POWER PLANT ENGINEERING

Class note

What is Power plant, Different type of power plant.

- Power plant:
- A **power station**, also referred to as a **power plant** or **powerhouse** and sometimes **generating station** or **generating plant**, is an industrial facility for the generation of electric power. Most power stations contain one or more generators, a rotating machine that converts mechanical power into three-phase electric power. The relative motion between a magnetic field and a conductor creates an electrical current.

Type of power plant

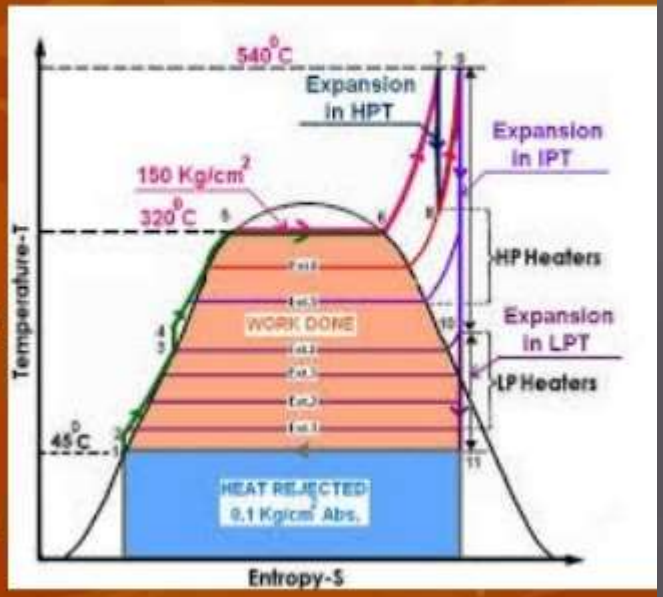
TYPES OF POWER PLANTS

1.BASED ON INPUT ENERGY /FUEL

(a.)COAL thermal Power Plants
(b.) HYDRAULIC Power Plants
(c.) NUCLEAR Power Plants
(d.) GEOTHERMAL Power Plants
(e.) SOLAR Power Plants
(f.)WIND power plants
(g.)BIOMASS power plant

Thermal Power Plant

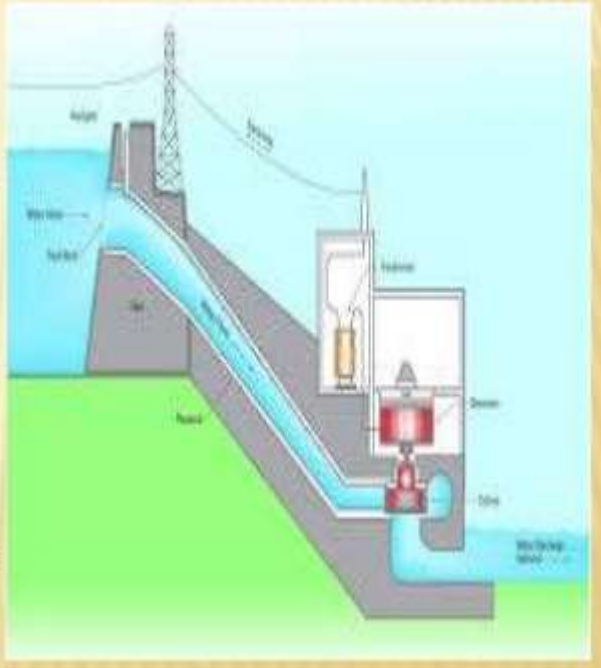
A thermal power station is a power plant in which the prime mover is steam driven. Water is heated, turns into steam and spins a steam turbine which drives an electrical generator. After it passes through the turbine, the steam is condensed in a condenser and recycled to where it was heated; this is known as a ***Rankine cycle***.



T – S diagram of Rankine Cycle

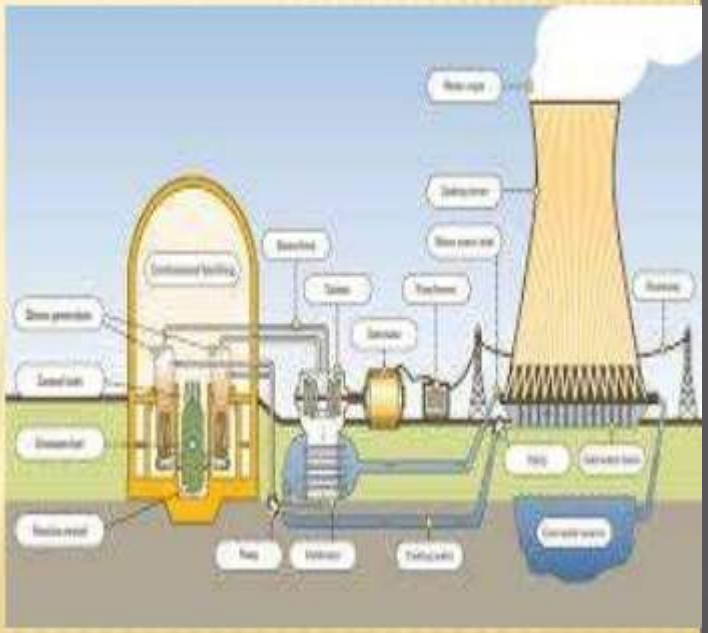
HYDRAULIC POWER PLANT

- The hydroelectric power plants are stations where energy is produced by the force of falling water
- The water moves a turbine connected to a generator that collect the energy that water creates



NUCLEAR THERMAL POWER PLANT

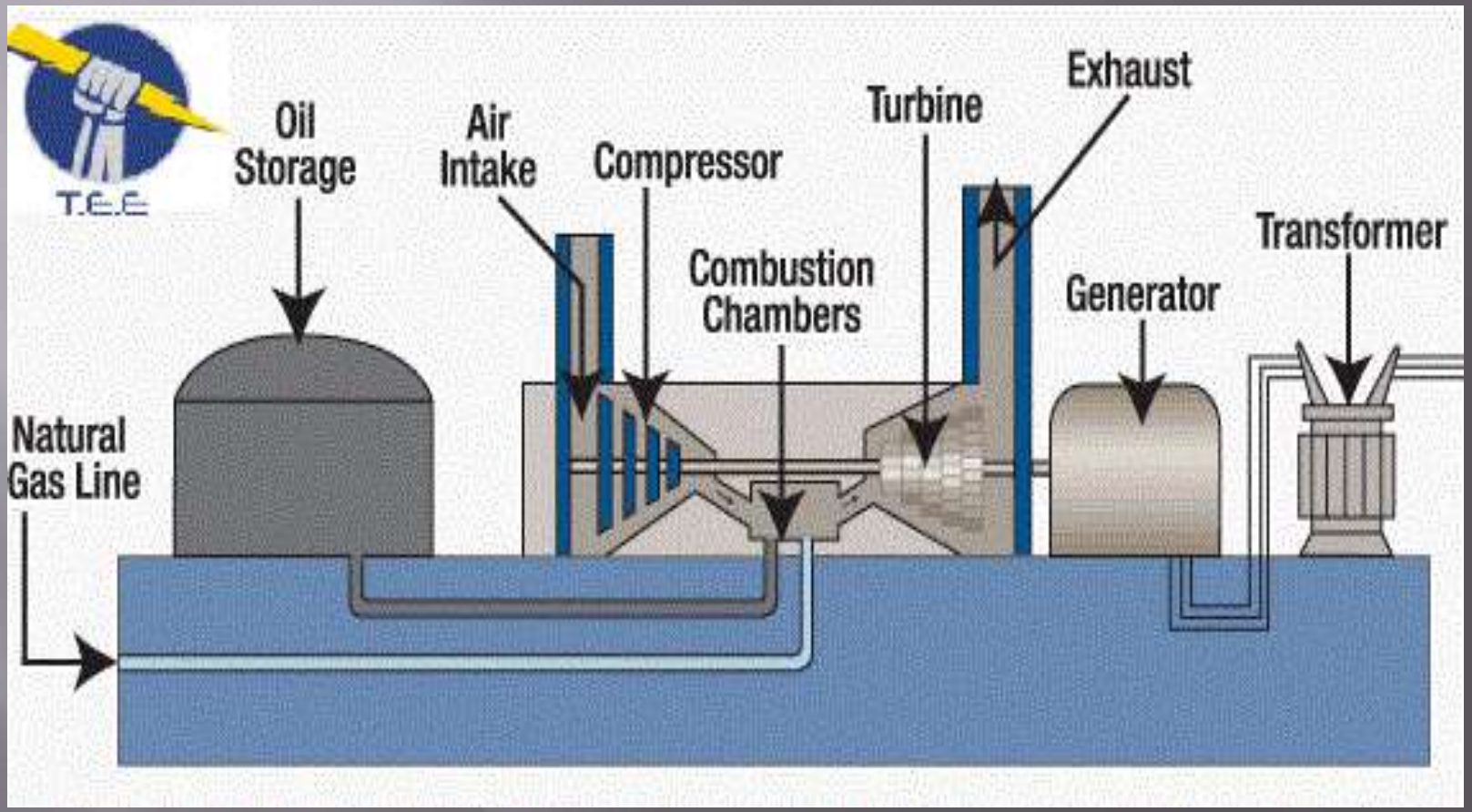
- The heat is produced by fission in a nuclear reactor (a light water reactor). Directly or indirectly, water vapour (steam) is produced. The pressurized steam is then usually fed to a multi-stage steam turbine.



WIND POWER PLANT

- Wind station are the ones that transform wind energy into another usefull kind of energy
- A wind form consist of almost a hundred of winds turbines connected to electric power transmission network

Gas Turbine power plant is also a thermal power plant.

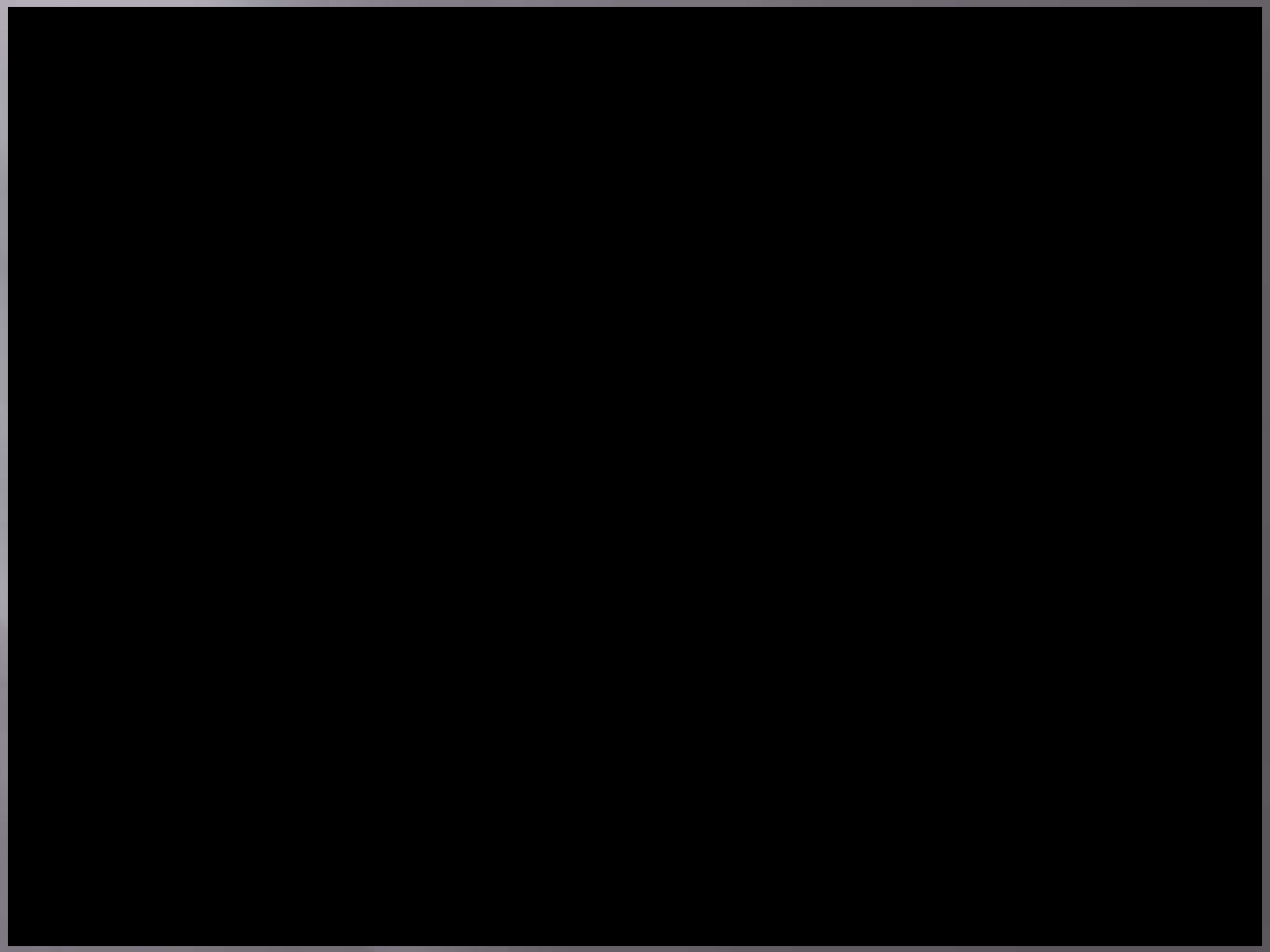


Video animation on gas Turbine power plant

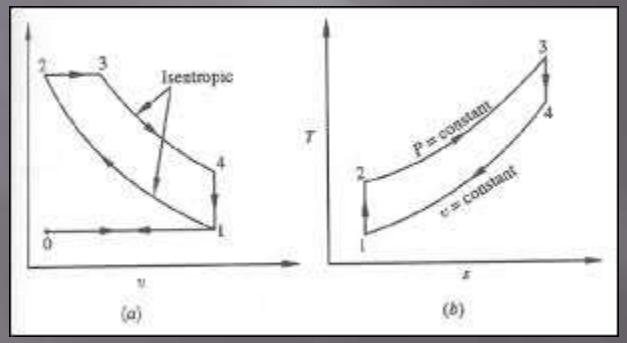
Nuclear power plant

- nuclear reactor. As it is typical of thermal power stations, heat is used to generate steam that drives a steam turbine connected to a generator that produces electricity.
- The conversion to electrical energy takes place indirectly, as in conventional thermal power stations. The fission in a nuclear reactor heats the reactor coolant. The coolant may be water or gas, or even liquid metal, depending on the type of reactor. The reactor coolant then goes to a steam generator and heats water to produce steam. The pressurized steam is then usually fed to a multi-stage steam turbine. After the steam turbine has expanded and partially condensed the steam, the remaining vapor is condensed in a condenser. The condenser is a heat exchanger which is connected to a secondary side such as a river or a cooling tower. The water is then pumped back into the steam generator and the cycle begins again. The water-steam cycle corresponds to the Rankine cycle.

Nuclear power plant working details in animation



PV and TS diagram of Breton cycle. In which gas Turbine work

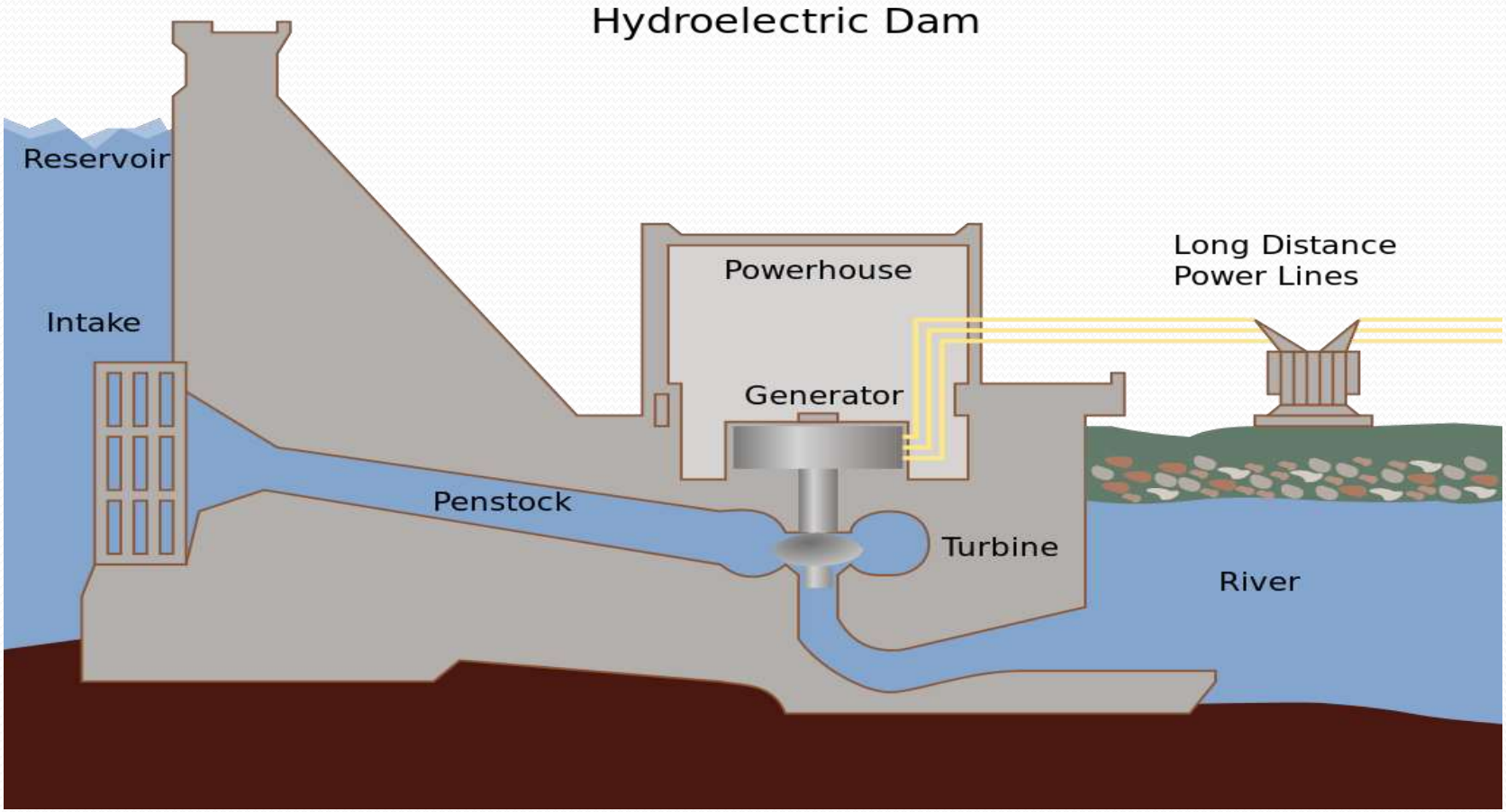


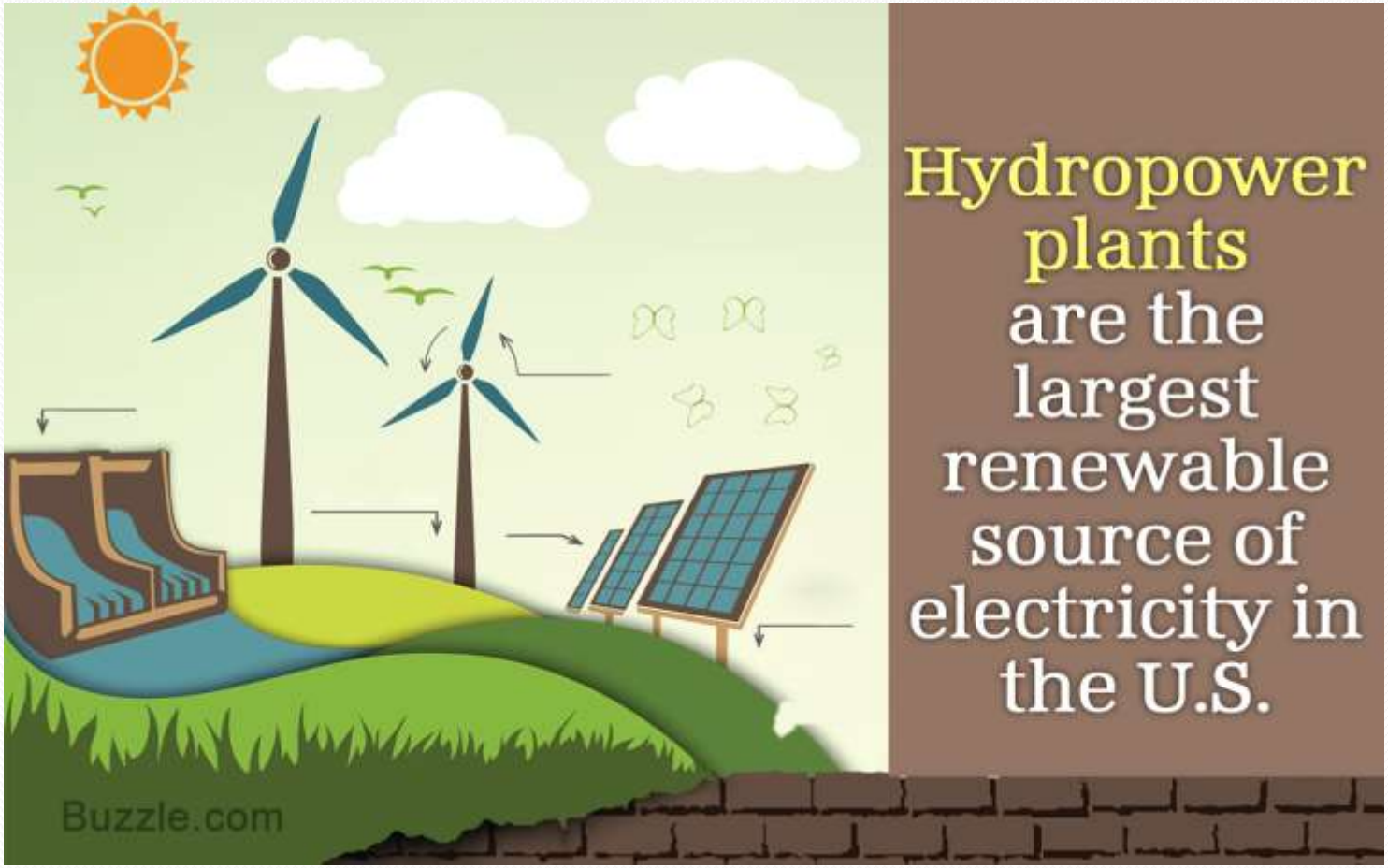
Hydraulic power plant

Class note

Made by MD Naiem hossain

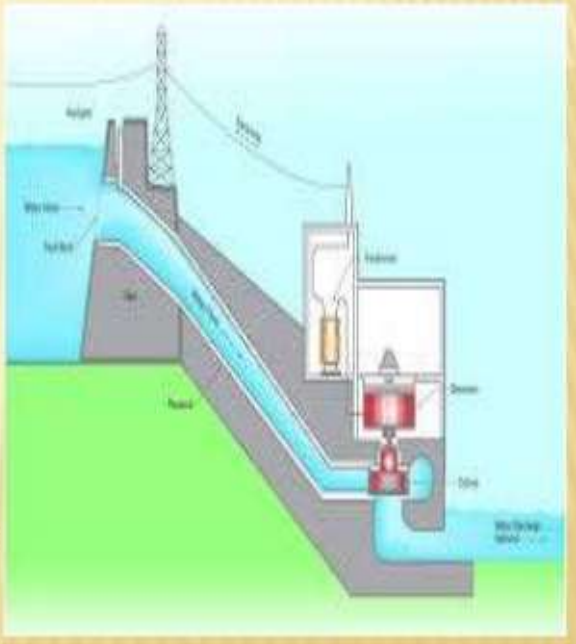
Basic Components

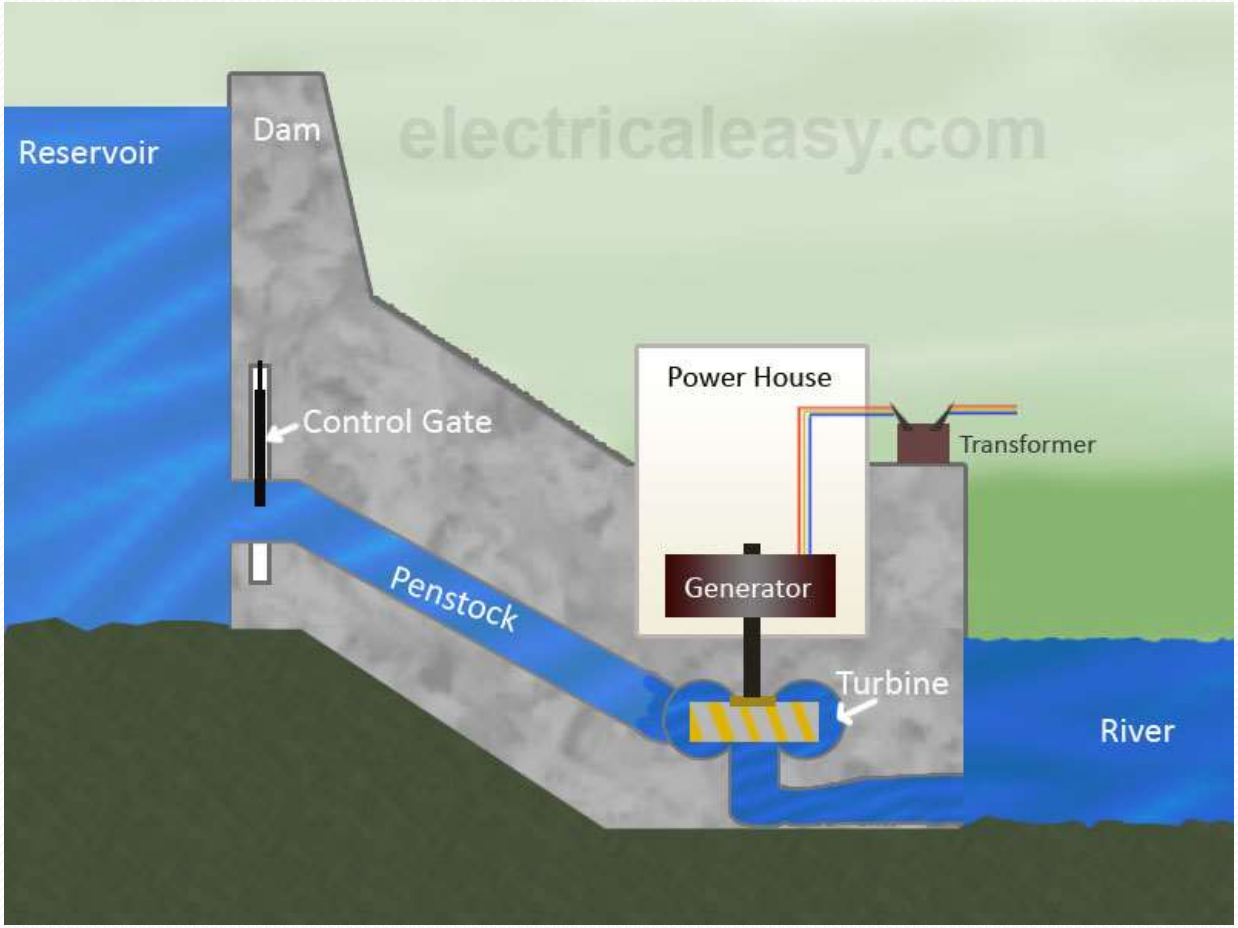



Hydropower plants are the largest renewable source of electricity in the U.S.
Buzzle.com

HYDRAULIC POWER PLANT

- The hydroelectric power plants are stations where energy is produced by the force of falling water
- The water moves a turbine connected to a generator that collect the energy that water creates




Reservoir
Dam
electricaleasy.com
Power House
Control Gate
Transformer
Generator
Penstock
Turbine
River

Animation of working hydra power plant

Nuclear power plant

Class note

Made by MD Naiem hossain

What is nuclear power plant

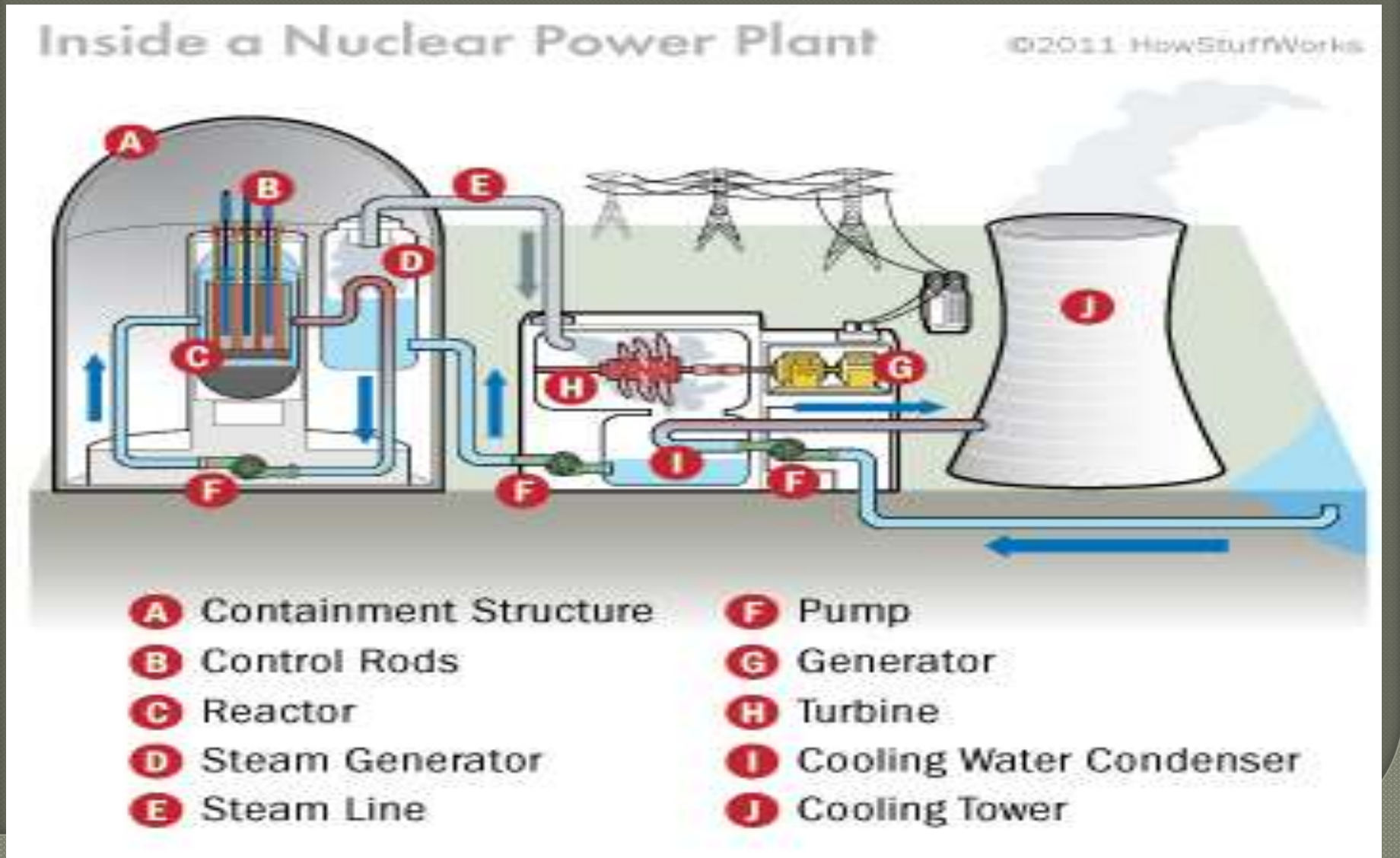
- A **nuclear power plant** is a thermal power station in which the heat source is a nuclear reactor. As is typical of thermal power stations, heat is used to generate steam that drives a steam turbine connected to a generator that produces electricity.

Working Details

- The conversion to electrical energy takes place indirectly, as in conventional thermal power stations. The fission in a nuclear reactor heats the reactor coolant. The coolant may be water or gas, or even liquid metal, depending on the type of reactor. The reactor coolant then goes to a steam generator and heats water to produce steam. The pressurized steam is then usually fed to a multi-stage steam turbine.

- After the steam turbine has expanded and partially condensed the steam, the remaining vapor is condensed in a condenser. The condenser is a heat exchanger which is connected to a secondary side such as a river or a cooling tower. The water is then pumped back into the steam generator and the cycle begins again. The water-steam cycle corresponds to the Rankine cycle.
- The nuclear reactor is the heart of the station. In its central part, the reactor's core produces heat due to nuclear fission. With this heat, a coolant is heated as it is pumped through the reactor and thereby removes the energy from the reactor. Heat from nuclear fission is used to raise steam, which runs through turbines, which in turn power the electrical generators

Basic components



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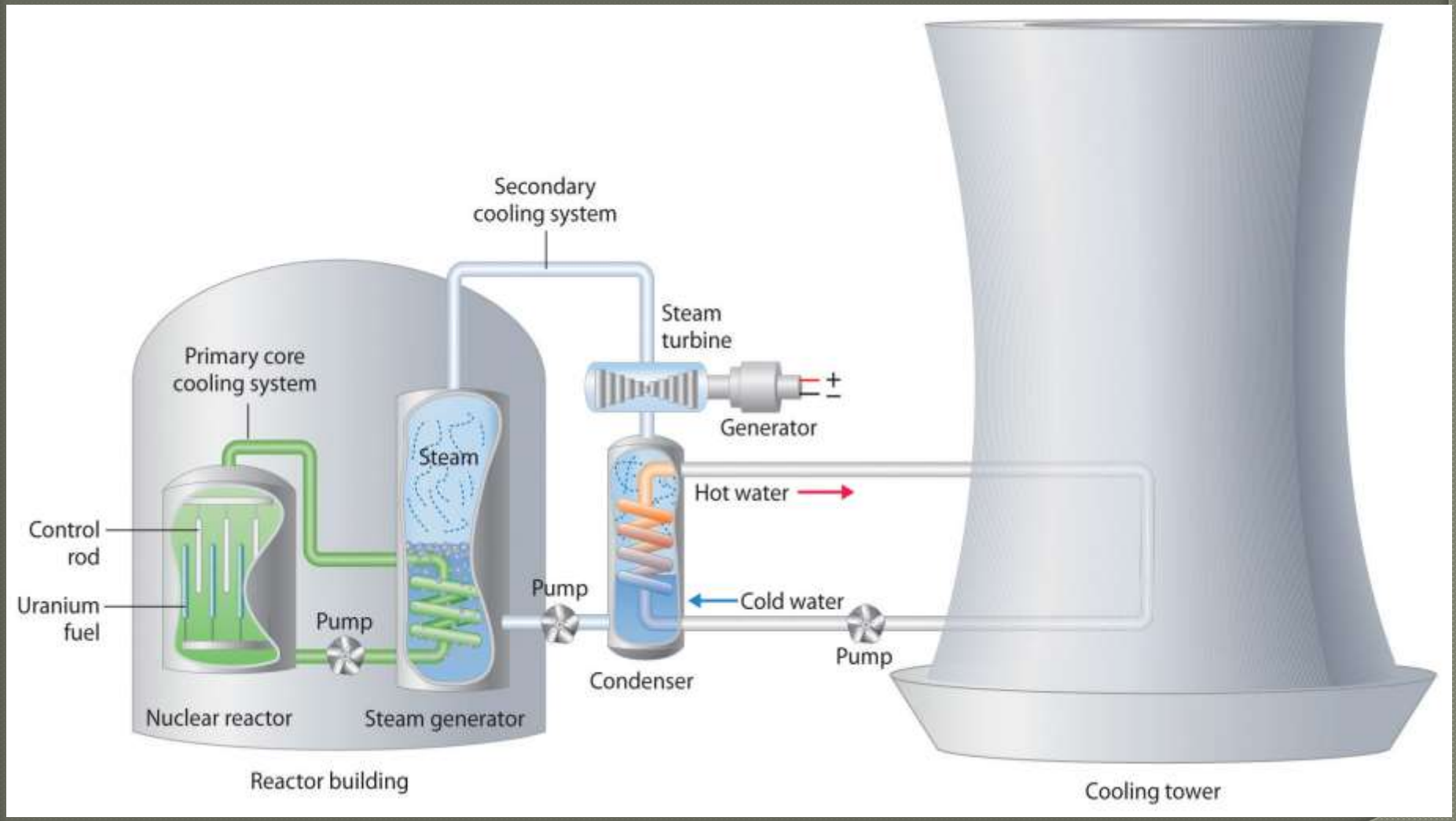

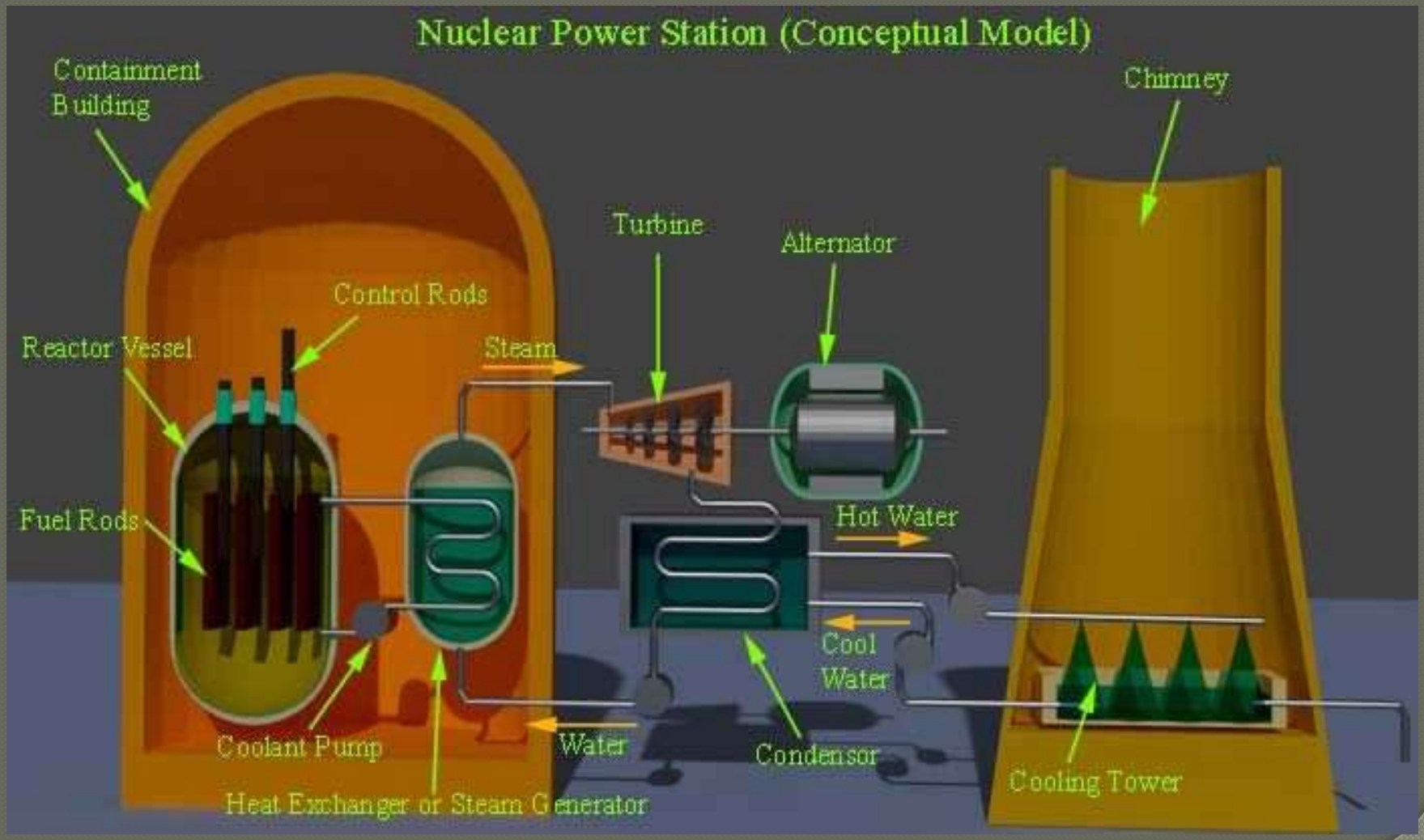
Nuclear Power Station (Conceptual Model)
Containment Building
Chimney
Turbine
Alternator
Control Rods
Reactor Vessel
Steam
Fuel Rods
Hot Water
Cool Water
Coolant Pump
Water
Condensor
Cooling Tower
Heat Exchanger or Steam Generator

3D Animation video on working

ভিডিও দেখতে নিচের অংশে ক্লিক করুন