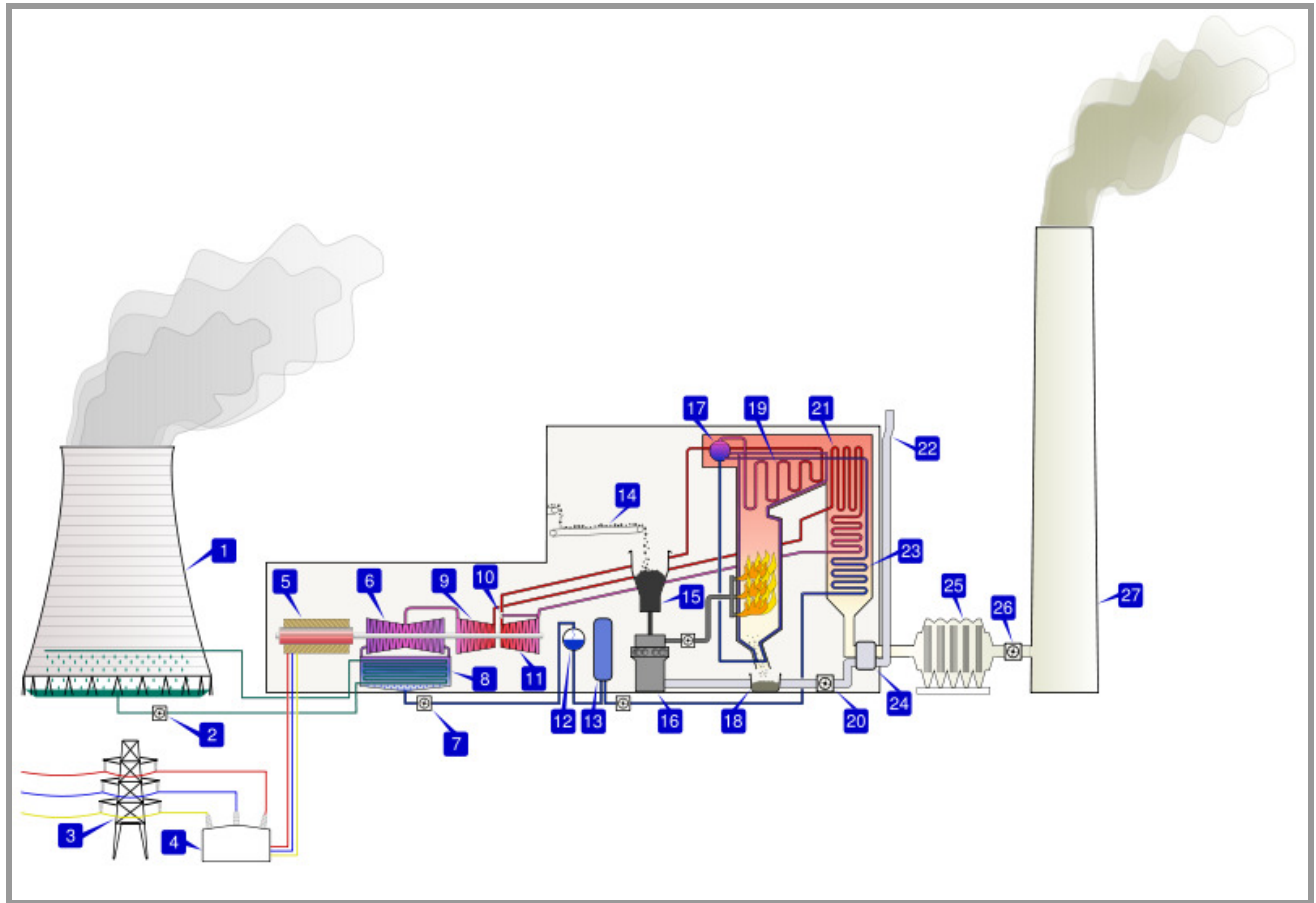


Diagram of a typical coal-fired thermal power station



Key

- | | | |
|----------------------------------|---------------------------|-------------------------|
| 1. Cooling tower | 10. Steam governor valve | 19. Superheater |
| 2. Cooling water pump | 11. High pressure turbine | 20. Forced draught fan |
| 3. Transmission line (3-phase) | 12. Deaerator | 21. Reheater |
| 4. Unit transformer (3-phase) | 13. Feed heater | 22. Air intake |
| 5. Electric generator (3-phase) | 14. Coal conveyor | 23. Economiser |
| 6. Low pressure turbine | 15. Coal hopper | 24. Air preheater |
| 7. Boiler feed pump | 16. Pulverised fuel mill | 25. Precipitator |
| 8. Condensor | 17. Boiler drum | 26. Induced draught fan |
| 9. Intermediate pressure turbine | 18. Ash hopper | 27. Chimney Stack |

Description

A typical coal-fired thermal power plant.

1. Coal is conveyed (14) from an external stack and ground to a very fine powder by large metal spheres in the pulverized fuel mill (16).
2. There it is mixed with preheated air (24) driven by the forced draught fan (20).
3. The hot air-fuel mixture is forced at high pressure into the boiler where it rapidly ignites.
4. Water of a high purity flows vertically up the tube-lined walls of the boiler, where it turns into steam, and is passed to the boiler drum, where steam is separated from any remaining water.

5. The steam passes through a manifold in the roof of the drum into the pendant superheater (19) where its temperature and pressure increase rapidly to around 200 bar and 570 °C, sufficient to make the tube walls glow a dull red.
6. The steam is piped to the high-pressure turbine (11), the first of a three-stage turbine process.
7. A steam governor valve (10) allows for both manual control of the turbine and automatic set point following.
8. The steam is exhausted from the high-pressure turbine, and reduced in both pressure and temperature, is returned to the boiler reheater (21).
9. The reheated steam is then passed to the intermediate pressure turbine (9), and from there passed directly to the low pressure turbine set (6).
10. The exiting steam, now a little above its boiling point, is brought into thermal contact with cold water (pumped in from the cooling tower) in the condensor (8), where it condenses rapidly back into water, creating near vacuum-like conditions inside the condensor chest.
11. The condensed water is then passed by a feed pump (7) through a deaerator (12), and pre-warmed, first in a feed heater (13) powered by steam drawn from the high pressure set, and then in the economiser (23), before being returned to the boiler drum.
12. The cooling water from the condensor is sprayed inside a cooling tower (1), creating a highly visible plume of water vapor, before being pumped back to the condensor (8) in cooling water cycle.
13. The three turbine sets are coupled on the same shaft as the three-phase electrical generator (5) which generates an intermediate level voltage (typically 20-25 kV).
14. This is stepped up by the unit transformer (4) to a voltage more suitable for transmission (typically 250-500 kV) and is sent out onto the three-phase transmission system (3).
15. Exhaust gas from the boiler is drawn by the induced draft fan (26) through an electrostatic precipitator (25) and is then vented through the chimney stack (27).

Source: Wikipedia - <http://en.wikipedia.org/wiki/Image:PowerStation2.svg>