

Key Economic Ideas for Water Quality Trading Programs

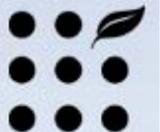
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**Dr. Marc O. Ribaud
Economic Research Service**



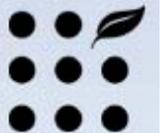
What I will cover

- Basic economic principles of water quality trading
- Why market-based policy instruments are (theoretically) desirable



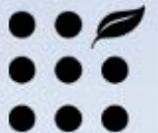
Economics of Pollution Control

- An efficient policy achieves pollution control goals at least cost
- Economic theory tells us that least cost is achieved when marginal costs of control are the same for all firms
- When marginal control costs differ, reallocation of pollution control among firms will reduce overall pollution control costs



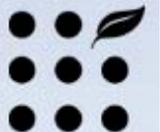
Command and control policy

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



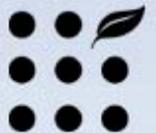
Market mechanisms

- 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



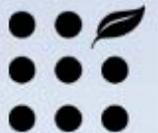
What is the “good” in a water quality trading market?

- 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 that meets water quality goals (less than current discharges)
- 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

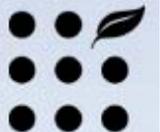


~~Voluntary Trading Program~~



Firm's decision-making

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



Example

100 lbs



Cost \$50/lb

Permit for 50 lbs

\$2,500

200 lbs

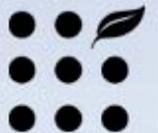


Cost \$100/lb

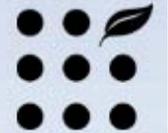
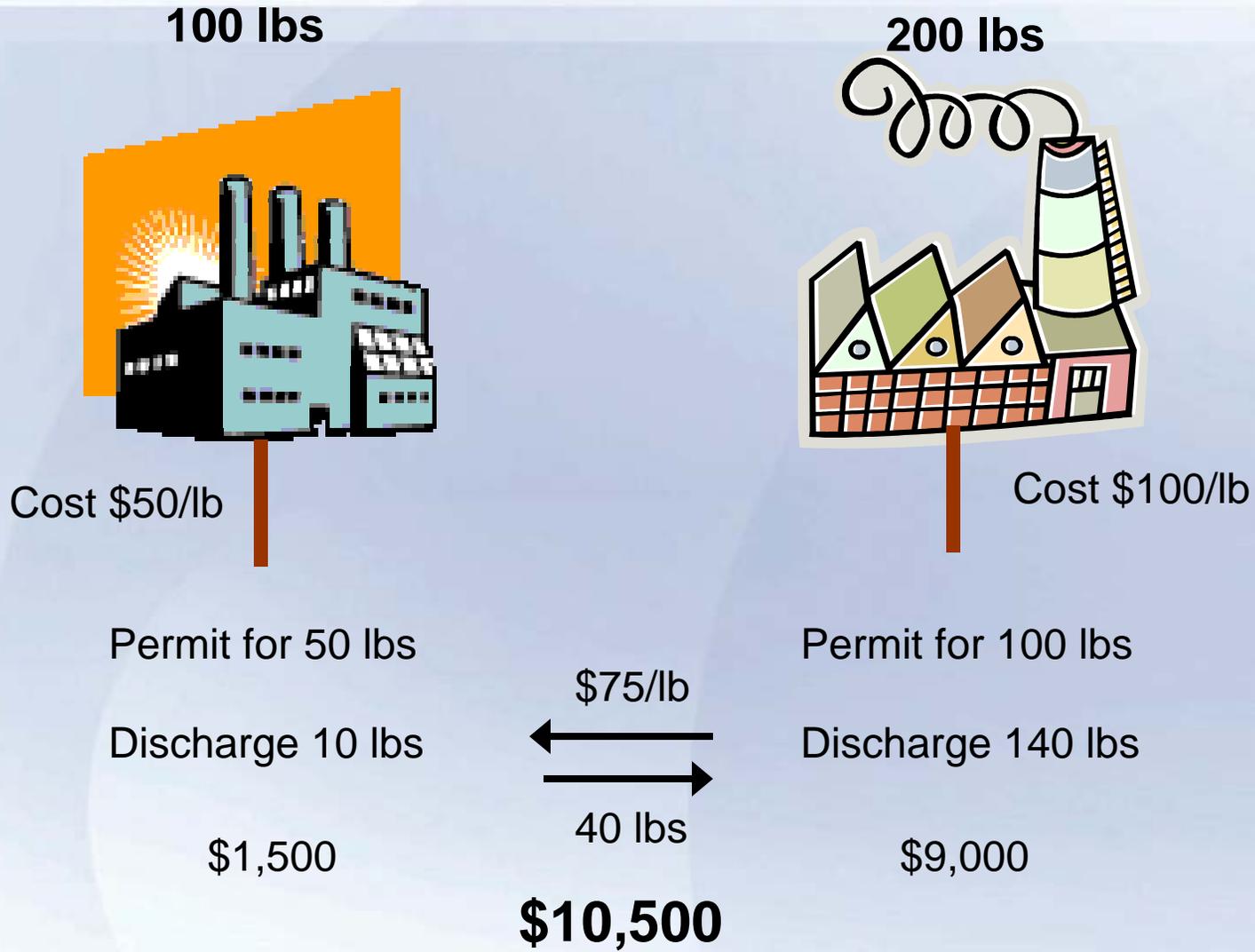
Permit for 100 lbs

\$10,000

\$12,500

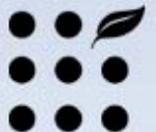


Example



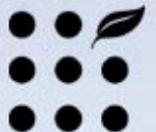
Benefits of trading

- Firms with low emission control costs will provide more pollution control
- With “perfect” market, the marginal cost of control (purchased credits and/or reduced emissions) will be the same for all firms
- Regulatory agency does not need to know anything about costs for firms, only the appropriate number of credits to achieve water quality goals



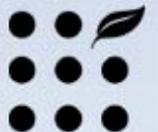
Benefits of trading

- 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



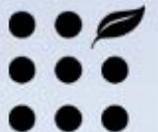
Additional Requirements

- 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
 - Issue for nonpoint sources
- 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
- Including nonpoint sources generally raises transactions costs
- Market design can lower transaction costs



Final words

- Establishing markets for pollution control can decrease overall pollution control costs (SO₂ for air quality)
- Key point is that there must be a regulation that caps or limits discharges
- Market-based approaches still need strong government involvement and oversight

