



Energy Transformations

Chemical Reactions, Nuclear Reactions and Light Energy Interactions with Matter

- Demo: Hot vs cold water and the movement of particles



Thinking and discussing:

- What is the difference between a chemical and a physical change?
- Recall Kinetic molecular theory and particle movement?

Energy is transformed in chemical reactions



- Energy in chemical bonds determines the amount of energy transformed
 - In an **endothermic reaction**, reactants have lower chemical potential energy than the products (feel cold)

Photosynthesis:



- Chloroplasts in plants and algae capture the Sun's energy and combine carbon dioxide and water to produce glucose (sugar) and oxygen
- Transformations: radiant energy into chemical potential energy stored in the bonds of the sugar molecules created.



cont'd

In an **exothermic reaction**, reactants have higher chemical potential energy than the products (feel warm)

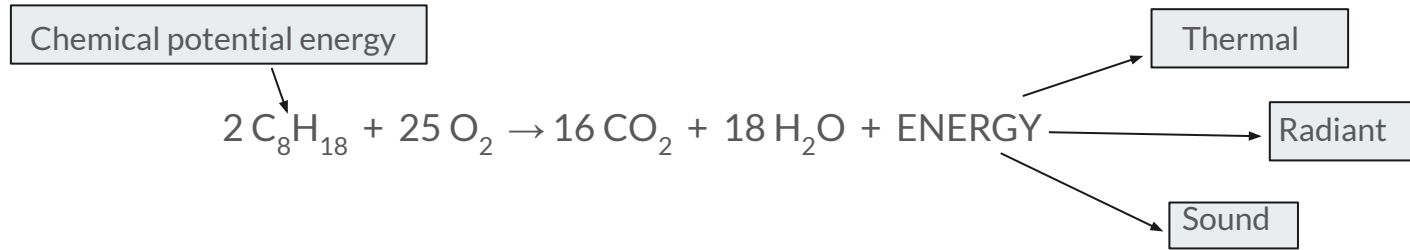
Cellular respiration:



- The mitochondria use this process to produce energy in the form of ATP (adenosine triphosphate)
- Transformations: chemical potential energy in sugar is first transferred to chemical potential energy in ATP, and then transformed into many different forms of energy: mechanical kinetic when muscles contract and electrical potential energy for conduction of a nerve impulse.

Energy Transformation and Fuels

- Fossil fuels contain large amounts of chemical potential energy



- Pollution is caused by contaminants such as sulfur and nitrogen.
- Chemical energy can be turned into electrical energy by fuel cells, that emit fewer pollutants.



Energy- Issues 21 p 8-9

1- READ the article

2. Consider the history of energy. How has the history affected our current understanding and usage of energy resources?

3. Where do you think the future of energy technology development is going in the future? What is your evidence from the issues 21 booklet?



Energy transfers and me: Journal entry

Answer the following questions in your journal:

1. How are photosynthesis and cellular respiration important for my survival?
2. How would Indigenous people's around the world use their knowledge of energy transfer for survival?
3. How could I use the knowledge of endothermic and exothermic reactions to help in my own life.

Issues 21: Read page 10/11 (Think/pair/share)



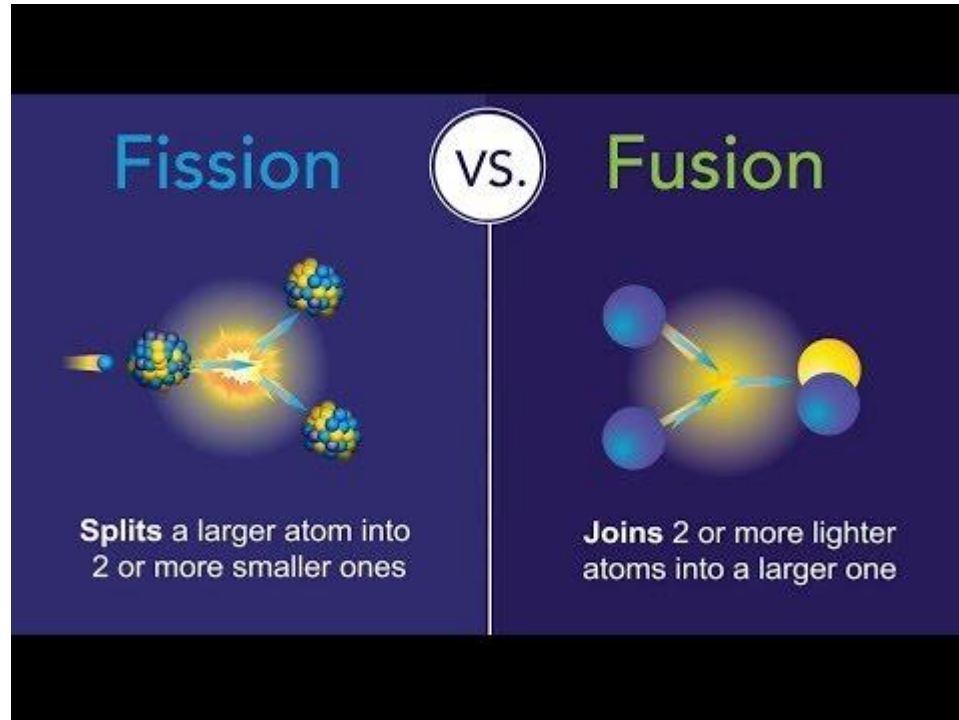
Class discussion around:

1. Which source of renewable energy is used the most in your community and province? The least?
2. What are the short and long term effects of limited, non-renewable sources of energy? How might different stakeholders react to these short and long term effects?
3. Who is more energy dependent: developed or developing nations? Why? Where the advantages of disadvantages of being energy dependent? What might an increasing need for energy suggest about our values and way of life? Should all people have a duty to care of about and conserve the environment? Why or why not?

Energy is transformed in nuclear reactions

Energy is transformed in nuclear reactions when atoms are changed into atoms of different elements.

Fission Vs Fusion





Think/pair/share- **RECORD** your answers

1. Compare the amount of energy transformed in chemical and nuclear reactions.
2. Use a Venn diagram to show the similarities and differences between nuclear fission and fusion.
3. Explain why the law of conservation of energy applies to nuclear reactions.

ISSUES 21 ENERGY: p 16/17 Nuclear Energy

Nuclear Energy assignment: Issues 21 and research

1. Issues 21 Read p 16 and 17

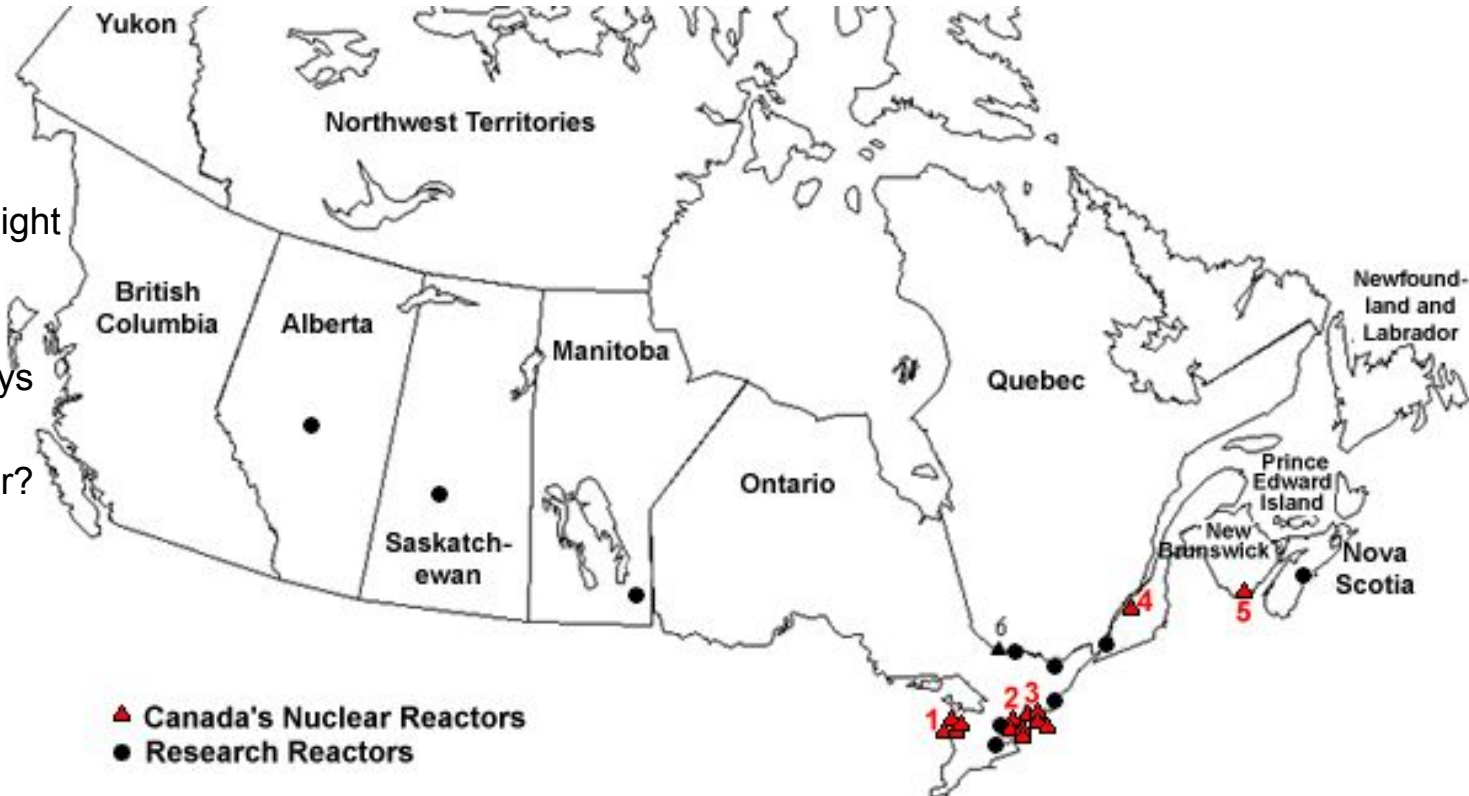
Write down one pro of nuclear energy that you find compelling, why?

Write down one con of nuclear energy that you find compelling, why?

2. Thinking about above, discuss whether Canada should/should not use nuclear energy as a power source.

Canadian context: Nuclear power- A discussion

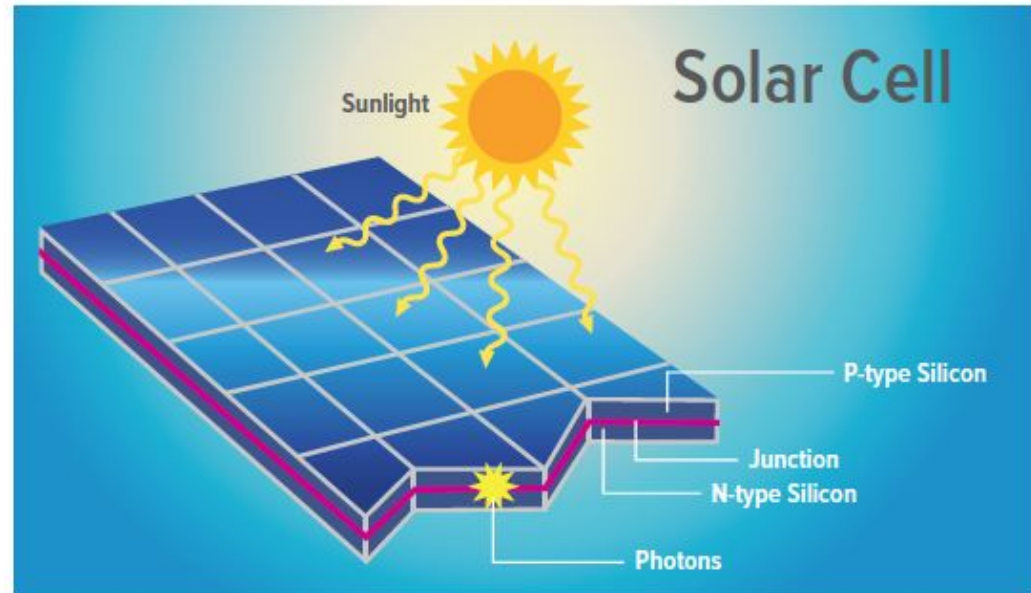
- What patterns do you notice?
- What factors determine when, where, why these reactors are built?
- Who lives in surrounding areas?
- What possible impacts might a reactor have on the community?
- Brainstorm options of ways the communities can voice their opinions on this matter?
- Who is responsible for communicating information about these reactors to the community?
- What information should they communicate?



Photovoltaic Cells

- Photovoltaic cells transform light energy into electrical energy.

Figure 3.31: Two types of silicon come into contact in a photovoltaic cell. Some electrons in the N-type jump into holes in the P-type. A separation of charge then attracts the other electrons. When these electrons absorb light energy, they are free to move across the cell, and a current flows through conductors into a circuit.





Vision

- The rods and cones in the retina of the eye absorb light energy.
- An electrical signal is sent by the optic nerve to the brain and an image is formed.



Discussion Questions

1. What role do electrons play in transforming light energy?
2. Compare human vision to a photovoltaic cell, in terms of energy transformation.

Dig Deeper Challenge



1. Read both of the choices individually and choose one of the following:
 - Effects of Radiation on Living tissues BC Connections 10 Textbook p 233
 - Storing Energy in Salt BC Connections 10 Textbook p 238
2. Create a poster on 8 ½ x 11” paper that answers and shares the information that you gathered in answering the 2 questions in the “dig deeper” section.
3. Record all resources used on a google document- you must print this and attach to the back of your poster.
 - Assessment 3.2 hand out (p 151-153 Do not do questions 5-7, and 11-13)