

Today

- Homework check
- Generators & Motors

$$\textcircled{3} \text{ c) } EI = 648,000 \text{ J}$$

$$Eff = 76\%$$

EO?

$$Eff = \frac{\text{Output}}{\text{Input}} \times 100\%$$

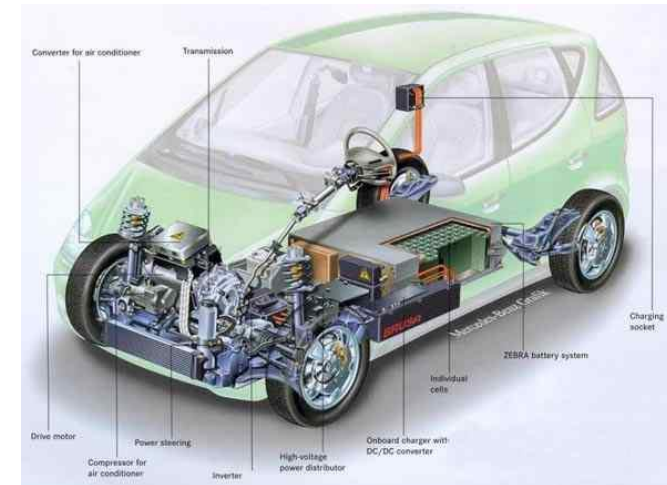
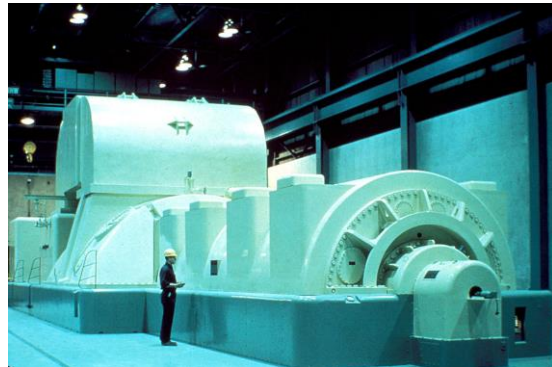
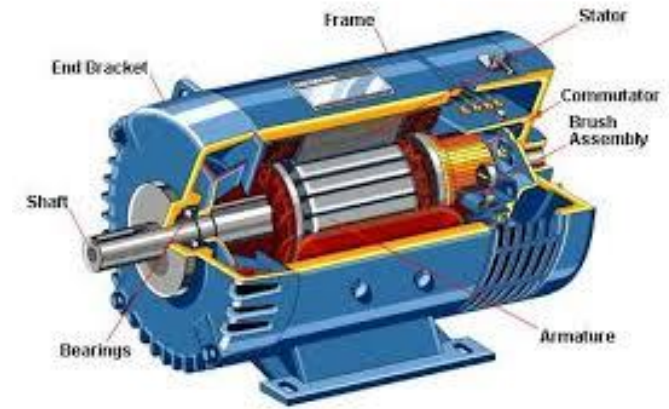
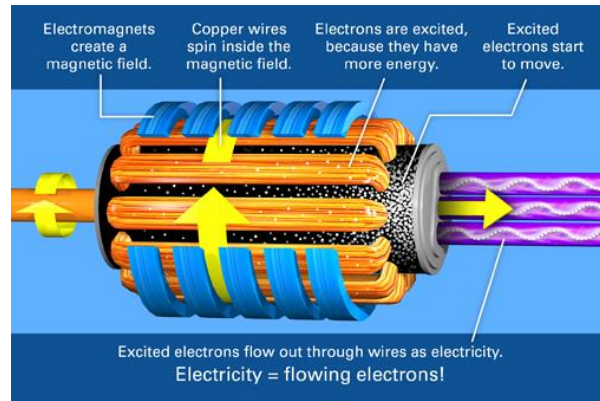
$$\frac{Eff \times \text{Input}}{100} = \text{Output}$$

$$\frac{76\%}{100} \times 648,000 \text{ J} =$$

$$\text{Output} = 492,480 \text{ J}$$

✓ Check Your Understanding – Answers

1. a.) 1200 W
b.) 648,000 J
c.) 92.3%
2. a.) 240 W
b.) 69% efficient
3. a.) 6750 V
b.) 648,000 J
c.) 492,480 J
6. a.) 583,200,000 J
b.) 279,936,000 J of energy saved
c.) The 52 W bulbs are more efficient.



3.2 GENERATORS & MOTORS

Generators

ELECTROMAGNETIC INDUCTION	Generation of electric <u>current</u> in a conductor by a changing magnetic field
GENERATOR	A machine that converts <u>mechanical</u> energy into <u>electrical</u> energy.

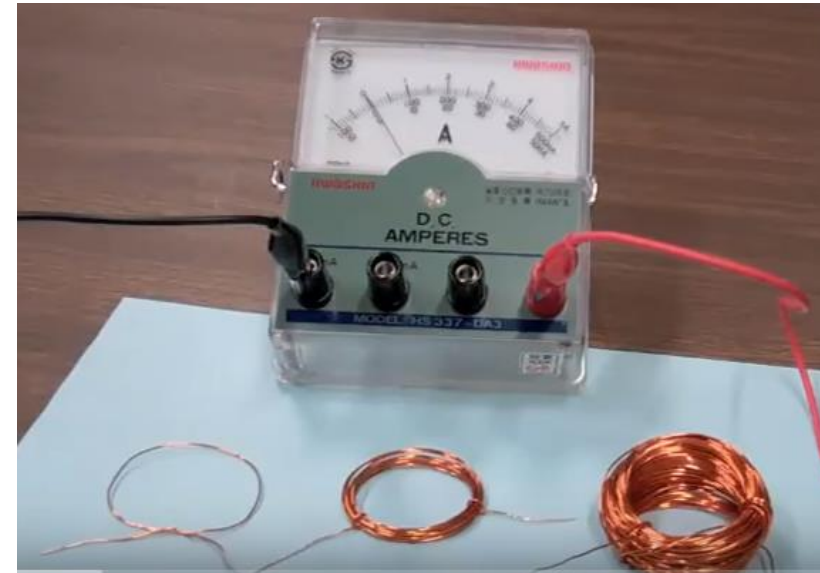
Electromagnetic Induction

- In 1831, Michael Faraday discovered electromagnetic **induction**
- Passing a bar **magnet** through a coil of wire produces current
- <https://youtu.be/hajlIGHPeuU>



Electromagnetic Induction

- <https://youtu.be/vwldZjld8fo>
- 3 ways to increase current:
 1. Increase the number of **wire coils**
 2. Increase the **speed** of the magnet
 3. Use a **stronger** magnet



Generators use Electromagnetic Induction

- The electricity that reaches our homes through power lines is produced using large machines called **generators**, which operate on the principles of electromagnetic **induction**



Motors

ELECTROMAGNET

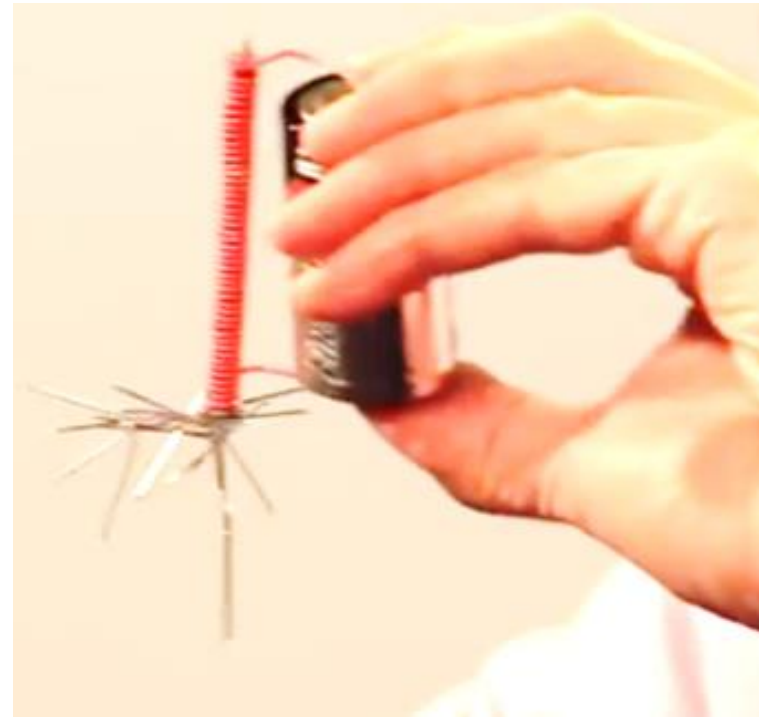
Coil of insulated wire usually wrapped around an iron core that becomes a magnet when current flows through it

ELECTRIC MOTOR

A machine that converts electrical energy into mechanical energy

Electromagnets

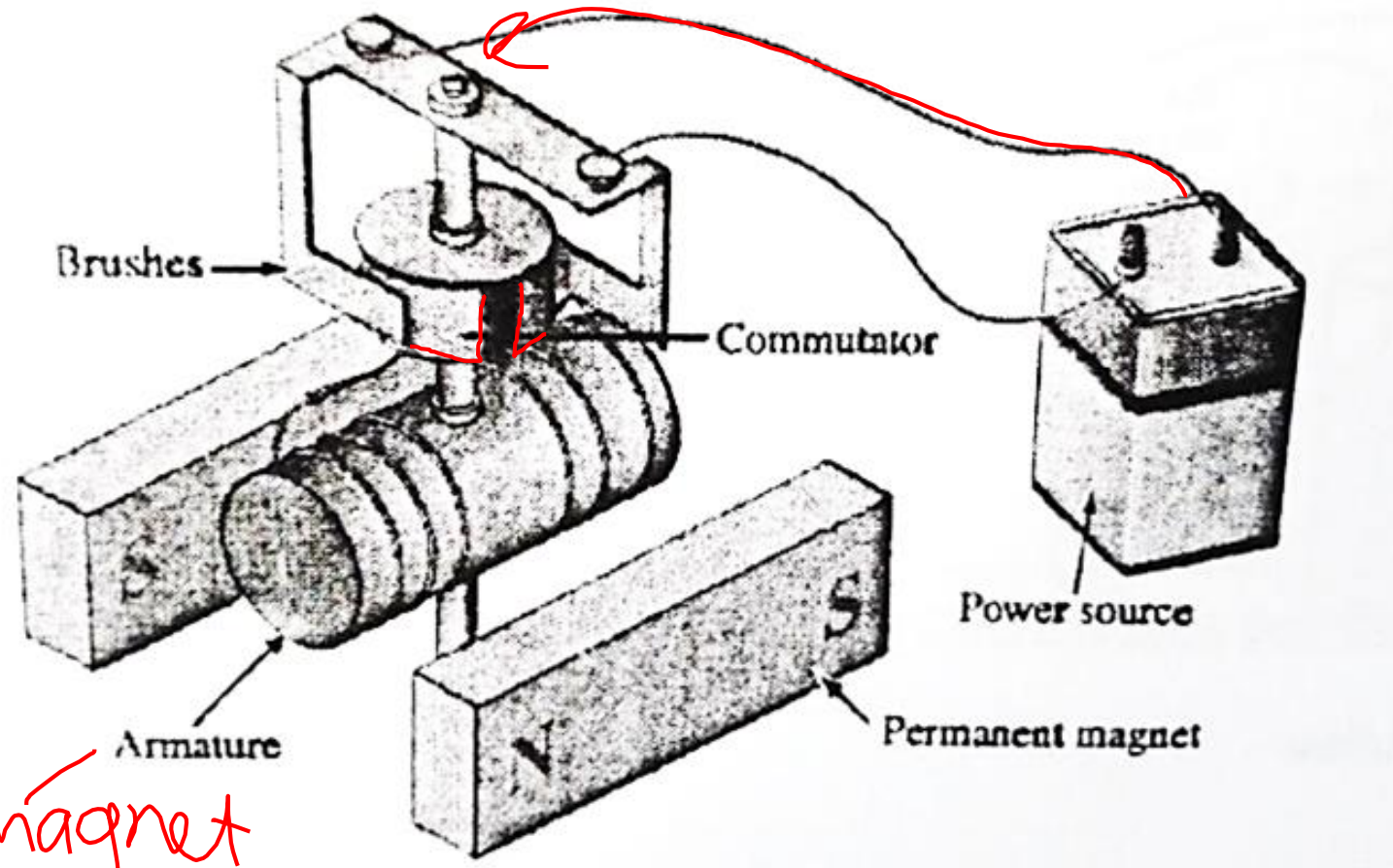
- Early experimenters discovered that they could make a strong magnet by sending current through a wire coiled around an iron rod
- <https://youtu.be/sFC7-WVNUP8>



Motors

- A motor consists of an electromagnet that is caused to spin by a permanent magnet
- Motors can be found in many machines, including:
 - junkyard - electromagnet
 - Blender
 - Magic Bullet
 - Microwave (Izzy)

Components of a St. Louis Motor



electromagnet

Components of a St. Louis Motor

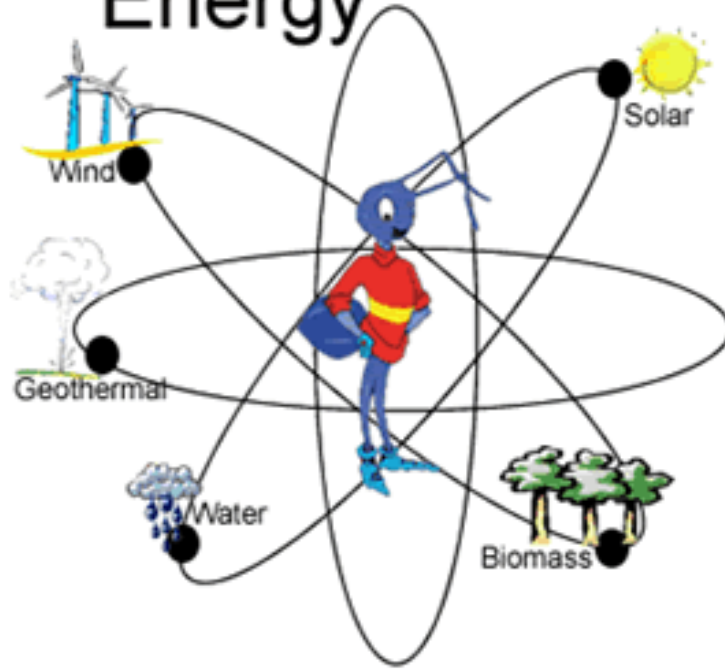
- **Armature** - spinning shaft with wire coiled around it; it spins due to repulsion and attraction from permanent magnets
- **Commutator** - split ring that that breaks the flow of electricity for a moment and then reverses the connection of the coil
- **Brushes** - makes electrical contact with the moving commutator by “brushing” against it.

✓ Check Your Understanding

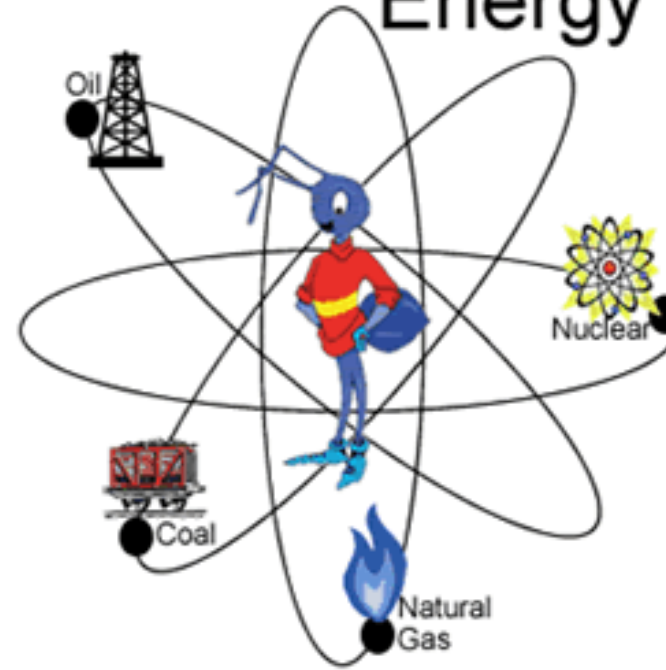
Front Bench Stations

1. Electromagnet
2. St. Louis Motor
3. Generator

Renewable Energy



Non-Renewable Energy



4.1 ELECTRICAL ENERGY SOURCES

How is Electricity Made?

- <https://youtu.be/NsQiVIPy6CA>
- Scan the QR code, or find the link on our website, to take the quiz!

