Cement Plants

- 4 Step Production Line:
  - Mine the Limestone: Cement plants usually located near quarries to lower transportation costs.
  - Cement Kiln: Limestone is mixed with sand to produce Kiln Mix -> sent to kilns along with coal (heating is facilitated by the coal). Kiln Mix is heated at 2,700 degrees F -> clinker mix
  - Clinker Mix is then mixed with gypsum in a cylinder filled with steel balls which grind mix into a fine powder -> Final Cement Product

- Associated Air Pollution:
  - From retrieving Raw Materials
    - Particulate Matter
    - Mercury in the Limestone and Fly Ash -> by product of generating electricity by coal.
  - From Kiln Combustion
    - CO2 – 2nd largest CO2 emitter behind electricity generation
    - Hydrocarbons – combine with NOx to form ozone and smog
    - NOx – precursor to ozone
    - SO2 – Acid rain
    - Particulate matter - Haze
  - Clinker Pollution
    - Heavy Metals = Nickel, Zinc and Lead found in non-negligible concentrations. These elements tend to bioaccumulate and can be released from the soil by acid rain. Severe health effects

- Relative News:
  - “EPA Clamps down on Cement Plant Pollution”
    
    
    - Mercury emissions reduced by 92%, Particulate matter reduced by 92%, sulfur dioxide reduced by 78%
  - “Holcim Portland Cement Plant goes Solar in Colorado”
    
    
    - owned by the Swiss based international cement company
    - 156,000 kilowatt-hours of electricity per year
  - “Cemex to pay $2M for pollution controls”
    
    
    - 1.4 million dollars for violating the Clean Air Act and 2 million dollars for pollution controls
• Pollution Controls:
  o Electrostatic Precipitator: ionizes contaminated air so that the charge particles are displaced = High Efficiency
    ▪ Used after the roller mill and the cement kiln production. Usually spray towers are used in order to moisten the particulate matter to increase efficiency
  o Baghouse Filters: polluted air is filtered through the bags with a clean air chamber near the top. High pressure air is used to separate the particulates, whatever is collected by the bags is recycled back into production.
  o In-situ Monitoring Devices: Basically used to measure emissions of hydrocarbons, sulfur dioxide and nitrogen oxides. Depending on the reading the operator can adjust temperature or flow of production so that emissions are decreased.
  o Selective Non-catalytic Reduction: Ammonia is added to the boiler to reduce NOx concentrations without a catalyst. The reaction reduces NOx to Nitrogen Gas.