Sources of Electrical Energy

1. Chemical – Chemical sources accumulate charge through chemical processes.

2. Photo – Photoelectric materials emit electrons when they are struck by light.

3. Thermo – Some dissimilar metals generate current when heated.

4. Electromagnetic – A wire moving in a magnetic field generates current.

5. Piezo – Certain crystals generate current when stressed.

Batteries:

Convert chemical energy into electrical energy.

Made of electric or electrochemical cells.

Electric cells can be dry cells (i.e. flashlight battery) or wet cells (i.e. car battery), depending on the type of electrolyte.

Photocell:

Light energy is converted to electrical energy.

Light shining on a metal surface causes electrons to be emitted from the surface.

The electrons are gathered in a wire to create a constant flow of charge.

Thermocouples:

Produce electrical energy from heat energy.

Electric charges are released as a result of temperature differences.

Used as thermometers in cars to show engine temperature.

One end is placed in the engine, while the other is kept out of the engine.

As the engine gets warm, the temperature difference produces a flow of electrons.

The warmer the engine, the greater the temperature difference, and the greater the flow of charge.

The moving charges operate a temperature gauge that shows engine temperature.

Also used in ovens and gas furnaces.

Formulas for Board– SI-Science

$P = \frac{E}{t}$ $t = \frac{E}{P}$ $E = Pt$ $E = QV$ $P = IV$

Measured in

E (energy) = Joules.

I (current) = Amps.

Q (charge) = Coulombs

P (power) = Watts.

V (voltage) = Volts

t (time) = seconds

$$\text{Percent Efficiency} = \frac{\text{Useful energy out}}{\text{Total Energy in}} \times 100\%$$