**Sulfur Dioxide and Acid Rain**

1. What two criteria pollutants form the acidic material that is deposited to the earth in the form of Acid Rain?
2. Where does the interaction take place producing the acidic material?
3. What is the source in the US of much of the sulfur dioxide pollutant?
4. Why do coal power plants in the Midwest and Northeast emit more Sulfur Dioxide than plants elsewhere in the US?
5. What are some of the effects of Acid Rain? What is meant by second order effects?
6. Why is Acid Rain more of a regional problem while, for example ground level ozone is a more local problem?
7. Where was the source of the SO2 emissions causing the Acid Rain problem in the Adirondacks in NY state?
8. Why couldn’t the original county-based approach of the Clean Air Act deal with the problem of Acid Rain?

The 1990 Amendment to the clean air act set up a regional trading program for SO2

Suppose firm given 100 yearly permits each worth 1 ton.

1. Under an emissions trading program, what are the three choices open to the firm?

Firm B

Firm A

$ $

MAC

MAC

25

8

Emissions/week

Emissions/week

5

5

12

12

If firms could ignore pollution costs, each emit 12 tons SO2/ week

1. How much does it cost Firm A to eliminate the 7th ton (go from 6 to 5 tons)?
2. How much does it cost Firm B to eliminate the 7th ton?

Suppose each firm given tradable permits to five tons per week

1. If the firms transacted which firm would be the buyer? Seller?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | **Marginal Abatement** | | |
|  |  |  | **Costs ($1,000/week)** | | |
| **Emissions (tons/week)** | | | **Source A** |  | **Source B** |
|  | 12 |  | 0 |  | 0 |
|  | 11 |  | 1 |  | 2 |
|  | 10 |  | 2 |  | 4 |
|  | 9 |  | 3 |  | 6 |
|  | 8 |  | 4 |  | 10 |
|  | 7 |  | 5 |  | 14 |
|  | 6 |  | 6 |  | 20 |
|  | 5 |  | 8 |  | 25 |
|  | 4 |  | 10 |  | 31 |
|  | 3 |  | 14 |  | 38 |
|  | 2 |  | 24 |  | 58 |
|  | 1 |  | 38 |  | 94 |
|  | 0 |  | 70 |  | 160 |

1. Which firm appears to be older?

Each firm is given five emission permits. If the first right is transacted, firm A would move from 5 tons to 4 tons; firm B moves from 5 to 6 tons emitted.

1. What is the least money A is willing to accept to sell the first ton?
2. What is the most money B is willing to pay to buy the first ton?

**Pound Traded** **Terms of trade**

First $10 and $25

Second $14 and $20

Third buyer willing to pay up to $14 seller would require at least $24 compensation

1. What is the total social cost of eliminating 14 tons of emissions if the two firms had to reduce by 7 tons each?
2. What is the total social cost of eliminating 14 tons of emissions if Firm A eliminated 9 tons and Firm B eliminated 5 tons?
3. Why pollution trading? Wouldn’t charging both firms $14 per emissions ton result in the same distribution of emissions?
4. Why didn’t the 1990 Clean Air Amendment simply tax firms for emitting SO2?