

Environmental Economics

Fourth Canadian Edition

Field • Olewiler

Chapter 13 Transferable Emission Permits (TEP)

For ECON 260 SFU only

Learning Objectives

- LO1 Describe the general principles of a transferable emission permit (TEP) and show graphically how it can achieve a cost efficient equilibrium.
- LO2 Explain the pragmatic issues in setting up a TEP system covering: initial rights allocation, trading rules, non-uniformly mixed pollutants, non-competitive markets, enforcement, and incentives for innovation.
- LO3 Describe the key features of the U.S. sulphur dioxide TEP system and how it achieved target levels of emissions cost effectively.

Transferrable Emission Permits (TEP)

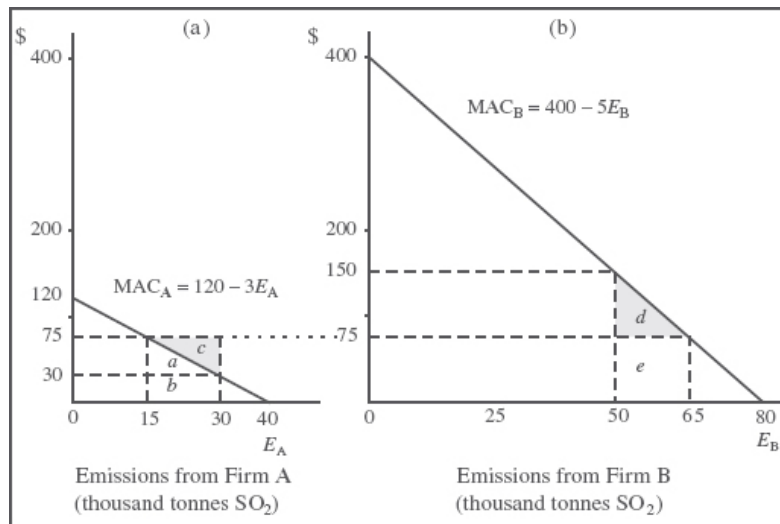
- TEP create a form of property right (a product)
 - The “right” to emit a certain amount of pollution
- Discharge permits are transferable
 - Can be bought and sold
 - Price agreed upon by the participants themselves
- Similar to a standard in that it caps the allowable amount of pollution
 - TEP begins with a centralized decision on total number of discharge permits to be put into circulation
 - But it places no set standard on any one firm

Transferrable Emission Permits

- Like a tax, transferable permits that are traded in a competitive market are a cost-effective policy
- Regulators do not have to know each polluter's MAC curve to achieve cost-effectiveness
- Once the target level of pollution is set, the market will reveal a polluter's MAC curve
- Trading occurs if the MACs of polluters are sufficiently different
 - Some will become sellers of permits and the others, buyers
- The exchange of permits provides each trader with cost savings

Transferrable Emission Permits

Figure 13-1 How Transferrable Emissions Permits Work



- A TEP system is introduced to lower sulphur pollution from an initial level of 120,000 to 80,000 tonnes per year. Polluters are given emission permits in proportion to their initial level of emissions (30 to firm A and 50 to firm B). Polluters will have an incentive to trade permits as long as their MACs differ at each one's emission levels. Polluter A will have an incentive to sell permits to B because it can reduce its emissions at lower marginal cost than can B. The cost-effective equilibrium is reached where the MACs of the two polluters are equal and their total emissions equal the target level. A total of 15 permits are traded. Firm A's net gain is area *c*; firm B's is area *d*.

How TEP permits are allocated

- A central authority sets the total number of permits (maximum level of emissions)
- The authority allocates the permits
 - Methods of allocation include:
 - Based on past pollution
 - Based on past production
 - Based on past efforts to reduce pollution
 - Equal amount to everyone
 - Auction (Tax revenue to government – same as with an emissions tax)

Establish Trading Rules

- Intervention by supervising parties can be counterproductive
 - Likely to increase the uncertainty among potential traders, increase the general level of transactions costs in the market, and interfere with the efficient flow of permits
 - General rule for public agency: set simple and clear rules and then allow trading to proceed
- Can everyone participate, or only firms in the business? (Can environmental groups buy permits and “retire” them?)
- How long are permits valid for? Is permit “banking” allowed? What level of emissions will be allowed in the future?

TEP Market Opens...

- Firms can buy or sell based on the price in the market and MAC
- If firms reduce emissions, they are rewarded by getting the chance to sell permits
- If firms have very high costs of emission reductions – they are better off than under a standard because the permits cost less than the MAC
- The market price will be just above the value of the MAC of the last unit reduced (same as the efficient emissions tax level)

Non-uniformly Mixed Pollutants

- Non-uniform emissions – the “Hot Spot” problem
 - E.g., TEP program to control total airborne SO₂ emissions in a region with numerous sources
 - Emission points not equal in terms of:
 - Location relative to the prevailing wind or to the area of highest population density,
 - MAC, nor
 - Impact of their emissions on ambient SO₂ levels over the populated area
 - If straight trading of permits among all sources, the damage caused by total SO₂ could change
 - If a downwind firm sold permits to an upwind firm, there would now be more emissions upwind of the population and, therefore, more damage

Non-uniformly Mixed Pollutants

- Ambient-based TEP system overcomes “Hot Spot” issue
 - E.g., emissions from Source B are twice as damaging as emissions from Source A
 - May set a rule that if Source B buys permits from Source A, it must buy two permits to get 1
- When pollutants are non-uniformly mixed, the ambient system is necessary to achieve a cost-efficient equilibrium
- However, very complex market system to operate
 - Many sources of different MDs to determine
 - Have to determine for each source how many permits should be purchased in order to be credited with one new permit

Non-uniformly Mixed Pollutants

- Simpler method: a zoned system
 - Each zone designated based on sources that were relatively similar in terms of location and impact of their emissions on ambient quality
 - Regulators could do one of two things:
 - Allow trading by firms only with other firms in the same zone, or
 - Make adjustments for all trades across zone boundaries using an ambient-based system

Non-Competitive Markets

- TEP programs work through a trading process, where buyers and sellers interact to transfer title to valuable property rights
- Problem with restricting trade across zone borders:
 - Markets work best when there is substantial competition
 - They work much less well if there are so few buyers or sellers that competitive pressures are weak or absent

Non-Competitive Markets

- To foster competition, regulators would like to set trading zones as widely as possible, to include large numbers of potential buyers and sellers
 - This may work against the ecological facts
 - May be meteorological or hydrological reasons for limiting the trading area
- For environmental reasons regulators may want to have trading areas restricted
 - However, for economic reasons they would want to have trading areas defined broadly

Enforcement

- Administering agency would essentially have to keep track of two things:
 - The number of permits in the possession of each source and
 - The quantity of emissions from each source
- Trades could, in fact, become complicated with multiple buyers and sellers, and with different types of transactions
- Some encouragement of inter-firm monitoring
 - If another firm cheats, that means they are not buying a permit from you

Incentives to Improve Abatement Technology

- Incentive to find a less costly way of controlling emissions
 - Very strong because you can either sell additional permits or buy fewer
- Over time, as technology improves, the price of permits in the market should drop

U.S. *1990 Clean Air Act Amendments*

- U.S. EPA created an innovative permit-trading scheme for the control of airborne SO₂ emissions in the *1990 Clean Air Act Amendments*
- The EPA issues a quantity of emission permits to designated power plants
 - Each permit will allow the release of 1 ton of sulphur dioxide from that plant

U.S. *1990 Clean Air Act Amendments*

- The permits may be traded at prices agreed upon between buyer and seller.
- The purpose of a TEP program like this is to achieve a reduction in total SO₂ emissions in a cost-effective way
 - More so than if all plants were required to meet the same proportionate reductions or if all firms were held to the same TBSs

Initial Allocation of Permits

- Phase I limited to 110 plants in 21 Eastern and Midwestern states
 - Each plant was allocated a prescribed number of permits
 - More permits given to larger plants, as measured by the average quantity of fuel used during the base period 1985–1987
- Phase II extended to cover an additional 1000 plants burning oil, natural gas, or coal
- The program has been a success in terms of reductions in emissions
 - Total U.S. emissions fell by more than 50% from 1995-2010

Was the SO₂ TEP System Cost Effective?

- The program was cost-effective for the following reasons:
 1. TEP markets work best if utilities are allowed to use whatever means they find the cheapest way to reduce emissions
 2. Prior to 2010, the EPA did not dictate technology choices made by utilities to reduce their SO₂ emissions
 3. The move to greater competition in supplying electricity to consumers probably aided the efficiency of the market by increasing the number of buyers and sellers

Was the SO₂ TEP System Cost Effective?

- The program was cost-effective for the following reasons:
- Provisions for banking permits for future use allow utilities to hedge against future changes in their emissions
- The increasing stringency of the regulations signaled increasing permit scarcity
 - As prices increase, producers have an R&D incentive
 - No longer constrained to use a prescribed TBS.

Chapter Overview

- Transferable discharge permits are being used more frequently
- TEP programs come with their own set of problems
 - How the TEP market operates is critical to whether this type of policy will work
- We examined the U.S. TEP program for SO₂ reduction among electric power producers
- Both TEPs and emission tax systems give the responsibility of making technical pollution-control decisions into the hands of polluters themselves rather than administrators

Chapter 14 will explain compliance costs, uncertainty, and information associated with policy.