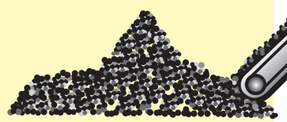
How Power Plants Are Reducing Air Emissions

This simplified diagram is illustrative of the operations at a large coal-based electric power plant. It explains the various control technologies in place at many U.S. power plants to reduce emissions to air, land, and water. These technologies are designed to control emissions of nitrogen oxide (NO_x), sulfur dioxide (SO_2), and particulate matter (PM). In addition, these control technologies capture significant amounts of other air emissions, including mercury. The diagram also illustrates the ways that byproducts of coal combustion are recycled into useful products.

Electric utilities use coal to generate over 50 percent of our nation's electricity and are leaders in developing new ways to produce electricity more cleanly and efficiently.



Coal

The most abundant and cost-effective domestic fuel for generating electricity.

NO_x Controls

Devices like low NO_x burners and selective catalytic reduction that reduce NO_x emissions.

Steam Generator (Boiler)

A large vessel that contains an assembly of tubes in which water is heated to steam that is then used to drive a turbine.

Precipitator/ Baghouse

Devices used to capture PM and fly ash.

Scrubber

A device used to remove SO_2 from the boiler exhaust (flue) gas.

Stack

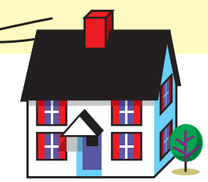
A chimney used to exhaust and disperse the hot flue gases from the boiler.

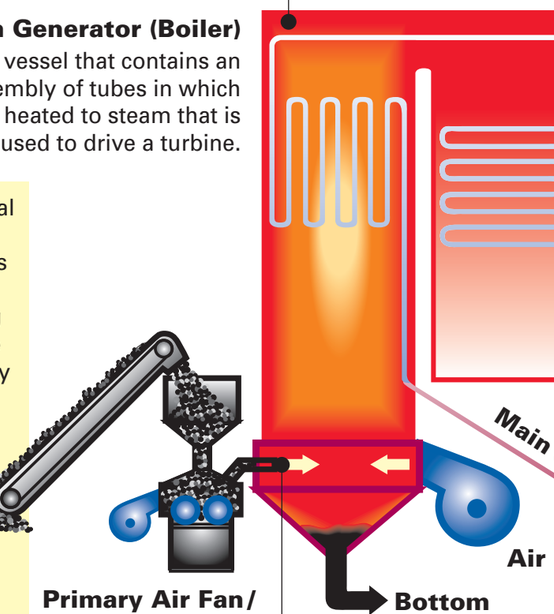
Emissions Monitoring

Utilities continuously measure many different types of air emissions.

Electric utilities have reduced air emissions significantly, while increasing electricity production and tripling the use of coal since 1970.

Electricity





Primary Air Fan/ Pulverizer

Devices used to prepare coal for burning by grinding it to a fine powder, and drying and mixing it with hot air to create an efficiently combustible fuel.

Bottom Ash

A coal-combustion byproduct that collects on the walls of the boiler, eventually falling to the bottom where it is collected. Bottom ash is a ceramic-like material that can be utilized to make asphalt, concrete aggregate, insulation, and blasting-cleaning grit; otherwise, it is disposed of in accordance with all applicable laws.

Burner

A nozzle device, generally located in the lower boiler walls, which introduces the pulverized coal into the boiler and mixes with the correct amount of additional air to burn the fuel efficiently and to reduce NO_x and carbon monoxide emissions.

Fly Ash

A light gray or tan powder that is the largest byproduct of coal combustion. Fly ash becomes entrained with, and carried out of the boiler by, the hot exhaust (flue) gases. It is collected and has uses similar to bottom ash.

Generator

A machine that transforms the mechanical energy of the turbine into electric energy.

Turbine

A device consisting of fan-type blades attached to a shaft that is spun by expanding steam, converting the kinetic energy of the steam into mechanical energy.

Transformer

An electromagnetic device that increases the output voltage of the generator while reducing the current (amperage) to make the transmission of electricity more efficient.

Cooling System

A system that cools steam passing through the condenser.

Condenser

A device that converts the steam from the turbine back into water, to be recirculated to the boiler, where it is heated and used again.

Source:
Edison Electric Institute

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