METHODS OF PRODUCING ELECTRICITY

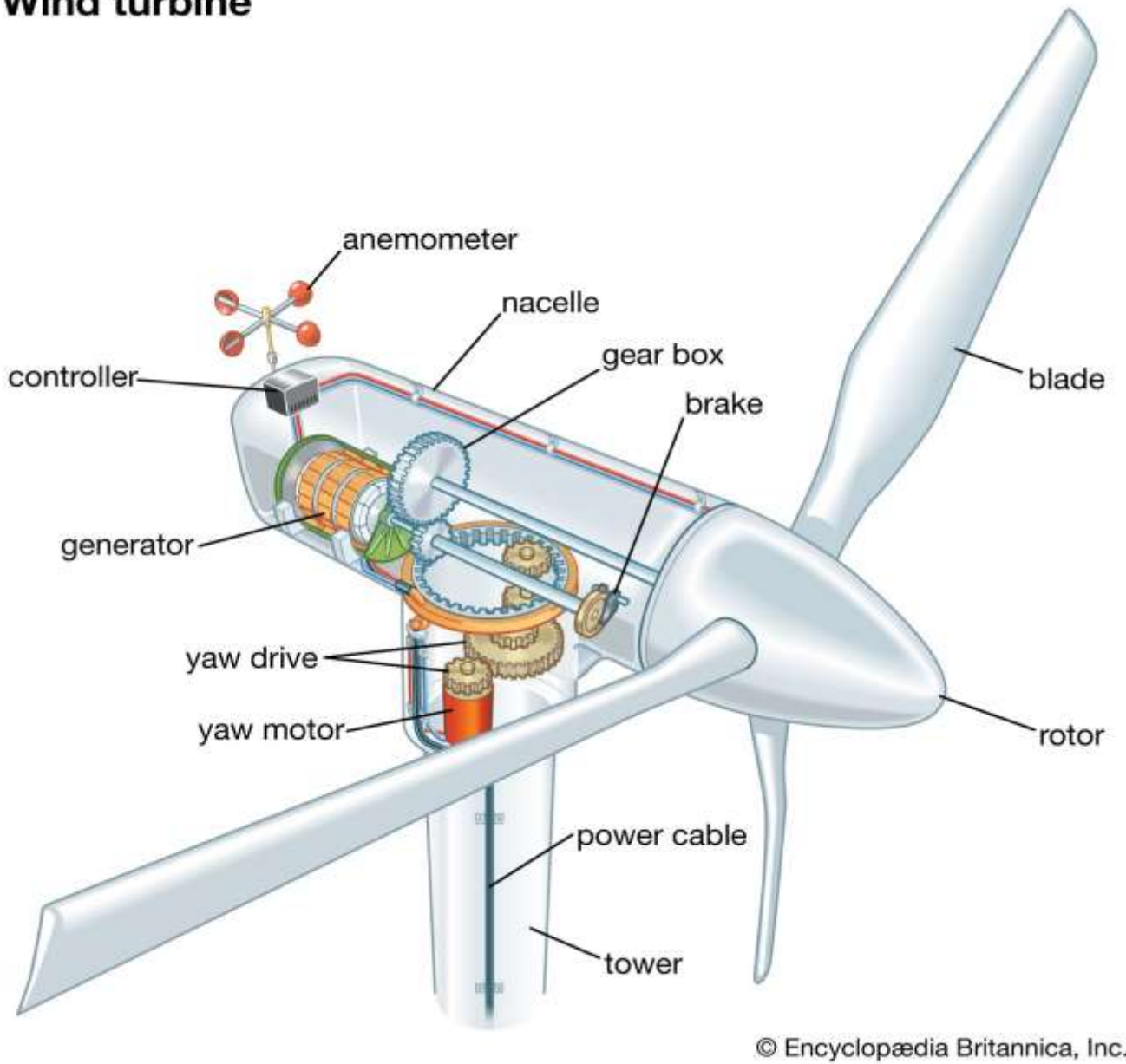
PAGE 50-53 (WORKING WITH NEW TECHNOLOGY)

ELECTRICITY CAN BE GENERATED FROM SUNLIGHT THROUGH PHOTOVOLTAIC CELLS GROUPED IN SOLAR PANELS, OTHERWISE IT CAN BE CREATED THROUGH ELECTROMAGNETISM INSIDE A GENERATOR. IN THIS LAST CASE YOU NEED POWER TO MAKE THE TURBINES MOVE, AND THIS POWER CAN COME FROM:

1) WIND POWER: USED FOR CENTURIES AS MILLS (MULINI A VENTO), NOWADAYS AS WIND TURBINES (PALE EOLICHE); IT USES THE FORCE OF WIND TO ROTATE BLADES THAT TURN A DRIVE SHAFT(ALBERO DI TRASMISSIONE)

2) WATER POWER: IN THE PAST WATERMILLS WERE BUILT NEAR THE RIVER TO EXPLOIT WATER POWER, TODAY WE BUILD DAMS (DIGHE) TO INCREASE THE POWER OF TURBINES TO GENERATE ELECTRICITY EXPLOITING THE HEIGHT.

Wind turbine




THE
AERMOTOR

3) STEAM POWER: SINCE THE INDUSTRIAL REVOLUTION THE HEAT COMING FROM THE BOILING OF WATER HAS BEEN A SOURCE OF ENERGY; THE HEAT TO BOIL THE WATER MAY COME FROM:

- FOSSIL FUELS (COAL, OIL AND NATURAL GAS) ARE BURIED, VERY OFTEN UNDERWATER AND EXTRACTED BY MINING OR DRILLING (TRIVELLAZIONE)
- NUCLEAR FISSION: THE SPLITTING OF URANIUM AND PLUTONIUM'S ATOMS GENERATE A HUGE AMOUNT OF HEAT THAT NEED TO BE CONTROLLED IN NUCLEAR CENTRALS.
- SOLAR FURNACES: THE SUNRAYS ARE DRIVEN ONTO A WATER TANK TO HEAT WATER.
- BIOMASS: USES THE WASTE OF FORESTRY AND AGRICULTURE TO CREATE HEAT AND BOIL THE WATER, SO THAT STEAM CAN BE PRODUCED. MANY CITIES HAVE THEIR OWN «INCENERITORS» THAT BURN HOUSEHOLD MATERIALS AND RUBBISH.
- GEOTERMAL ENERGY: IT'S A NATURAL SOURCE OF ENERGY, IT IS PRESENT UNDER THE SURFACE OF EARTH IN SOME SPECIFICAL AREAS. TO EXPLOIT IT YOU NEED TO DRILL DEEP HOLES AND THEN PIPE WATER DOWN.

WHAT CAN WE SAY ABOUT THESE SOURCES OF ENERGY?

SOME OF THEM ARE RENEWABLE, SO THIS MEANS THAT THEY ARE INEXHAUSTIBLE, SOME OTHERS ARE NON-RENEWABLE, SO THIS MEANS THAT THEY WILL OVER ONE DAY (NOT SO FAR).

RENEWABLE SOURCE OF ENERGY:

WIND POWER
SOLAR POWER
WATER POWER
BIOMASS POWER
GEOTERMAL POWER

OTHER ARE NON-RENEWABLE:

COAL
NATURAL GAS
NUCLEAR POWER
OIL

NOW TRY TO ANSWER TO SOME QUESTIONS:

- Which methods for generating electricity depend on the weather or climate?

- …… are limited to certain places?
- ……..use renewable natural resources?
- …… consume non-renewable natural resources?

THE GENERATOR

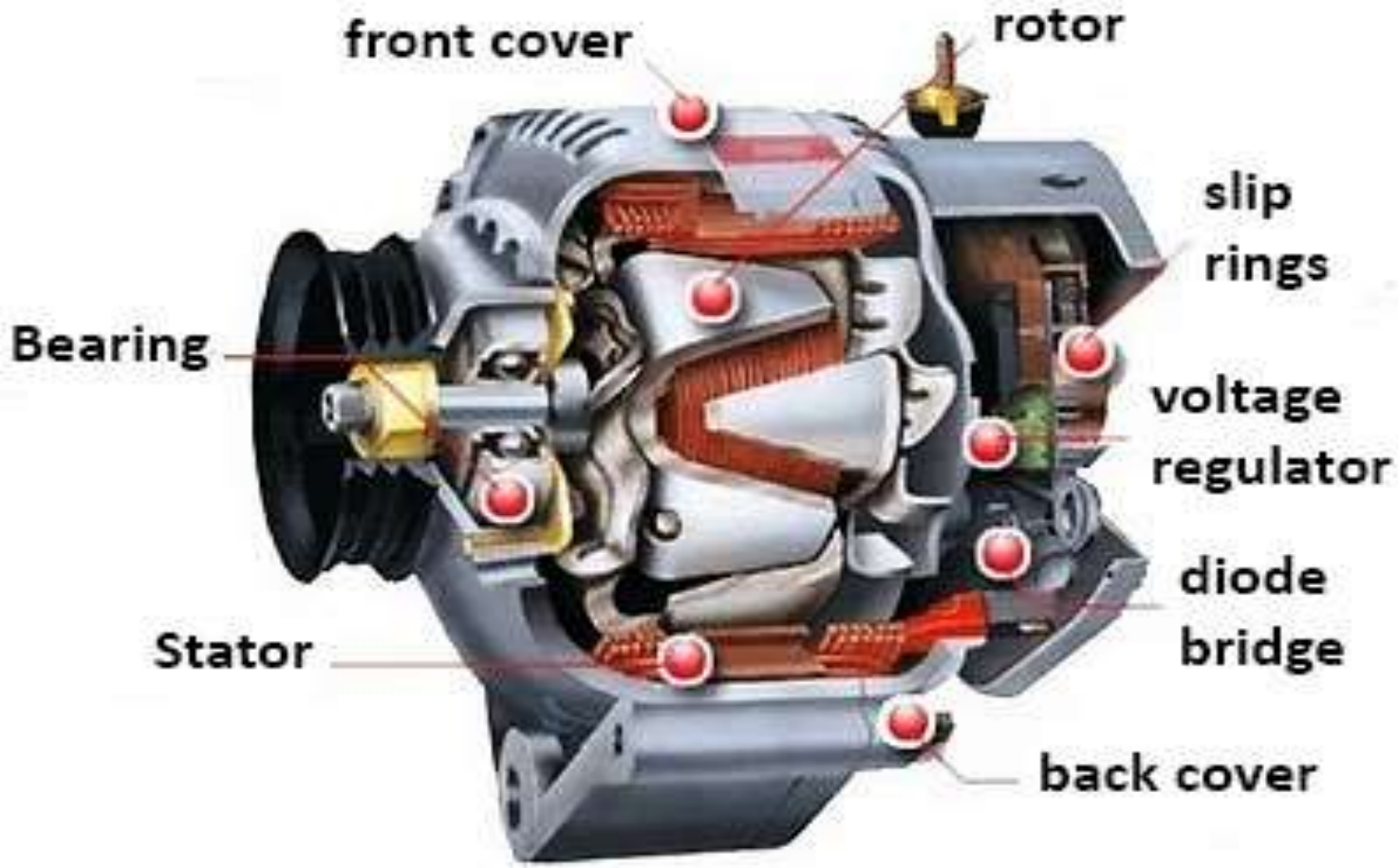
- WHAT IS IT?

- electric generator, also called dynamo, is a machine that converts mechanical energy to electricity for transmission and distribution over power lines to domestic, commercial, and industrial customers. Generators also produce the electrical power required for automobiles, aircraft, ships, and trains.

- The mechanical power for an electric generator is usually obtained from a rotating shaft and it may come from a number of sources: hydraulic turbines at dams or waterfalls, wind turbines, steam turbines using steam produced with heat from the combustion of fossil fuels or from nuclear fission, gas turbines burning gas directly in the turbine or gasoline and diesel engines. The construction and the speed of the generator may vary considerably depending on the characteristics of the mechanical prime mover.

- Nearly all generators used to supply electric power networks generate alternating current. Since a number of generators are connected into a power network, they must operate at the same frequency for simultaneous generation. They are therefore known as synchronous generators or, in some contexts, alternators.

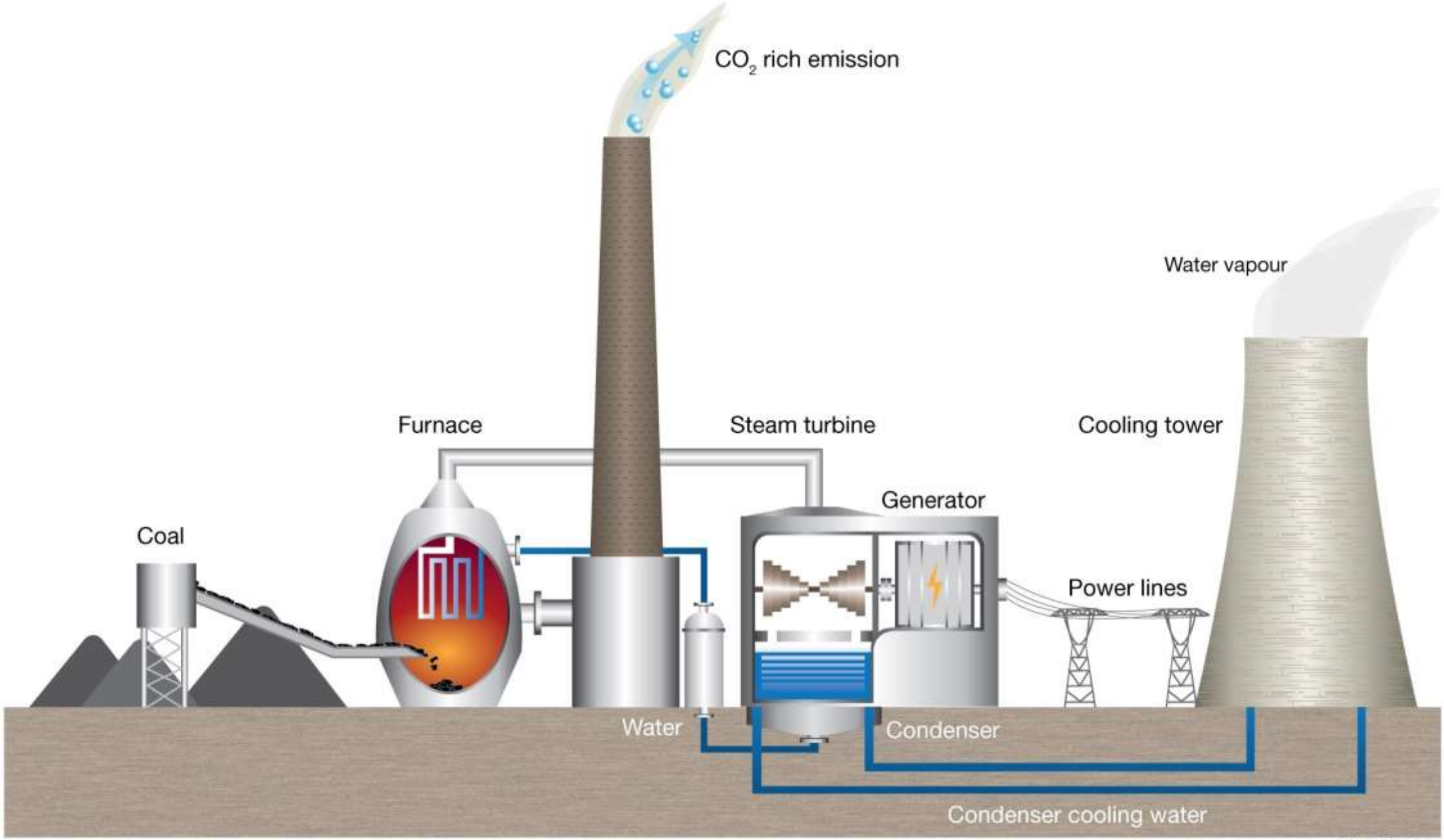
GENERATOR CONSTRUCTION



FOSSIL FUELS POWER STATION:

- THE MAJORITY OF POWER STATIONS ALL AROUND THE WORLD USE FOSSIL FUELS, SUCH AS COAL, OIL OR NATURAL GAS TO GENERATE ELECTRICITY.
- HOW DO THEY PRODUCE ELECTRICITY:

- A fossil fuel power station is a thermal power station which burns a fossil fuel, such as coal or natural gas, to produce electricity. Fossil fuel power stations have machinery to convert the heat energy of combustion into mechanical energy, which then operates an electrical generator.


CO_2 rich emission
Water vapour
Furnace
Steam turbine
Cooling tower
Generator
Coal
Power lines
Water
Condenser
Condenser cooling water
© CO2CRC

MAIN STEPS:

1)THE LOW PRESSURE STEAM IS PIPED IN THE COOLING TOWER WHERE THE SPRAY(OR DROPS)OF STEAM CONDENSES BACK INTO WATER

2)COAL, OIL OR GAS ARE BURNED IN THE BOILER TO PRODUCE HEAT WHICH BOILS THE WATER IN PIPES UNTIL IT TURNS IN HIGH PRESSURE STEAM

3) THE SPINNING DRIVE SHAFT IS CONNECTED TO COILS OF WIRE IN A MAGNETIC FIELD. IN THE GENERATOR AS THE COILS OF WIRE SPIN AROUND THEY GENERATE ELECTRIC CURRENT

4)FUMES CREATED BY BURNING FUEL IN THE BOILER ARE CHANNELED IN THE CHIMNEY AND RELASED IN THE AIR.

5) HIGH PRESSURE STEAM IS PIPED IN THE TURBINE, THE STEAM THEN PUSHES TROUGH A SERIES OF BLADES MAKING THEM SPEED AT HIGH SPEED AND TURN A DRIVE SHAFT. THE STEAM LOSES PRESSURE AND IT IS PIPED OUT AT THE OTHER END.