **Sectors:** Electric power, industrial boilers

OTC Summary Results

- Substantial NO_x emissions reductions achieved
- High compliance among affected utility and industrial boilers
- Reductions distributed evenly throughout region
- Emissions reduced on peak days
- Industrial units successfully integrated
- Healthy allowance market created
- Costs lower than projected

EU Emissions Trading System



- **Problem:** Climate Change
- **Scope:** 25 Member States (MS)
- **Timing:** Periods are 2005-2007 and 2008-2012
- **Gases:** Direct CO₂ only in first period; others may be added in 2nd period
- **Coverage:** ~12,000 installations
- **Sectors:** Energy activities, iron & steel, minerals, pulp and paper

Key Design Elements

- Setting the cap
- Allowance distribution
- Compliance Period
- Banking
- Monitoring and reporting emissions
- Compliance and enforcement
- Additional flexibility
- Roles and responsibilities

Setting the Cap SO₂

- In theory, set where marginal abatement costs equal marginal benefits
- In practice, often based on:
 - Science
 - Economics
 - Politics
- For SO₂ Program:
 - Congress set national cap: 50% reduction from 1980 levels
 - Cap is around 9 million tons by 2010

Setting the Cap (cont.)

NO_x Programs

- U.S. NO_x Programs
 - State caps set on uniform benchmarks
 - OTC: % reduction from historic baseline
 - SIP Call: Based on unit specific data and performance standard
- States could choose how to meet the state-wide NO_x emissions budget
 - EPA encouraged a cap and trade program for large electric generating units and industrial boilers
 - Model rule encouraged consistency

Setting the Cap (cont.)

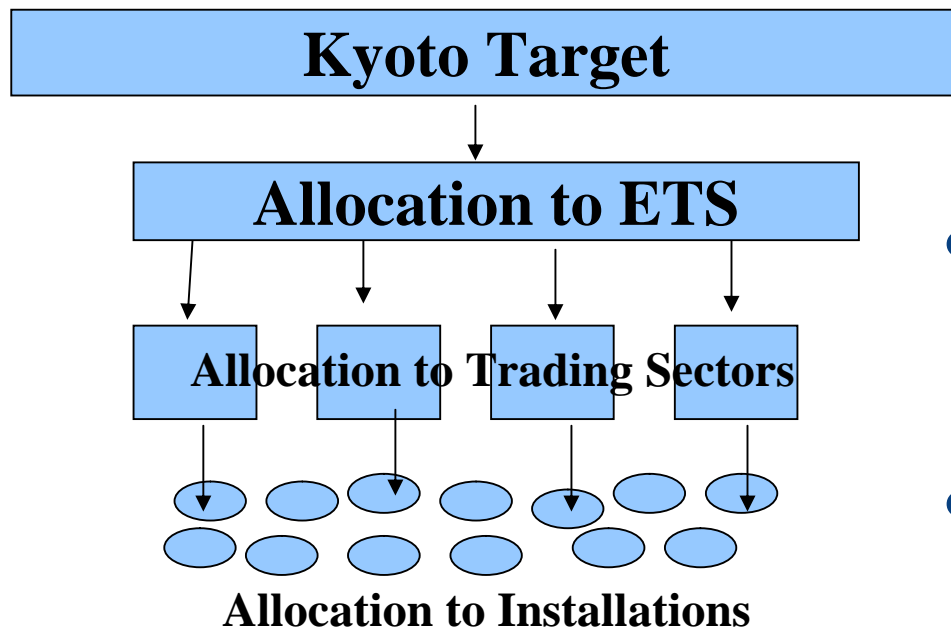
EU ETS

- EU ETS
 - EU Member States have national Kyoto “burden sharing” targets
 - ETS is a “cap within a cap”
 - Each Member State proposes sectoral caps as part of its National Allocation Plan
 - European Commission provides general criteria and will review draft allocation plans

Setting the Cap (cont.)

EU ETS

Multiple Decisions for Member States



- Decision #1: How much of Kyoto target will be in trading program?
- Decision #2: What will be the target for each sector?
- Decision #3: How will allowances be allocated to each installation?

Allowance Distribution

General

- Allowances can be auctioned or distributed at no cost
 - Auctions have advantages but have been politically difficult to do on a wide scale
- Many methods for no cost allocations
 - Permanent (grandfathering) vs. updating
 - Based on mass emissions, fuel input, or production output
- Set-asides have been used for a variety of purposes (e.g., new sources)
- Bottom-line: Allowance distribution is not an environmental issue

Allowance Distribution

SO₂

- Phase II standard allocation based on product of:
 - Performance standard, e.g. 1.2 lb/mmBtu
 - Average fuel use (1985-1987)
- Special provisions
 - Clean plants: 120% of actual use
 - High growth states: additional allowances
- New sources receive no allocation
- Annual auction of 2.8 percent of allowances
- A variety of set asides (e.g., renewables, efficiency)

Allowance Distribution

NO_x

- Sources receive allowances through allocations from state
- States have discretion to determine allocation methodology (method and length of period)
- States may also set aside a portion of the budget
 - Renewables and energy efficiency
 - New sources

Allowance Distribution

EU ETS

Compliance Period	Mandatory Free Allocation	Optional Auction
2005-2007	Minimum 95%	Max 5%
2008-2012	Minimum 90%	Max 10%

- Most MS have not yet submitted allocation plans
- Unclear how many MS will use auction provision

Allowance Distribution EU ETS

- National Allocation Plans Criteria
 - Consistent with achieving overall Kyoto target
 - Take into account
 - Proportion of emissions in capped sector
 - Other policies
 - Technical potential of activities within sector
 - Early action
 - Competition from non-EU countries
 - Address new entrants

Banking and Borrowing

SO₂ and NO_x

- Key considerations for banking
 - Is it consistent with environmental goals?
 - Will it create early reductions?
 - Is there potential for cost savings, increased liquidity?
- U.S. SO₂ Program allows banking (no borrowing)
 - Emission reductions ahead of schedule
 - Cost savings from banking = \$250 million/year
- U.S. NO_x Programs have banking restrictions
 - “Progressive flow control” triggered when total bank 10% of budget
 - Requires portion of banked allowances to be surrendered 2:1 if needed to cover emissions

Banking and Borrowing

EU ETS

- Banking is allowed in principle
 - Left to each Member State during first phase; mandatory for subsequent phases
 - Some MS's concerned about meeting Kyoto target if bank is too large
 - Most MS's will not allow banking in first period
- Borrowing allowed within each compliance period

Compliance Period

SO₂, NO_x, EU ETS

- Length of compliance period
 - Based on the environmental problem, what makes sense?
 - What is administratively feasible?
- NO_x Programs: Seasonal compliance
- SO₂ Program: Annual compliance
- EU ETS: Annual compliance
- Kyoto: Five year compliance period

Monitoring and Reporting Emissions SO₂ and NO_x

- Complete and consistent accounting of total mass emissions with continuous emissions monitors (CEMs) and alternate methods
- Accurate and consistent measurement among sources
 - Conservative emission estimates where necessary
- Reporting on sufficiently frequent basis for adequate feedback and data availability to public

Quality Assurance and Verification

SO₂ and NO_x

- Certification of emissions monitoring systems
- Stringent daily, quarterly and annual QA checks and tests
- Conservative data substitution for missing data
 - Provides incentive for monitoring
 - Monitors running over 99% of the time
- Near 100% electronic auditing of emissions data
- Random on-site field audits and witnessing of QA tests

Monitoring & Reporting EU ETS

- Monitoring principles set out in Annex
 - CEMs are optional; most sources will use emission factors and activity data (e.g., fuel use)
 - Emission reports must be independently verified
 - MS set up process to certify 3rd party verifiers
 - MS receive reports and may give variances from “top tier” methods
- No standardized electronic reporting

Tracking Systems

SO₂ and NO_x

- Construct national registry for recording allowance transfers:

Allowance Tracking System (ATS)

- Issuance, holdings, transfers, retirement

- Construct national system for collecting and verifying emissions data:

Emissions Tracking System (ETS)

- emissions measurements, QA/QC results, missing data

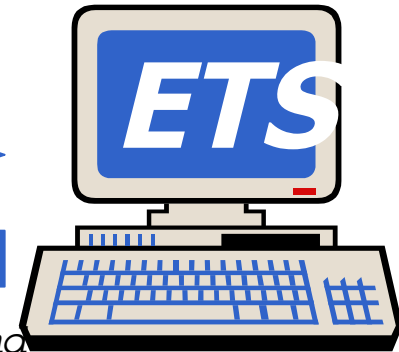
Tracking Systems

SO₂ and NO_x (cont.)

Emissions Tracking System



Source electronically submits emissions data every quarter



EPA checks data quality and provides automated feedback to source

	Reporting Period or Quarterly	Cumulative or Cumulative Ozone Season	Annual	EPA Accepted
SO ₂	2633.4	5629.1	2633.4	
CO ₂	230774.0	601228.0	230774.0	
Heat Input	2249279.0	5013635.0	2249279.0	
NO _x Rate	0.3	0.3	0.3	

Source: EPA

Tracking Systems

SO₂ and NO_x (cont.)

Allowance Tracking System

- Allowance Tracking System is official record of allowance transfers
- Each allowance has a serial number
- Parties reach agreement, then authorise EPA to transfer allowances or transfer online
- ATS is not a trading platform

On-line Allowance Tracking System (OATS)

On-line Trading

Step 1 Please select the Account you want to transfer from; the Account you want to transfer to, and the Representative ID for that account; and for trades 'in perpetuity' check off the PERPETUITY FLAG

Transfer From

Account Number: 99990000482

Account Name: Allegheny Energy Supply Co. LLC

Representative ID: 17

Representative Name: David Benson

E-mail Address: dbenson@alleghenyenergy.com

Transfer To

00615000DG1A

Bellefonte

1110

Joseph Bynum

jrbynum@tva.gov

Perpetuity Flag

Step 2 Please select the Allowance blocks you want to transfer by checking them off.

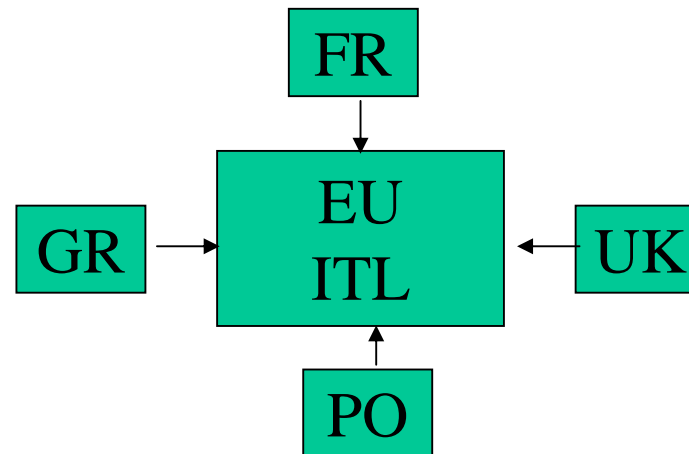
Select	Year	Serial Start	Serial End	Amount
<input type="checkbox"/>	1998	5123472	5128620	5149
<input type="checkbox"/>	1999	5108373	5128620	20248
<input checked="" type="checkbox"/>	2000	8675672	8684565	8894
<input checked="" type="checkbox"/>	2001	8675673	8684565	8893
<input checked="" type="checkbox"/>	2002	8675672	8684565	8894
<input type="checkbox"/>	2003	8675673	8684565	8893

Source: EPA

Tracking Systems

EU ETS

- Each member state may have a national registry for its allowances (“registry” = allowance tracking system)
- Registries will communicate with each other
- EU will develop an independent transaction log (ITL) to verify transactions between MS
- No requirement for emissions tracking system



Compliance & Enforcement

SO₂ and NO_x

- Annual reconciliation: Compare emissions with allowances and deducts one allowance for each ton of emissions
- Penalties for non-compliance
 - SO₂ Program:
 - Automatic offset (deduct allowance from next year's allocation)
 - Automatic financial penalty (\$2,900/ton of SO₂)
 - Possible civil and criminal penalties
 - NO_x Program
 - 3 allowances surrendered for each ton from next year's account (no automatic monetary penalty)
 - Possible civil and criminal penalties

Compliance and Enforcement

EU ETS

- Uniform excess emissions penalties
 - € 40 (\$50)/ton CO₂e in 1st Phase (2005-2007)
 - €100 (\$125)/ton CO₂e in 2nd Phase (2008-2012)
 - Excess emissions must be offset in following year
- MS must set additional penalties (e.g., for fraudulent reporting) but have broad discretion
- “Naming and Shaming” provision for violators

Additional Flexibility

EU ETS

- EU Linking Directive
 - Proposed that JI/CDM credits can be used
 - If offsets reach 6% of the total cap, there will be an automatic review of the role of offsets
 - Limit may be raised to 8%
- Directive allows EU to link to other systems
 - Other countries must have ratified Kyoto
 - Mutual recognition of allowances
 - European Parliament has suggested linking to U.S. and Australian States

Comparison of Responsibilities

D=Decentralized

C=Centralized

	Target Setting	Allocation	Registries	Emissions Measurement Standards	Emissions Verification	Penalties	Sectors Covered/ Threshold
U.S. SO ₂	C	C	C	C	C	C	C
U.S. NO _x	C	D	C	C	C	C	C
EU ETS	D (EU Rev.)	D (EU Rev.)	D	C	D w/3 rd party verif.	C	C

Keys to Successful Cap & Trade

- Cap
 - Protects the environment
 - Provides predictability to market participants
- Accountability
 - Accurate, complete emissions measurement
 - Transparent emissions and allowance data
 - Predictable consequences for noncompliance
- Simplicity of design and operation
 - Minimal, but effective government role
 - Facilitates market and maximizes cost savings