

Key Economic Ideas for Water Quality Trading Programs

**Mid-Atlantic Regional Water Program
March 22, 2007**

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Overview

- Basic economic principles of water quality trading
- Why market-based policy instruments are (theoretically) desirable
- The realities of developing working point-nonpoint trading programs



Economics of pollution control

- An efficient policy achieves discharge reduction control goals at least cost
- When costs of controlling a unit of discharge varies across firms, reallocation of pollution control among firms will reduce overall pollution control costs



Command and control policy

- Sets standards for pollution control technology
- Can achieve efficient solution IF regulatory agency knows cost functions of each firm
- Unit costs of control likely to differ across firms
- Limits flexibility and innovation
- Does not account for economic growth



Market mechanisms

- Markets are institutions through which potential buyers and sellers deal with each other in the process of exchange
- Decisions (how much at what price) based on personal benefits and costs
- If a market can be established for pollution control, a regulator does not have to know firms' costs to achieve a least-cost solution



What is the “good” in a water quality trading market?

- The commodity in a water quality trading market is a pollution allowance or “credit”
 - Right to discharge a given amount over the course of a year
 - Defined by regulatory agency
 - Identical for all market participants
- Contingent on being able to measure and enforce pollution discharge requirements



Creating demand for the good

- Regulatory agency limits the number of credits by setting a “cap” equal to the maximum discharge required to meet water quality goals (less than current discharges)
- Credits allocated to existing firms
- At the end of the year, if the firm does not have enough credits to cover its discharges, it would be subject to penalties
- Rules allow firms to meet discharge requirements by controlling discharges, purchasing credits, or both. Firms with excess credits can sell them



~~Voluntary Trading Program~~



Firm's decision-making

- If a firm can purchase credits at a lower price than the cost of reducing discharges itself, it will purchase credits.
- If a firm can reduce discharges at a cost lower than the price of a credit, it will reduce emissions and sell excess credits.



Example: Regional emissions cap of 150 lbs, no trading

Factory A
Discharge: 100 lbs



Cost/lb \$50

Permit for 50 lbs

Cost: \$2,500

Factory B
Discharge: 200 lbs



Cost/lb \$100

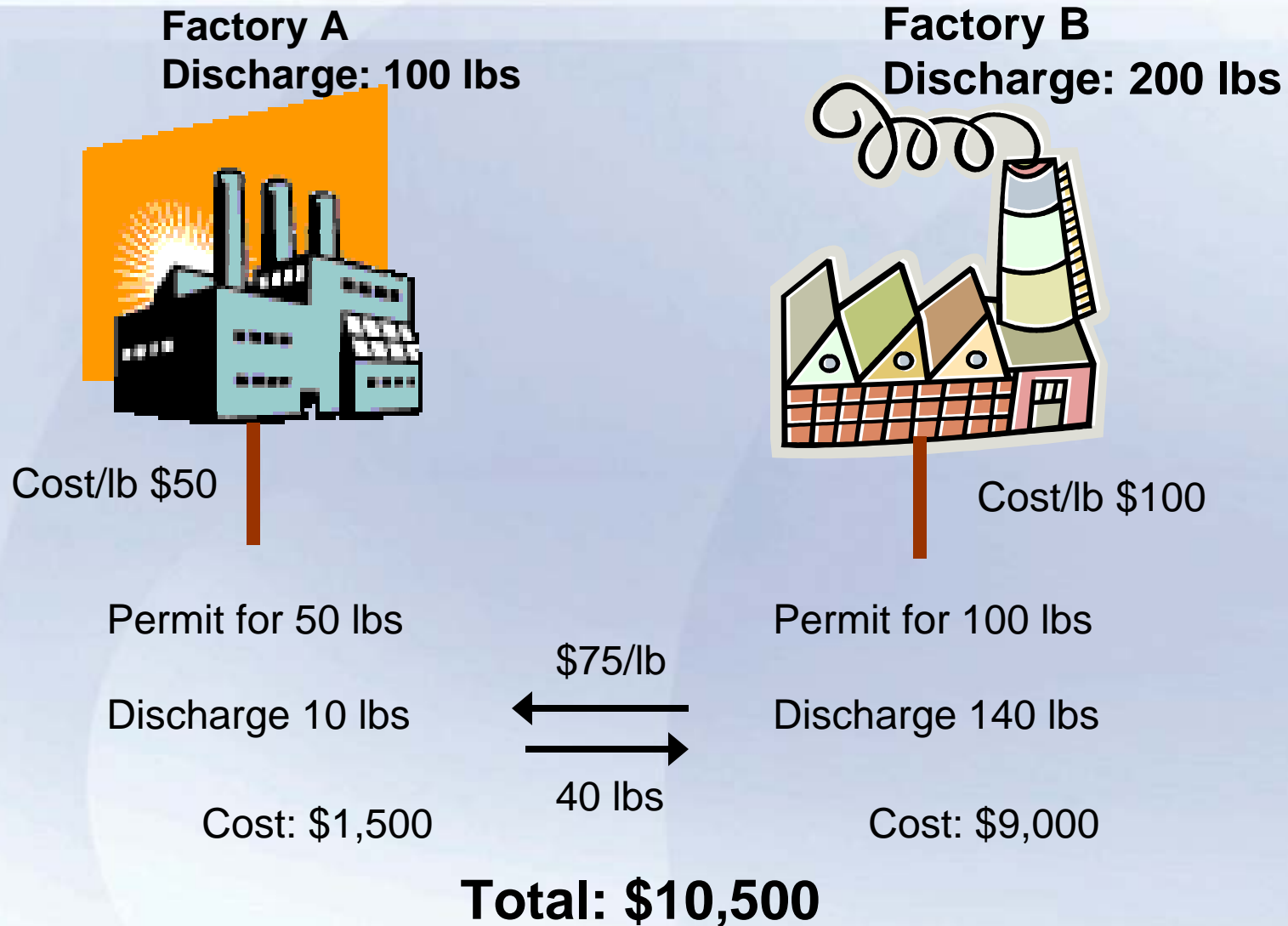
Permit for 100 lbs

Cost: \$10,000

Total: \$12,500



Example: Regional emissions cap of 150 lbs, trading



Benefits of trading

- Firms with low emission control costs will provide more pollution control
- Regulatory agency does not need to know anything about costs for firms, only the appropriate number of credits to achieve water quality goals
- Lower aggregate cost for same level of control as command and control



Benefits of trading

- Allows maximum flexibility. Firms can meet cap by:
 - Installing pollution control technology
 - Adopting more efficient production technology
 - Rearranging production processes
 - Purchasing allowances
- Creates incentive for innovation and new technologies without penalty
- Protects water quality in face of economic growth



Additional requirements

- Many buyers and sellers?
 - “fluid” market vs. offsets
 - Market power reduces efficiency
 - Offsets can still reduce costs
- Market participants in same watershed
- Certainty in control
 - Uncertainty raises costs
- Hotspots not an issue
 - Incentive structure allows increased emissions for some firms



Transaction costs

- Transactions costs reduce overall benefits from trading
 - monitoring of water quality
 - validation of credits
 - finding trading partners
 - monitoring of trades
- Market design can lower transaction costs



What about agriculture?

- Generally not regulated under Clean Water Act (exception confined animal operations)
- Can be source of “cheap” credits if allowed to trade with regulated point sources
- Of 39 working water quality trading programs, 22 allow trades with agricultural sources, mostly involving nutrients
- However, almost no trades have taken place



Issues with demand

- Uncertain ability of nonpoint sources to deliver credits (practice effectiveness and weather)
- Liability for failure of agriculture to deliver expected credits
- Trading ratios (drive up price)
- Locating potential suppliers
- Weak enforcement of laws



Issues with supply

- Agriculture not regulated, so little incentive to seek trades that allow increased scrutiny
- Perceived risk by farmers of future regulations by entering trades (and admitting they are polluting)
- Baseline conditions and conservation programs (double dipping)



Tar-Pamlico example

- Addresses nutrient enrichment
- Water quality trading program establishes responsibility at the group level
 - Discharger association for point sources
 - Agricultural Cost Share Program for nonpoint sources
- Discharge cap set for association
- If group exceeds cap, pay offset fee to cost share fund
- State offers cost share to willing farmers
- Trading ratios established



In summary

- Establishing markets for pollution control can decrease overall pollution control costs (SO₂ for air quality)
- There must be a regulation that caps or limits discharges
- Market-based approaches still need strong government involvement and oversight
- Point-nonpoint trading has substantial transactions costs

