Closed Cycle Gas Turbine:

- Working fluid circulates in a closed circuit and does not cause corrosion or erosion
- Any fuel, nuclear or solar energy can be used

Combined Cycle Power Plants

Combined Cycle power plants are those which have both gas and steam turbines supplying power to the network. Combined cycle power plants employ more than one thermodynamic cycle – Rankine (steam) and Brayton (gas). Additionally, combined cycles are characterized by flexibility, quick part-load starting, suitability for both base-load and cyclic operation, and a high efficiency over a wide range of loads

A gas-fired combined-cycle power plant, also known as a Combined Cycle Gas Turbine Power Plant combines the strengths of two thermal processes in ideal fashion. Electricity production using a gas

turbine, together with a steam turbine. The acronym normally used to describe this system is CCGT. Around two thirds of the electrical power generated is produced by the gas turbine. In a similar way as an aero plane engine, a mixture of compressed air and fuel is combusted. The hot gases that this process creates drive the turbine and, with it, the generator that is coupled to it. The rest of the electrical power generated, roughly a third, is produced by the steam turbine using the hot exhaust gases leaving the gas turbine. In the heat recovery steam generator (HRSG) the exhaust gases transfer their heat to the circulating water. The pressurized water vaporizes, causing the temperature in the system to rise. The steam drives the steam turbine and, with it, the generator that is coupled to it.

1. Ambient air is drawn in via filter stages and compressed in the compressor.
2. Gas turbine: air is compressed, natural gas is mixed in. Combustion takes place, generating hot gases under high-pressure. The turbine powers the generator and the compressor.
3. Heat recovery steam generator: water is vaporized using the hot exhaust gases from the gas turbine.
4. Steam turbine: the steam powers the turbine. The resulting mechanical energy is transferred to the generator.
5. Condenser: here the exhaust steam from the steam turbine is converted back into water by means of air cooling.
6. Generators: here the mechanical energy from the turbines is converted into electricity. The heat recovery steam generator (3. on the model) is a large and complex configuration consisting of bundles of pipes and drums. It has three areas, each with a different pressure level: one high, one medium and one low. By dividing into these three levels, it is possible to harness an impressive amount of the energy contained in the exhaust gas.