

Acid Rain

Current Event: Vice-Minister of Environmental Protection, Zhang Lijun

- China is still producing more 'traditional pollutants' than it can bear
- Consumption of coal: which has rose around 1 billion tons in the 5 years since '06, and could rise another billion in the next 5 years.
- The Environmental Ministry is who deals directly with these types of problems
- He blames cars and industry
- China GDP in 2009: \$4.985 Trillion
- “Green GDP”: Chinese calculations show that the cost of pollution, degradation of soil, desertification and disappearing wetlands increased to the equivalent of \$196 billion in 2008 – and that’s based on incomplete data, so it could really be even higher. That’s roughly 4% of all economic activity.
- China has plans to cut its levels of C intensity, by 17% by 2015.
- State council announced that SO₂ and chemical oxygen demand will be cut by a further 8% in the next 5 years, and NO_x and ammonium nitrate will also be cut by 8-10%

Acid Rain: caused by the emission of NO_x and SO₂. Originally: only mildly acidic.

But they react with the atmosphere and create acidic compounds such as sulfurous acid, nitric acid and sulfuric acid, which fall as rain.

-pH < 7 are acidic. A pH > 7 are alkaline.

Unpolluted is slightly acidic (pH of over 5.7, because carbon dioxide and water in the air react together to form carbonic acid, but unpolluted rain also contains other chemicals.

- $K=[OH][SO_2][M]$

SO₂ pollution: produced by coal combustion (bituminous coal = high in S)

-SO₂ is a respiratory irritant- the effects appearing at concentrations above about 1 ppm (bronchitis).

-It damages the environment first to the freshwater fish and then to the forest

-The US in 1990 enacted the Clean Air Act, which reduced SO₂ and NO_x emissions

-This acidic pollution can be transported by wind over many hundreds of kilometres, and is deposited as acid rain

-The lifetime of SO₂ molecules in the *stratosphere*, is several weeks, during which it produces Sulphate aerosols.

-The lifetime of SO₂ molecules in the *troposphere* is a few days. The amount is highly variable, above a low background concentration.

Cleaning the Coal Plants:

-Flue gas desulfurization is a technology used to remove SO₂ from the exhaust. ---

Tall flue gas stacks disperse emissions by diluting the pollutants in ambient air and transporting them to other regions.

-Wet scrubbing (limestone/seawater) vs Dry scrubbing

-Wet \$200-\$500 to 400MW \$500-\$5000 per ton

-Dry \$150-\$300 to 200MW \$500-\$4000 per ton

-5 deaths for every megaton of coal extracted.

2520 Megatons. They have 1000 billion tons of coal reserves.

In 2007 total Coal production was over 2.8 billion tons (40% of world’s total)

Power Plant. Total Load = 10,000 tons. They may receive 3-5 loads a day during peak.