



IS IT RENEWABLE OR NON-RENEWABLE ENERGY?

Grade 5, Science and Technology

Source: Adapted from *Is it Renewable or Non-Renewable Energy?*, Earth Day Canada's EcoKids Program

DESCRIPTION

In this learning activity, students will work individually, with a partner, and in small groups to understand a variety of energy forms. They will learn to identify renewable sources of energy by playing the Energy Trivia Game and the Sunlight Rays and Pipelines Game.

CURRICULUM LINKS – SCIENCE AND TECHNOLOGY, GRADE 5

Understanding Earth & Space Systems – Conservation of Energy & Resources

Overall Expectations: 1, 2, 3

Specific Expectations: 1.1, 2.4, 2.5, 3.1, 3.2, 3.3

Understanding Matter & Energy – Properties of & Changes in Matter

Overall Expectation: 1

Specific Expectations: 1.1, 1.2

PLANNING NOTES

Materials

- 6 buckets
- Tape
- Tennis balls (1/team)
- Game pieces for *Sunlight Rays and Pipelines*
- Dice for *Sunlight Rays and Pipelines*
- *Energy Trivia Game Bucket Labels* (Appendix 1)
- *Energy Trivia Game Questions* (Appendix 2)
- *Sunlight Rays and Pipelines Gameboard* (Appendix 3)
- *Sunlight Rays and Pipelines Instructions* (Appendix 4)
- *Sunlight Rays and Pipelines Trivia Cards* (Appendix 5)

Prior Learning

The extraction, transportation, and processing of natural resources uses a lot of energy. Different energy sources have different impacts on the environment. Learning to assess the different environmental impacts will help our society make wise energy choices for a healthy, sustainable future.

Learning Skills & Work Habits

Collaboration, self-regulation, responsibility

Recommended Class Time

- 3 periods

TEACHING/LEARNING STRATEGIES

Introduction: Whole Class Discussion

1. Ask students to define what energy is and record responses.
2. Ask students to give examples from everyday life of how that energy is used and record responses.
3. Introduce the topic of renewable energy. Define the word renewable and record the suggestions given.
4. Think-pair-share. Have students identify various renewable energy sources and how they are used, share with a partner, and record their responses.
5. Depending on responses, discuss different renewable energy sources, such as solar, wind, geothermal, biomass, tidal, wave, and hydropower.
6. Introduce the topic of non-renewable energy. Think-pair-share about the definitions of renewable and non-renewable energy and record suggested definitions.
7. Lists sources of energy (coal, hydro, nuclear, tidal, wind, solar, petroleum [fossil fuels], biomass, geothermal, oil, natural gas) and ask students to place them under the headings "renewable" and "non-renewable." Have students compare notes with a partner and take up the answers with the class.

Enhancing Activity: Energy Trivia Game

Before introducing the game, divide students into teams of five or six. Please note that the Energy Trivia Game can also be played outside.

1. One student from each team plays one round of the Energy Trivia Game. The rest of the team members wait in line or at their desks, and are challenged to answer the questions for themselves. A new team member comes to the front to answer each round/question.
2. Students stand behind a taped line on the floor or asphalt. Lined up across from them are six plastic buckets with the following labels (see Appendix 1):
 - Ocean (tidal & wave) energy
 - Solar energy
 - Geothermal energy
 - Hydropower energy
 - Wind energy
 - Biomass energy
3. Each player is given a numbered tennis ball that represents their team.
4. Students hold their tennis ball in their hand and listen to the trivia question being read. Either the teacher or selected students can read the questions. Make sure that you indicate to the class that they can't throw their tennis ball until the entire question has been read.
5. When students know the answer, they throw their tennis ball into the correct bucket. Students who have the correct answer and successfully throw the ball so it remains inside the bucket earn a point for their team.
6. Once a question has been answered, the next student gets up to play. Encourage students to stay positive and

be supportive of team members. You can award points for best team spirit.

7. Remind students that if they step over the line or throw the tennis ball before the entire question is read, they will be disqualified.
8. To make the game flow better and eliminate cheating, have one or two students be the scorekeepers. Their responsibility is to identify which numbered balls land in the correct buckets and make sure students remain behind the taped line.
9. To consolidate learning, have students prepare a chart with the following column headings: Type of renewable energy; One thing I learned about this type of energy; One thing I would like to know more about.

Culminating Activity: Sunlight Rays and Pipelines

1. Students work in small groups of five or six to play the Sunlight Rays and Pipelines Game, which is similar to Snakes and Ladders.
2. Each group is given a *Sunlight Rays and Pipelines Gameboard*, *Sunlight Rays and Pipelines Instructions* containing the rules of the game, and *Sunlight Rays and Pipelines Trivia Cards*. (See Appendices 3-5)
3. When students are finished playing the first round, have them develop trivia questions of their own to use during the game. Depending on students' abilities, this step could be completed prior to playing the game.
4. Whole Class Discussion – Review the importance of renewable energy sources and discuss the long-term impacts on society and on the environment of the human use of non-renewable energy sources.

APPENDICES

Appendix 1 – *Energy Trivia Game Bucket Labels*

Appendix 2 – *Energy Trivia Game Questions*

Appendix 3 – *Sunlight Rays and Pipelines Gameboard*

Appendix 4 – *Sunlight Rays and Pipelines Instructions*

Appendix 5 – *Sunlight Rays and Pipelines Trivia Cards*



APPENDIX 1
IS IT RENEWABLE OR NON-RENEWABLE ENERGY?
ENERGY TRIVIA GAME BUCKET LABELS

OCEAN (TIDAL & WAVE) ENERGY



GEOHERMAL ENERGY



HYDROPOWER ENERGY



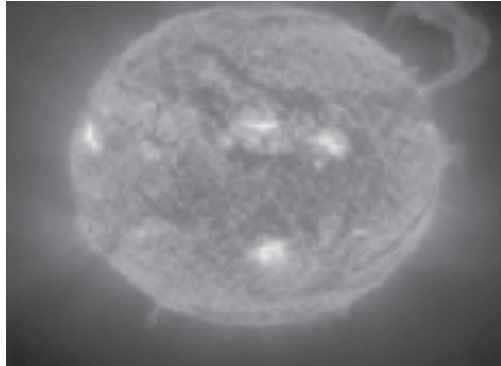
WIND ENERGY

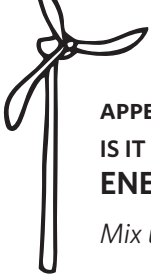


BIOMASS ENERGY



SOLAR ENERGY





APPENDIX 2

IS IT RENEWABLE OR NON-RENEWABLE ENERGY?
ENERGY TRIVIA GAME QUESTIONS

Mix up the questions for best results.

The oldest machines used for capturing this type of renewable energy were water wheels. What energy source am I talking about?

Answer: hydropower

Many of Canada's freshwater (rivers and lakes) have been used to produce this type of energy.

Answer: hydropower

This renewable energy source may cause significant environmental damage, such as flooding and the destruction of fish and wildlife habitats if not used carefully. What type of energy am I?

Answer: hydropower

Since Canada has more fresh water in its lakes and rivers than any other country in the world, we use this form of renewable energy more than any other to produce electricity.

Answer: hydropower

This form of energy is made by using the heat from the Earth's core. Which type of renewable energy am I talking about?

Answer: geothermal

Usually this type of energy source depends on a dam to raise the level of water in the reservoir. Which renewable energy am I?

Answer: hydropower

This energy is one of the most economical sources of renewable energy because it can be set up quickly and cheaply. What type of energy am I talking about?

Answer: wind

Which energy source captures the energy from the air?

Answer: wind

One of the oldest uses of this type of renewable energy is for transportation over oceans. Which am I?

Answer: wind

Which energy source uses the light and heat from the sun?

Answer: solar

This energy source depends on the wind blowing across the sea.

Answer: ocean (wave)

Which energy source makes your car hot when it is parked in the sun?

Answer: solar



APPENDIX 2

IS IT RENEWABLE OR NON-RENEWABLE ENERGY?

ENERGY TRIVIA GAME QUESTIONS *Continued*

What energy type makes the wind blow and the ocean currents flow?

Answer: solar

This energy source uses the pressure acting on the rocks and minerals of the Earth's core to make heat. Which renewable energy am I?

Answer: geothermal

What kind of energy uses geysers, hot springs, and steam vents to gather hot water and steam to heat our homes?

Answer: geothermal

This energy source gives us more energy in one second than people have used since the beginning of time.

Answer: solar

Which kind of energy sometimes find its way to the surface of the earth in the form of volcanoes and fumaroles (holes where volcanic gases are released)?

Answer: geothermal

One way to use this kind of energy is to bend or force waves into a narrow channel, increasing their power and size, which can then spin turbines.

Answer: ocean (wave)

Which energy source uses wood, straw, manure, and other natural materials that contain stored energy?

Answer: biomass

Which type of renewable energy uses any form of plant or animal tissue?

Answer: biomass

Which type of renewable energy uses the power of waves and tides to make electricity?

Answer: ocean (wave)

One of the oldest energy sources that humans have used is wood burning - which renewable energy is this?

Answer: biomass

Ethanol and methanol are alcohols, made from plant sugars. They are good examples of which type of renewable energy?

Answer: biomass

Which type of energy depends on the gravitational pull of the moon and sun, and the rotation of the Earth?

Answer: ocean (tidal)



APPENDIX 3

IS IT RENEWABLE OR NON-RENEWABLE ENERGY?
SUNLIGHT RAYS AND PIPELINES GAME BOARD

91	TRIVIA CARD	71	TRIVIA CARD	51	50	31	30	TRIVIA CARD	10
92	89	TRIVIA CARD	69	52	49	32	24	12	9
93	88	73	68	TRIVIA CARD	48	33	TRIVIA CARD	13	8
94	87	74	67	54	47	TRIVIA CARD	27	14	7
95	86	TRIVIA CARD	66	55	46	35	26	15	6
96	85	75	65	56	45	36	25	TRIVIA CARD	5
TRIVIA CARD	84	77	TRIVIA CARD	57	44	37	24	17	TRIVIA CARD
98	TRIVIA CARD	78	63	58	43	38	28	18	3
99	82	79	62	TRIVIA CARD	42	TRIVIA CARD	22	19	2
finish	81	80	61	60	41	40	21	20	start



BLM 1.4.b
EcoKids
LATER DAY CANADA

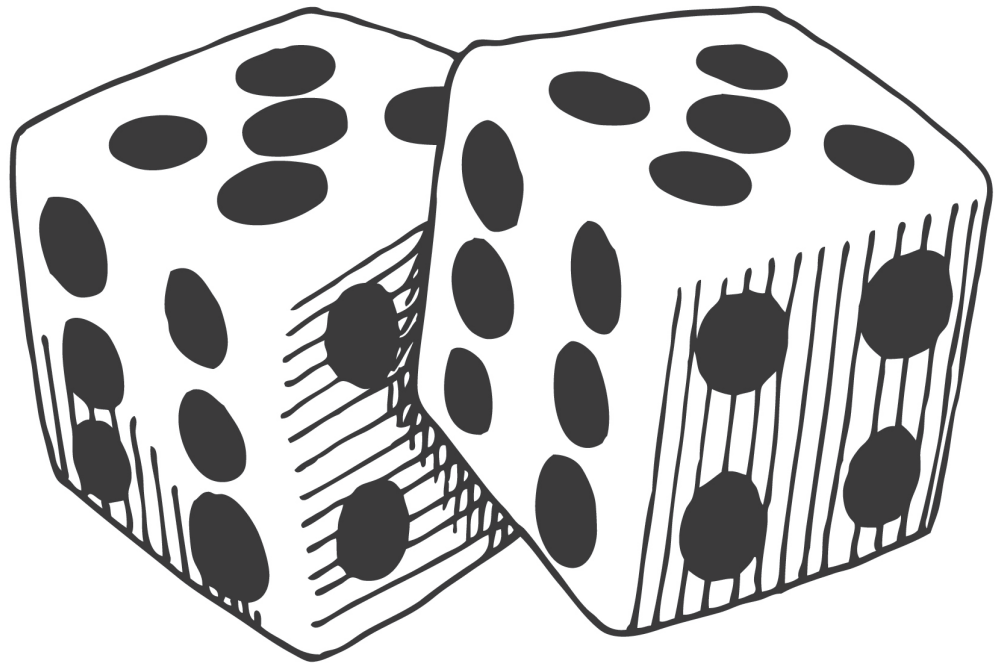


APPENDIX 4
IS IT RENEWABLE OR NON-RENEWABLE ENERGY?
SUNLIGHT RAYS AND PIPELINES INSTRUCTIONS

Choose a game piece and place it on the start space of the game board.

Take turns rolling the die to determine who will play first. The person with the highest number goes first. Continue taking turns in a clockwise order from the first person.

- If you land on a **pipeline**, you must slide down because you are drilling for fossil fuels and this contributes to the greenhouse effect.
- If you land on a **ray of sunlight**, you must slide up because you are using solar energy, which is renewable energy.
- When you land on a **trivia card** space, a group member selects a card from the top of the card deck and reads the trivia question. If the player answers the question **correctly**, they can roll the die again and have another turn. If they answer **incorrectly**, the player remains on the same space. The trivia card is placed at the bottom of the pile.
- The first person who lands directly on the **finish space** wins the game. To land directly on the finish space, the student must roll the exact number needed to move there.





APPENDIX 5
IS IT RENEWABLE OR NON-RENEWABLE ENERGY?
SUNLIGHT RAYS AND PIPELINES TRIVIA CARDS

Hydropower produces _____ of Canada's electricity?

- a. 25%
- b. 61%
- c. 87%

Answer: b

Hydroelectricity is generated using the energy from _____ water.

Answer: falling/stored

What kind of damage can the use of hydropower cause?

Answer: flooding; loss of habitat

Water wheels are the oldest type of machine for capturing what type of renewable energy?

Answer: hydroelectrical

Geothermal energy is produced using heat from where?

Answer: the Earth's core

What kind of energy uses geysers, hot springs, and steam vents to gather hot water and steam to heat our homes?

Answer: geothermal

What kind of renewable energy source can be harnessed using small, portable chargers?

Answer: solar

Solar energy is captured and turned into _____ or electricity.

Answer: heat

What kind of energy makes plants grow, helping them make food and oxygen?

Answer: solar

Solar energy produces both the wind and _____ currents.

Answer: ocean

Biomass energy is made from _____ and _____ tissue.

Answer: plant, animal

True or False? Landfill gas is a form of biomass energy.

Answer: true

True or False? There are no negative impacts caused by biomass energy.

Answer: false - biomass energy adds greenhouse gases to our air

Oil, coal, and natural gas are examples of _____ energy, whose use contributes to global warming.

Answer: non-renewable energy

Wind energy is captured by large _____ that are placed high on towers and are turned by the wind.

Answer: windmills/turbines

Low costs, quick set up, and only a small environmental impact have made _____ power the fastest-growing new energy source.

Answer: wind

True or False? Offshore and high-altitude locations are best for wind turbines.

Answer: true

What type of renewable energy was first used for transportation?

Answer: wind - sailboats

The blowing wind generates wind power, and when it blows across the sea it also creates _____ energy.

Answer: ocean - tidal/wave

Which of these energy sources comes from the ground?

- a. Coal
- b. Oil
- c. Geothermal energy
- d. Natural gas
- e. All of the above

Answer: e