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September 12, 2023 1:57 PM

Science 9 – Physics Topic 3.1: Generating Electrical Energy

Different types of energy can be transformed into electrical energy

- Most of the electrical energy in Canada is generated by transforming Kinetic energy into electrical energy
- Source of kinetic energy may be moving water, wind, or moving steam produced by nuclear reactions or burning fossil fuels

Kinetic Energy to Electrical Energy: Generator System

Generator system: A system that transforms kinetic energy to electrical energy

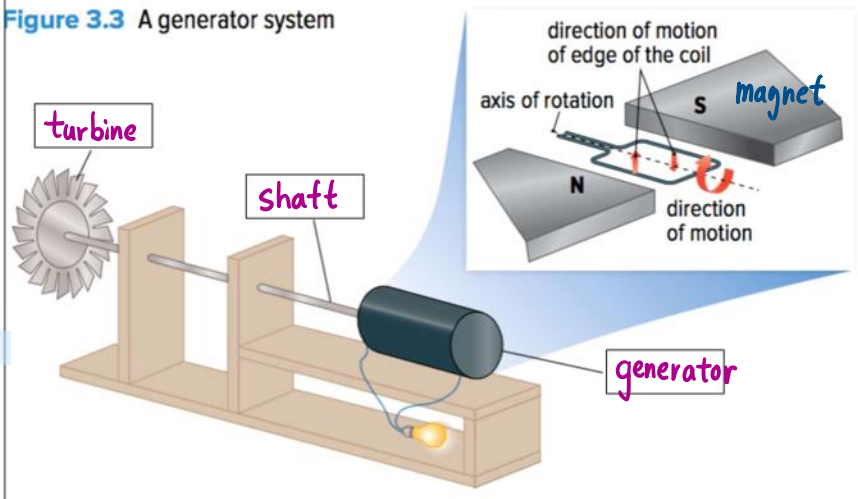
- Turbine: Steam, water, or wind cause the turbine to spin
- Shaft: As the turbine spins, the shaft spins.
- **Generator**: Kinetic energy of the spinning shaft is transformed into electrical energy inside the generator

Turbine: Stream, water, or wind cause the turbine to spin.

Shaft: The shaft connects the turbine to the generator. As the turbine spins, it makes the shaft spin.

Generator: The kinetic energy of the spinning shaft is transformed into electrical energy inside the generator. This happens when energy from the shaft turns a wire loop or a coil near a strong A magnet As the wire turns, electrons flow in the wire. This flow of electrons powers electrical devices.

Figure 3.3 A generator system



Generating Electrical Energy in Canada

Most of the electrical energy in Canada comes from river flow, fossil fuels, and nuclear reactions

British Columbia:

- River flow is the main source (hydroelectric energy)
- Also uses fossil fuels
- No nuclear reactors in BC

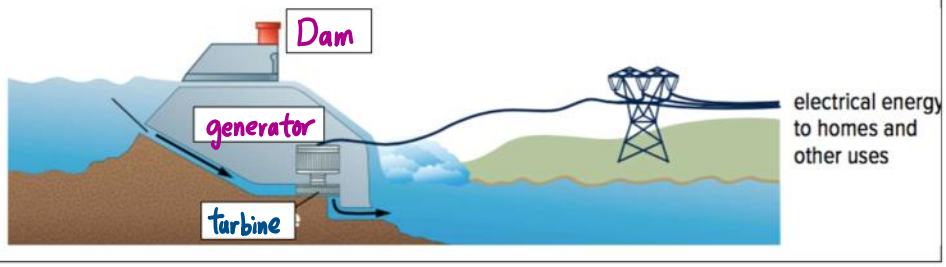
Hydroelectric Energy from River Flow

Two systems generate hydroelectric energy:

- Dam station (shown below)
  - Water stored behind dam has potential energy

- As water flows downhill, it gains kinetic energy, which turns a turbine connected to a generator
  - Run-of-river station
    - Water flowing freely in a river turns a turbine

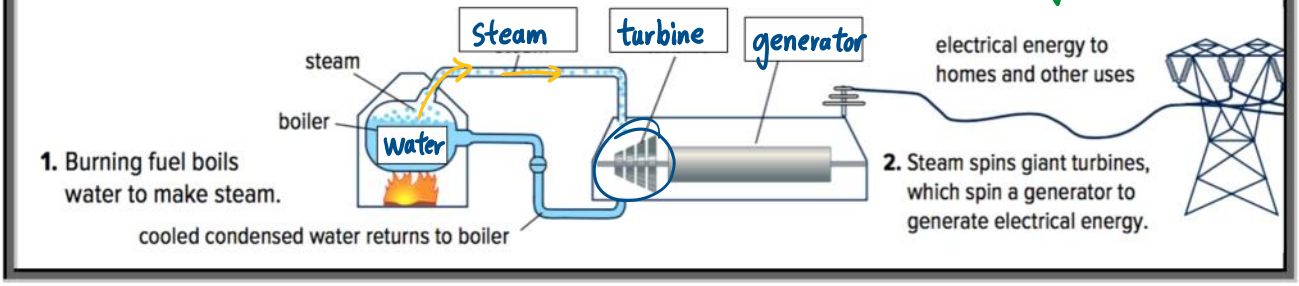
Water flowing through a dam spins giant turbines, which spin a generator to produce electrical energy.



Electrical Energy from Fossil Fuels

Generating station:

- Thermal (Heat) energy from burning coal is used to boil water into steam
- Pressure associated with moving steam turns the blades of turbine connected to generator

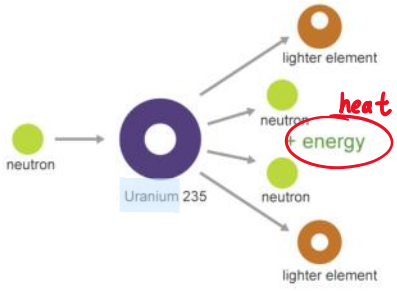


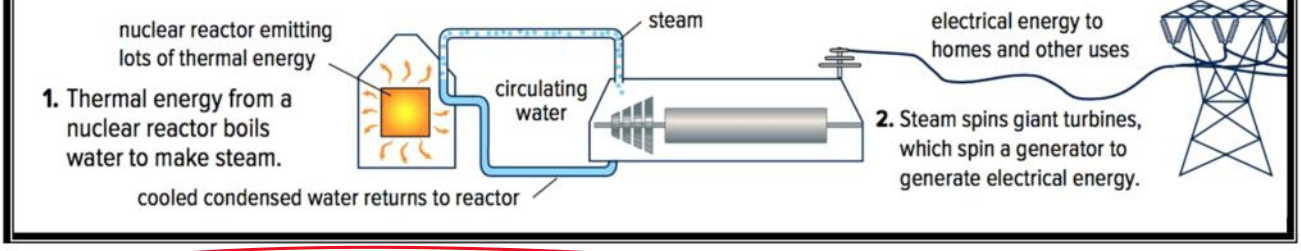
Electrical Energy from Nuclear Reactions

Nuclear reactor:

- Uranium or plutonium atoms undergo fission reactions
- Splitting one atom sets off a chain reaction that causes more atoms to split, which releases more energy
- Most of the energy is thermal energy (heat), which is used to boil water into steam
- Pressure from the moving steam turns turbines connected to generators

How fission splits the uranium atom





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