

People for Energy and Environmental Literacy (PEEL)

Lesson Plan 4

Renewable Energy 101

Basic Level

Intermediate Level

Advanced Level

Date: January 2019

Version 1.1

Summary of Activity

Grade: 3 – 12

Subject: Science, Social Studies

Time: 2 – 3 Hr

Theme: Renewable Energy

Description:

This lesson introduces the five types of renewable energy: wind, solar, hydro, geothermal and biomass. Students will learn the basics of each type, which they can then use to further their learnings in lessons 5 to 8. Students will be able to differentiate between renewable and non-renewable energy and list the benefits of each. Three presentations are available:

Basic level – Grades 3-5

Intermediate level – Grades 6-8

Advanced level – Grades 9-12

What's included:

PowerPoint file – Renewable Energy 101 – Basic Level (Grades 3-5)

PowerPoint file – Renewable Energy 101 – Intermediate Level (Grades 6-8)

PowerPoint file – Renewable Energy 101 – Advanced Level (Grades 9-12)

Each PowerPoint file has notes on each slide with questions and advice for the instructor.

The lesson can be completed over two or three class periods. There are activities at the end of the presentation that students can complete to test their understanding of the material.

Overview

Students are introduced to the different types of renewable energy and how they differ from non-renewable energy. Students will learn at a high-level, the basics of wind, solar, hydro, geothermal, and biomass energy generation. This lesson is intended to provide a foundation for the following lessons. Students will learn about the type of energy conversion each energy source conducts. In the Resources section of this Lesson Plan, there are two publications by Natural Resources Canada and several videos. These resources are supplemental to the presentation, which may be shown to students to further their understanding and answer any questions they may have.

Curriculum Links

The table below provides a guide to some of the curriculum links between this lesson plan and grades and subjects.

Table 1: Curriculum links to this lesson plan

Grade Level	SUBJECT			
	Science	Social Studies	Career & Technology Studies	Environment and Outdoor Education
3		Global Citizenship	<ul style="list-style-type: none"> Environmental Stewardship Occupational Area, Primary Resources Occupational area, Agriculture Occupational Area 	<ul style="list-style-type: none"> Part of a complex global environment Human life and life styles are dependent on environmental resources Humans influence environment through direct and indirect means Principles of conservation
4	Waste and Our World	Alberta: A Sense of Land		
4	Plant Growth and Changes	Alberta: Celebrations and Challenges		
5	Electricity & Magnetism			
6		Citizens Participating in Decision Making		
7	Interactions and Ecosystems			
8	Light and Optical Systems			
8	Mechanical Systems			
9	Environmental Chemistry	Issues for Canadians: Economic System in Canada and the United States		
10	Energy and Matter in Chemical Change			
10	Energy Flow in Technological Systems			
10	Energy Flow in Global Systems			
10	Stewardship			
11	Science Technology and Society			
12	Chemistry and the Environment			
12	Energy and the Environment			

In addition to curriculum links, there are also direct links to the Alberta 21st Century Learner competencies.

CRITICAL THINKING	COMMUNICATION
PROBLEM SOLVING	COLLABORATION
MANAGING INFORMATION	CULTURAL AND GLOBAL CITIZENSHIP
CREATIVITY AND INNOVATION	PERSONAL GROWTH AND WELL-BEING

Figure 1: Alberta 21st Century Learner Competencies

This lesson focuses on the following learner competencies:

- Critical Thinking
- Managing Information
- Cultural and Global Citizenship

Energy and Environmental Learning Outcomes

By the end of the lesson, students should be able to:

- Understand the difference between renewable and non-renewable energy, and defining each
- Identify the five types of renewable energy discussed
- Know what the Natural Resources Canada definition of renewable energy is
- Understand at a high level how each of the renewable energy systems converts the resource to energy
- List the benefits of renewable energy
- Be aware of the planned coal phase-out in Alberta and the shift towards renewable development (Advanced)

Planning Notes

Materials

- Renewable Energy 101 PowerPoint presentation (different versions available as applicable)

Prior Learning

There is no prior learning required for this lesson, although it is beneficial if students have gone through lessons 1, 2 and 3.



Teaching/Learning Strategies

This lesson can be taught with the slide presentation, or with alternative research and analysis completed on their own. The presentation contains a small quiz at the end to test what students have learned.

Instructions

Pre-activity discussion

It may be beneficial for teachers to ask students what they already know of renewable and non-renewable energy. Depending on their knowledge base, students could proceed directly to the specialized renewable energy topics (Lessons 5-8).

Activity

Test student's knowledge with solving a crossword puzzle. Students may also complete a renewable energy word search.

Post-Activity questions (Follow up questions)

1. What type of renewable energy do you think is the most suited to Alberta? Consider Alberta's geography, climate, and economics.
2. What type of renewable energy is least suited to Alberta?

Extension

Ask students if they can think of any other ways they can harvest energy from a renewable source.

Resources

All resources are identified in the PowerPoint Presentation in the notes section.

Print resources

This lesson has two print resources in the Activity section, below. You can choose from a renewable energy-themed word search or crossword puzzle.

Websites

- Natural Resource Canada (NRCan) has a page on their website called *About Renewable Energy*. This text discusses the five types of renewable energy and their presence in Canada.
 - <https://www.nrcan.gc.ca/energy/renewable-electricity/7295>
- NRCan has another page titled *Renewable Energy Facts*. This page takes a closer look at renewable energy production in Canada by type and provides a comparison of Canada's standing to other countries.
 - <https://www.nrcan.gc.ca/energy/facts/renewable-energy/20069>



Videos

- The following is a YouTube video published by National Geographic. The video discusses what renewable energy is and in high level the five renewable energy technologies.
 - <https://www.youtube.com/watch?v=1kUE0BZtTRc>
- The videos linked below are by Student Energy on YouTube. They are all short videos that discuss the basics of each type of renewable energy type. These videos provide supplemental information to the presentation slides.
 - Wind Energy (1 minute, 45 seconds):
 - <https://www.youtube.com/watch?v=Z5c50-hcD0>
 - Solar PV (1 minute, 51 seconds):
 - <https://www.youtube.com/watch?v=gl5tY5Noacc>
 - Hydropower (3 minutes, 13 seconds):
 - <https://www.youtube.com/watch?v=q8HmRLCgDAI>
 - Geothermal (2 minutes, 8 seconds)
 - <https://www.youtube.com/watch?v=DFQrE91kZwk>
 - Biomass (3 minutes, 38 seconds):
 - <https://www.youtube.com/watch?v=yHWcddUZ35s>

GreenLearning.ca

The following resources are GreenLearning activities that are related to this PEEL topic.

- Re-Energy: <http://www.greenlearning.ca/programs/re-energy/>

Data References

References are available in the Renewable Energy 101 presentation in the notes section of the PowerPoint Document.

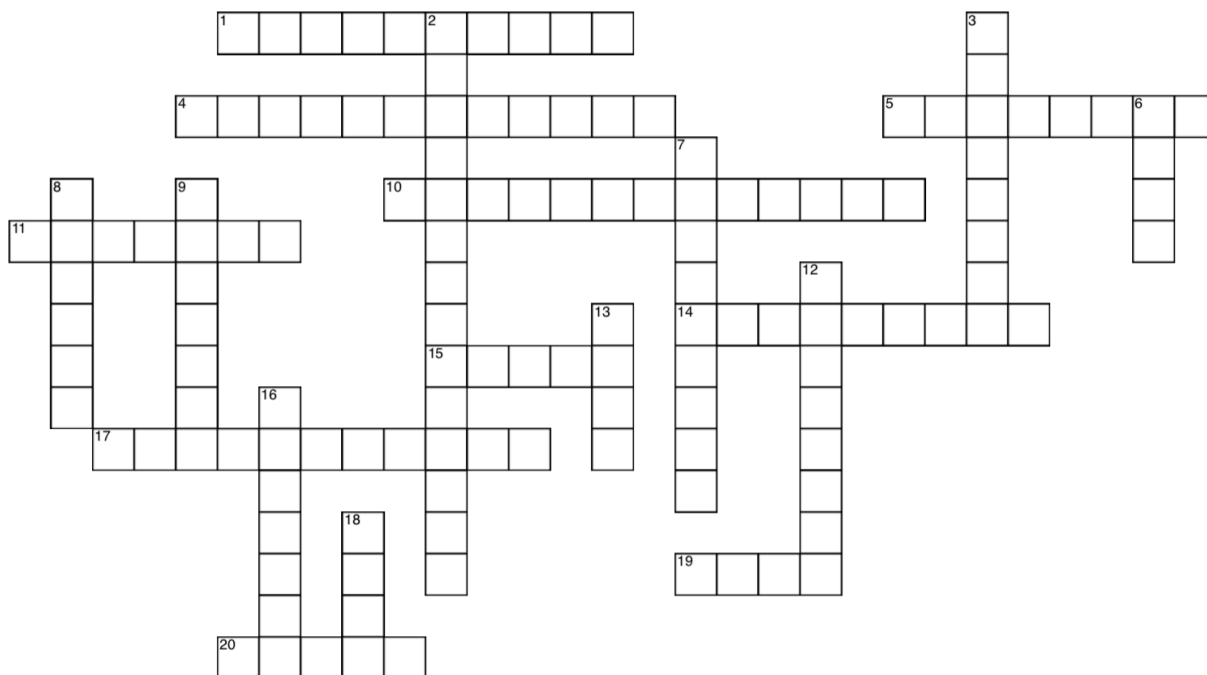
Feedback

We are continuously interested in improving and updating this lesson plan. Please send your feedback to info@teachpeel.ca.

ACTIVITY – RENEWABLE ENERGY CROSSWORD PUZZLE

Complete the crossword puzzle to test your knowledge of renewable energy concepts

RENEWABLE ENERGY CROSSWORD



ACROSS

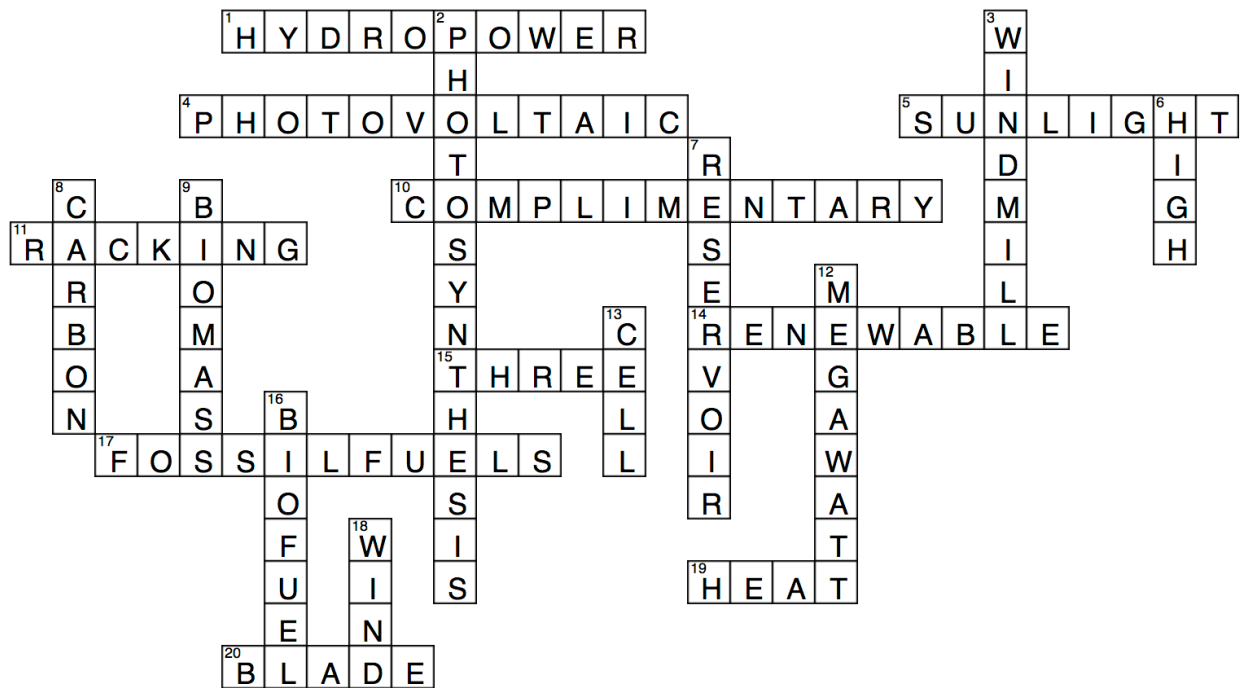
1. Electrical generation from water
4. Using light to generate electricity
5. Solar PV converts _____ to electricity
10. Wind and solar are _____ to one another
11. The structure used to hold solar modules
14. Alberta is shifting towards _____ energy generation
15. A wind turbine typically has _____ blades
17. Geothermal is a potential replacement for what?
19. Geothermal uses the Earth's _____ to generate electricity
20. The part of a turbine that spins

DOWN

2. How a plant gets its own energy
3. A wind turbine is not a _____
6. Southern Alberta has _____ wind and solar potential
7. The storage of water for later use
8. An emission
9. Renewable energy source from organic material
12. A unit of energy
13. The smallest component of solar PV
16. A fuel made from biomass
18. Energy source of a turbine

ACTIVITY – RENEWABLE ENERGY CROSSWORD PUZZLE ANSWERS

RENEWABLE ENERGY CROSSWORD



ACTIVITY – RENEWABLE ENERGY WORD SEARCH

Complete the word search below



Biofuel
Biogas
Biomass
Blade
Cell
Chemical
Dams
Electricity
Energy
Environment
Ethanol

Garbage
Generator
Geothermal
Green
Hydropower
Megawatt
Offshore
Panel
Peel
Photosynthesis
Photovoltaics
Renewable

Reservoir
Run of River
Solar
Steam
Sunlight
Sustainability
Turbine
Water
Well
Wind
Wood



ACTIVITY – RENEWABLE ENERGY WORD SEARCH ANSWERS

