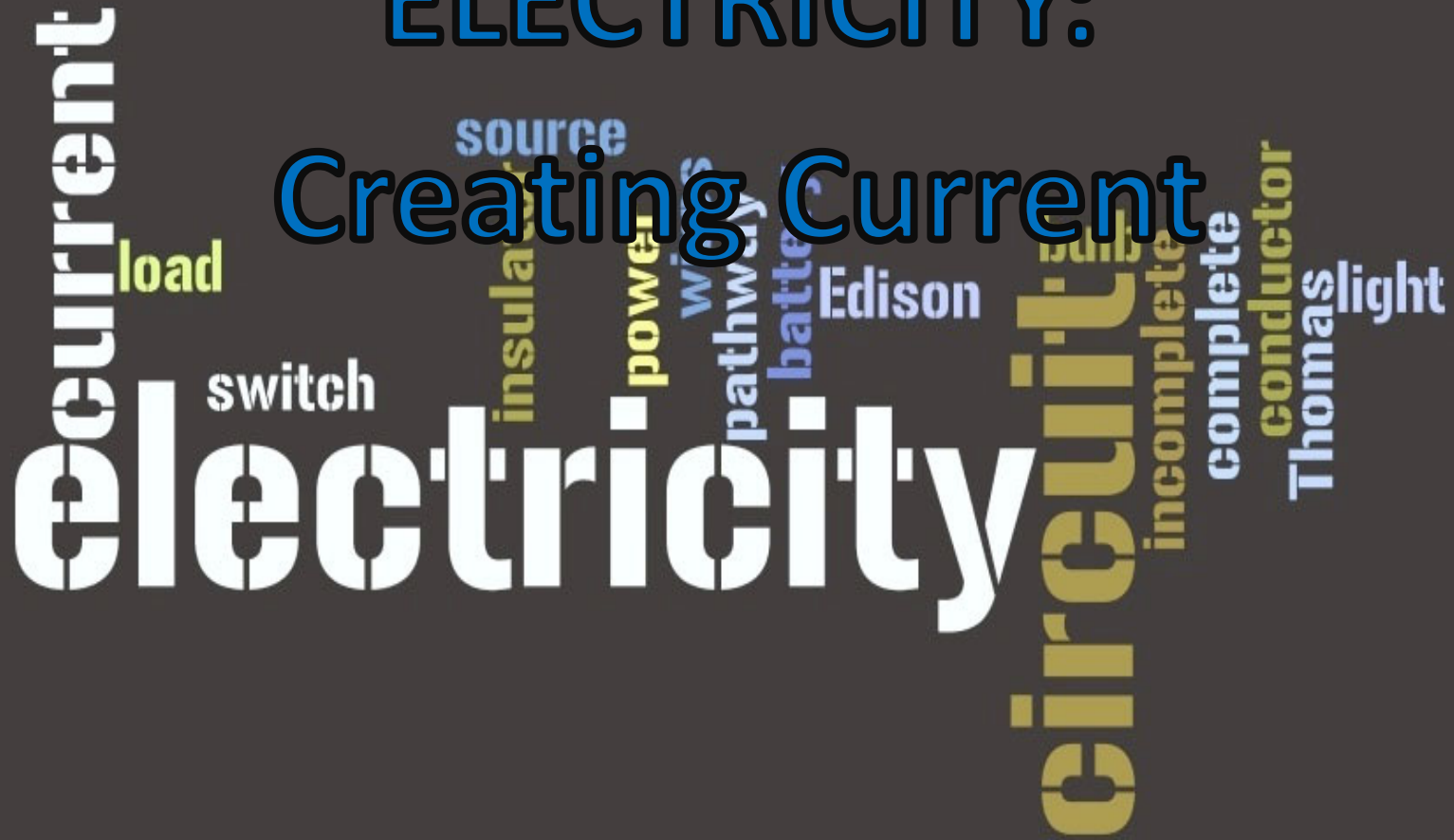


ELECTRICITY:

Creating Current



A word cloud on a dark gray background featuring various terms related to electricity. The words are arranged in different sizes, orientations, and colors (white, yellow, and blue). The most prominent words are 'electricity' (large, white, horizontal) and 'circuit' (large, yellow, vertical). Other visible words include 'current' (white, vertical), 'load' (yellow, horizontal), 'switch' (white, horizontal), 'source' (blue, horizontal), 'insulator' (yellow, vertical), 'power' (yellow, vertical), 'pathway' (blue, vertical), 'battery' (blue, vertical), 'Edison' (blue, horizontal), 'incomplete' (yellow, vertical), 'complete' (yellow, vertical), 'conductor' (yellow, vertical), 'Thomas' (yellow, vertical), and 'light' (white, horizontal).

current

load

switch

source

insulator

power

pathway

battery

Edison

incomplete

complete

conductor

Thomas

light

electricity

circuit

OUTCOME QUESTION(S):

S1-3-08:

What is “electricity” and how is it created?

Vocabulary & Concepts

Electricity Generator

Creating “Electricity”

- Different **sources** exist for **creating energy** from *free electrons* and *generating an electric current*
 - *Batteries*
 - *Solar Panels*
 - *Hydro Dams*
 - ...

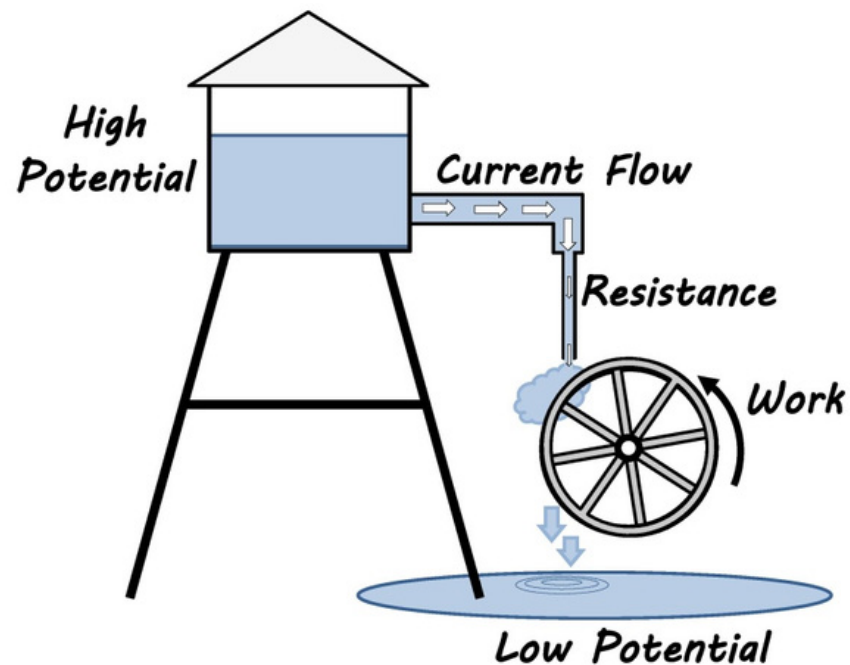
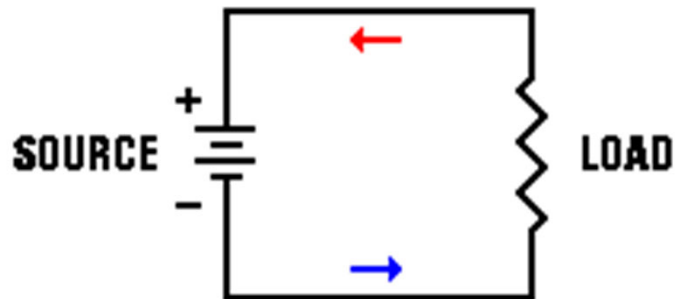
What other ways have you seen to create electricity?

(Current) Electricity:
the *flow of electrons* around a circuit.

Most electricity is created using two basic steps:

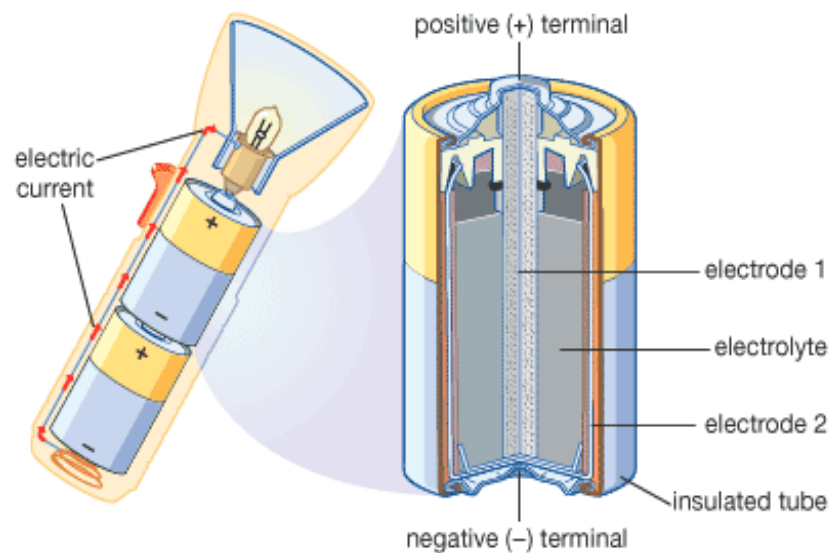
1. *Remove electrons* from one location *(takes energy)*
2. Let electrons *flow back* *(releases energy)*

Just **converting** one form of **energy** into another **form**



1. Chemical: source converts *chemical* energy into electrical energy.

- Reaction *separates electrons* from metal (+)
- *Energized* electrons collect at other metal (-)
- Electrons flow *back to (+) metal*
- Example: Batteries

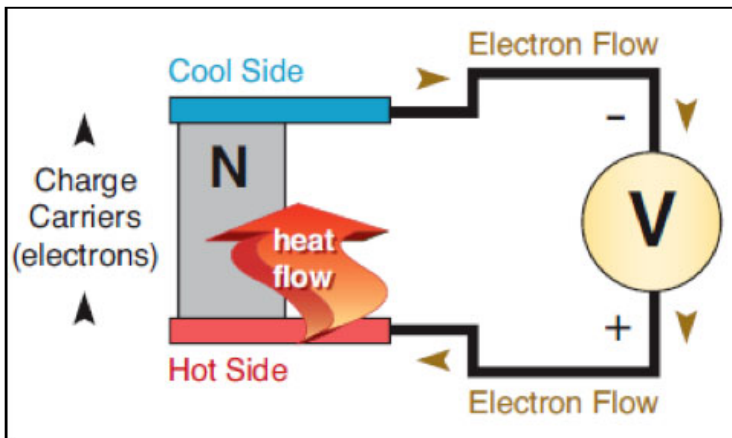


2. Thermoelectric: source converts *heat* energy into electrical energy.

- Metals *heated at one end* and cooled at other
- *Energized electrons* flow towards cool side

Example: thermocouple / thermopile

Thermocouples are used as safety control devices in furnaces, engines and appliances



3. Photoelectric: source converts *solar* energy into electrical energy.

- Light energy separates *electrons* from material
- *Energized electrons* accumulate on “collector”
- Creates a *weak* flow of electrons

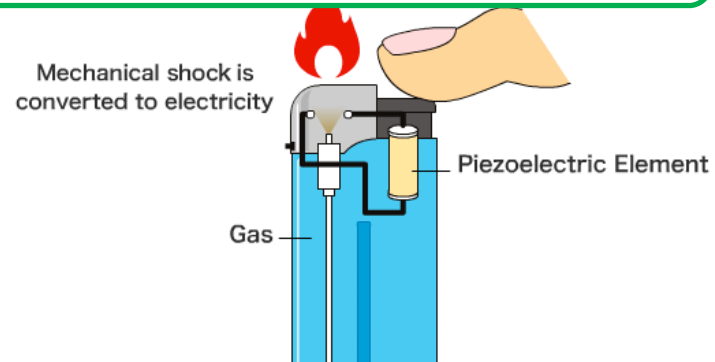
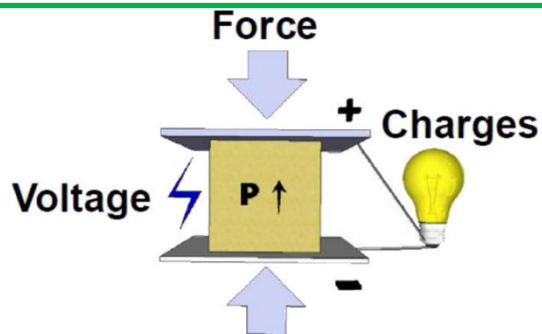
Remember: visible light is just one form of wave around us -
Some are low energy (radio wave) some high energy (x-ray)



4. Piezoelectric: source converts *mechanical* energy into electrical energy.

- (some) Materials **polarize** when squeezed
various crystals, ceramics, bone
- Creates **charge separation** across the faces
- **Electrons flow** when **faces are connected**
- Example: lighter

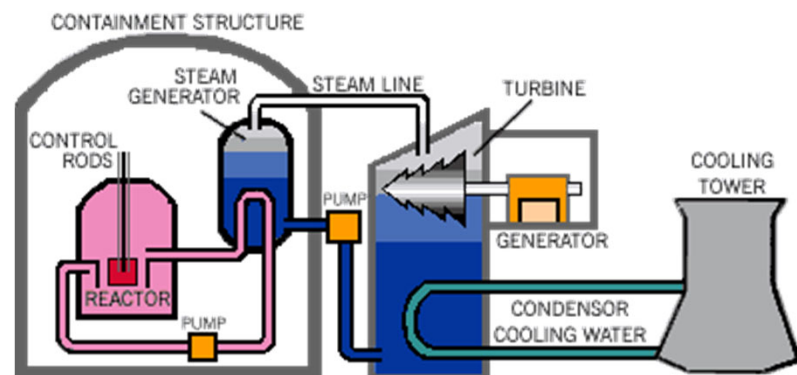
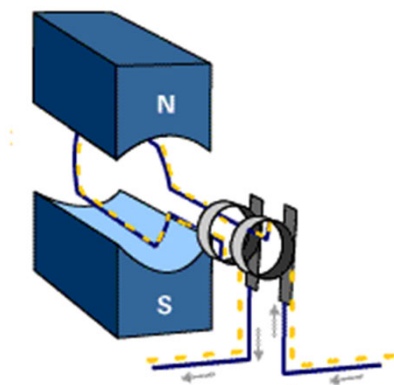
Piezo comes from the Greek word meaning *pressure*

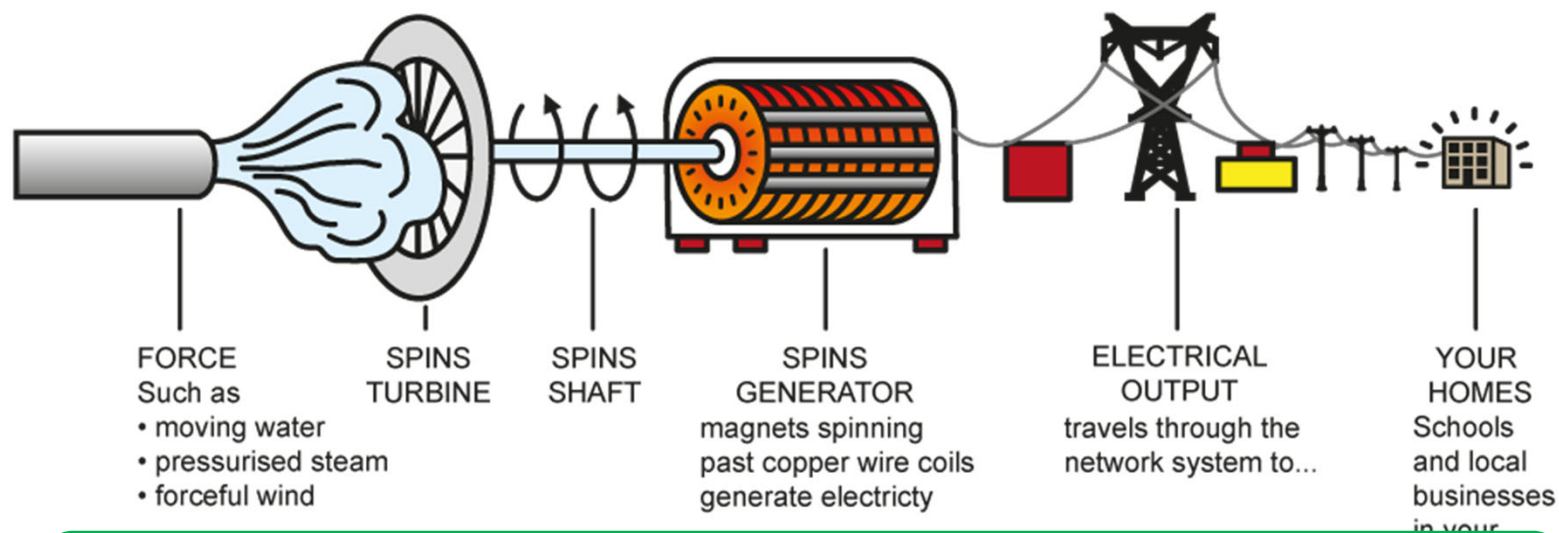


5. Electromagnetic: source converts *mechanical* energy into electrical energy.

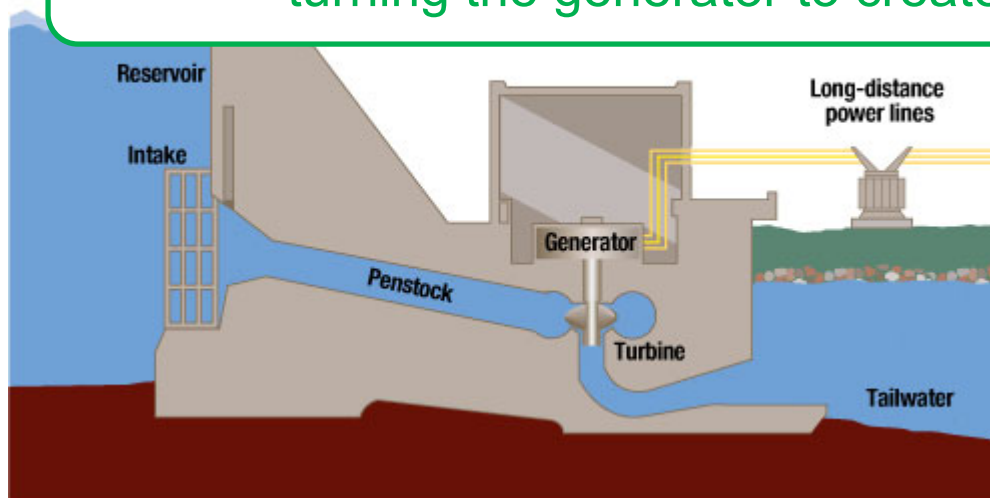
- Coil of *wire spinning* through a magnet creates a flow of *energized electrons*
- Example: generator

Note: an energy source is needed to turn generator:
wood, coal, gas, falling water, nuclear reaction, wind...





97.6% of Manitoba energy comes from dammed water turning the generator to create the electricity



**Manitoba
Hydro**

STATIC Vs. CURRENT ELECTRICITY

SIMILAR	DIFFERENT
Both: need <u>input of energy</u> to create charge <i>(friction or other source)</i>	Static: displaced electrons are <u>localized</u> Current: displaced electrons <u>move</u>
Both: 1 st step is charge separation 2 nd step is <u>charge transfer</u> <i>(neutral object or battery)</i>	Static: <u>brief</u> transfer of small amounts of charge Current: <u>continued</u> transfer of large amounts of charge
Both: will <u>discharge</u> <i>(run out)</i> when all electric charge is transferred back	Static: discharges <i>randomly</i> Current: discharges through a <u>conducting path</u>

CAN YOU ANSWER THESE QUESTIONS?

S1-3-011:

What is “electricity” and how is it created?

Vocabulary & Concepts

Electricity Generator