Lesson Four: Renewable Energy

6.ESS3.1 Differentiate between renewable and nonrenewable resources by asking questions about their availability and sustainability. 6.ESS3.2 Investigate and compare existing and developing technologies that utilize renewable and alternative energy resources.

Engage

Image

Videos

Energy Usage	Fossil Fuels	Natural Gas

Coal	Nuclear	The Student Energy Project

Identifying the Problem

In your own words, state the problem that we will be addressing. Why is this a problem? Why do we need a solution?

Explore and Explain: Working Through Text

Directions: Read pages 178–185 and answer the following questions as they guide you in understanding renewable energy resources.

Page 178

1. My Planet Diary: Why do you think Picken's decision was so surprising?

2. Do you think more focus should be put on finding sources of energy other than oil? Explain.

3. List the sources of renewable energy that are available to us.

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4. Define solar energy

5. What are three benefits of solar energy?

One:
Two:
Three:

6. What are two reasons why solar energy hasn't replaced fossil fuels?

One:
Two:

7. How is solar power used to generate electricity in solar power plants?

8. What are solar cells able to do?

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9. What is passive solar heating? What is an example?

What Is It:
Example:

10. What is Active Solar heating? What is an example?

What is it:
Example:

Figure 2

11. Label the following as **passive** or **active** solar heating

Sunlight Abosrbtion	
Solar Water Heater	
Solar Cells	
Backup Heat Source	
Window Design	

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12. Arrange the parts of the water cycle using 1-4, starting with evaporation.

	Condensation – The water vapor cools, condenses, and forms clouds
	Accumulation- The water collects and flows on earth's surface
	Precipitation – The water falls back to earth as rain, sleet, snow, or hail.
1	Evaporation – The heat from the sun turns water into water vapor

13. Define hydroelectric power

14. Arrange, using the numbers 1-3, how electricity is generated using water.

	When a dam's gates are open, water flows through tunnels at the bottom of the dam, which turns large fans called turbines
	The turbines are connected to a generator, which converts the mechanical energy of the water and turbines into electricity.
	A dam is built across a river, blocking the flow of water

15. List advantages & disadvantages of generating hydroelectric power according to the text.

Advantage:
Disadvantage:

16. Arrange, using numbers 1-4, to show how wind is formed from the sun's energy.

	We feel the rising of warm air and sinking of cool air as wind.
	Different areas of the atmosphere have different temperatures and air pressures
	The sun heats the Earth's surface unevenly
	Differences in air pressure cause warm air to rise and cooler air to sink.

17. What are wind farms?

18. Why do you think wind is the fastest growing energy source in the world?

19. List advantages & disadvantages of generating nuclear power according to the text.

Advantage:
Disadvantage:

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20. Define Biomass fuel and provide examples.

Define:
Examples:

21. Tell what the following byproducts of biomass fuels are used for.

	Corn, sugar cane, and other crops are used to make alcohol, which is added to gasoline to create gasohol.
	Bacteria produce methane gas by decomposing biomass materials in landfills.
	Crops, such as soybeans, produce oil.

22. What are some disadvantages of biomass fuels?

Disadvantages:

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23. Define geothermal energy

24. Where is geothermal energy being used today?

25. What are some disadvantages of geothermal energy?

Disadvantages:

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26. What are two renewable technologies being used for cars and transportation?

27. Explain how the following technologies work.

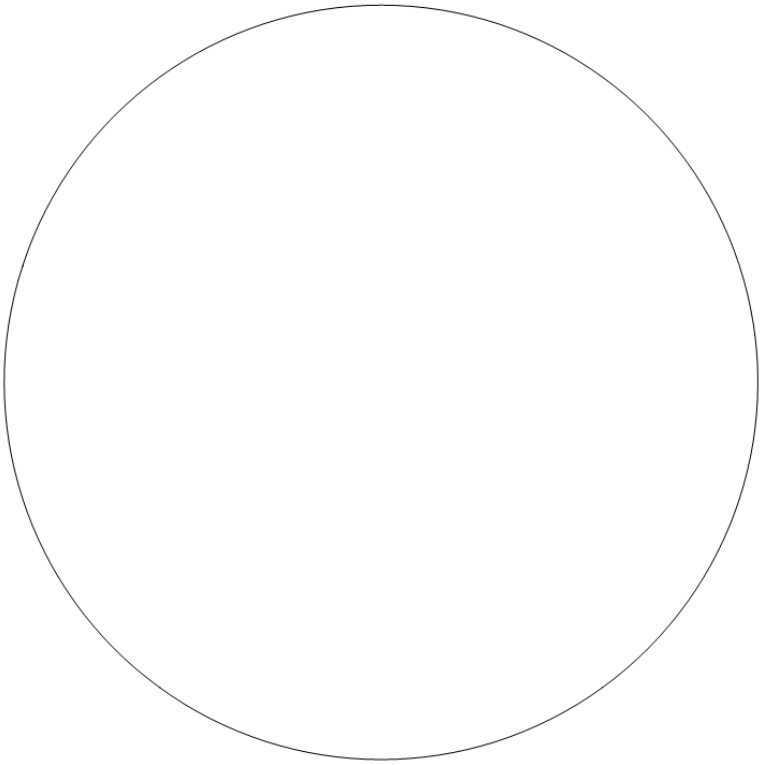
Electric Cars:
Hydrogen Cars:

Evaluate: Click on the "Energy Image" and answer the following

1. What do you notice about the data presented?

2. Do you think this is good or bad? Why?

3. Create a pie chart for what you believe would be the ideal way we use energy resources.



4. Write your new percentages for the following energy resources. (Reminder: They have to add up to 100).

Oil:

Natural Gas:

Coal:

Nuclear Power:

Renewable:

5. How is yours different?

6. What steps do would we as a nation have to take to achieve this?
