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Science Standard
6.6.a.

CALIFORNIA EEI Education and the Environment Initiative

Student Workbook

California Education and the Environment Initiative

Energy: It's Not All the Same to You!

California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency
California Natural Resources Agency
Office of the Secretary of Education
California State Board of Education
California Department of Education
California Integrated Waste Management Board

Key Leadership for the Education and Environment Initiative:

Linda Adams, Secretary, California Environmental Protection Agency
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Andrea Lewis, Assistant Secretary for Education and Quality Programs, California Environmental Protection Agency
Mark Leary, Executive Director, California Integrated Waste Management Board
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Key Partners:

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Lesson 5 Energy Choices—No Free Lunch

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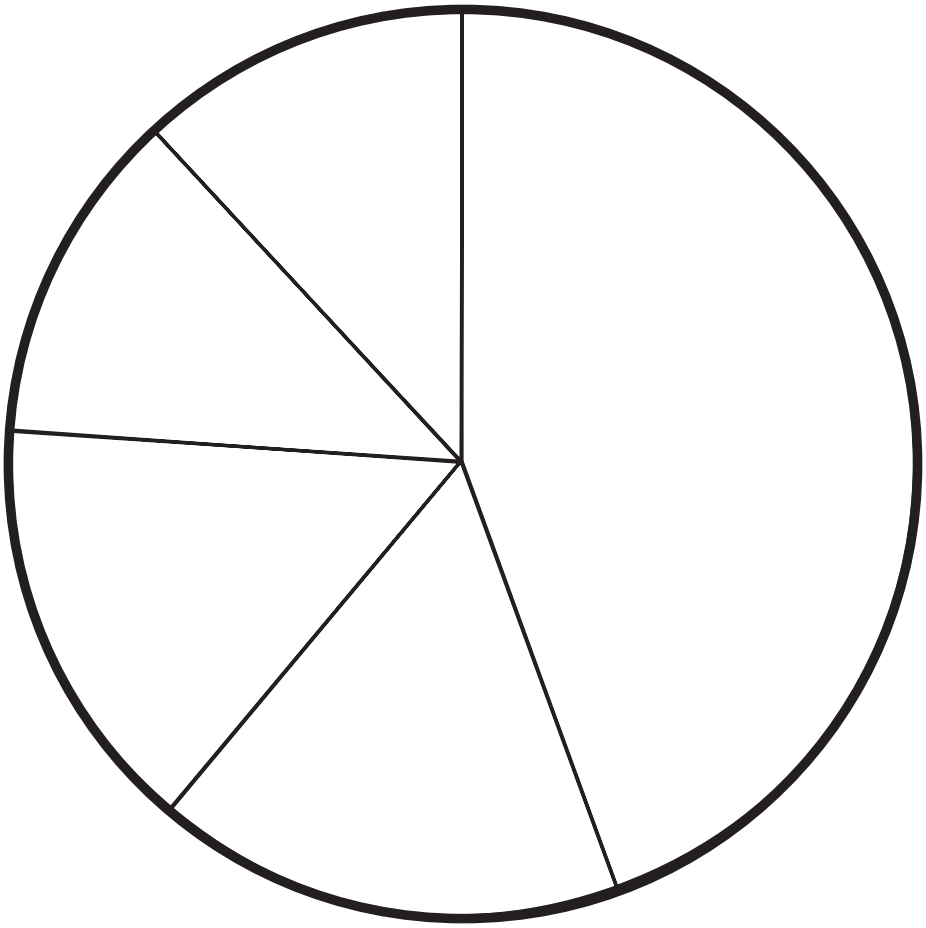
Name: _____

Instructions: Complete this circle graph to show the percentage of each energy source used to generate electricity in California. Assign each energy source a color in the key below. Then, use the data in the **California Power Mix** table to correctly color in the "pie pieces" on the graph.

Graph of California's Power Mix



Key

_____
_____
_____
_____
_____

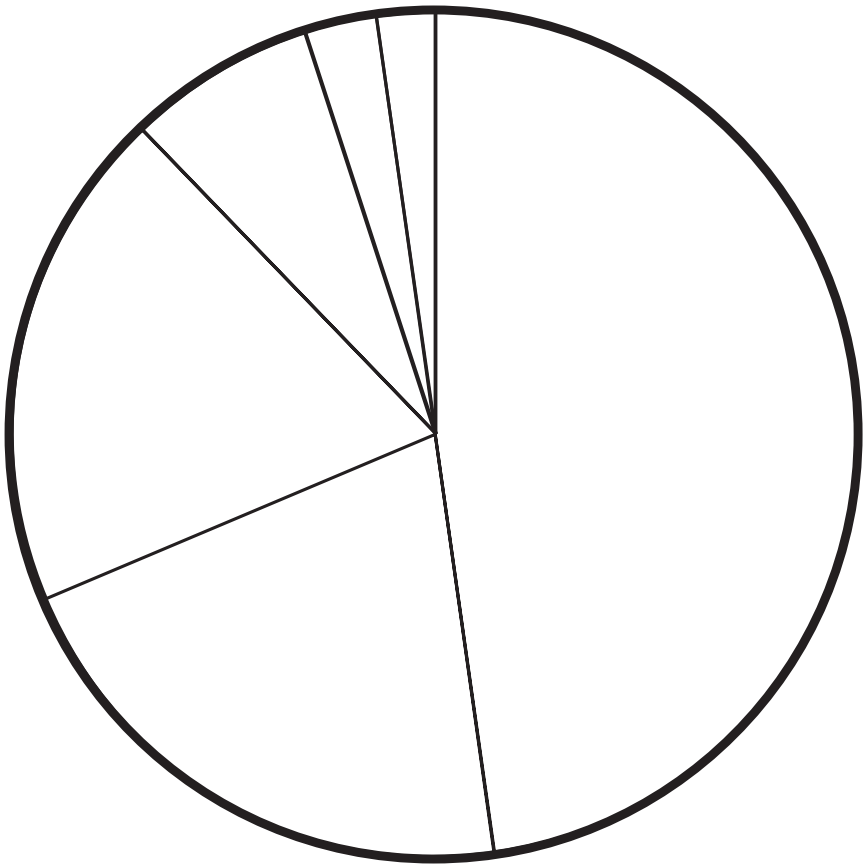
California's Power Mix

Energy Source	Percent of Total
Natural Gas	45%
Coal	17%
Nuclear	15%
Large Hydro	12%
Renewables	12%

Name: _____

Instructions: Complete this circle graph to show the percentage of each energy source used to generate electricity in the United States as a whole. Assign each energy source a color in the key below. Then, use the data in the **United States' Power Mix** table to correctly color in the "pie pieces" on the graph.

Graph of the United States' Power Mix



Key

_____
_____
_____
_____
_____
_____

United States' Power Mix

Energy Source	Percent of Total
Coal	48%
Natural Gas	21%
Nuclear	19%
Hydropower	7%
Renewables	3%
Other	2%

Name: _____

Instructions: Choose one of the energy sources you see in the power mixes on the previous pages and explain what you know about that energy source in the spaces below.

1. Energy source: _____

2. Where it comes from: _____
_____
_____

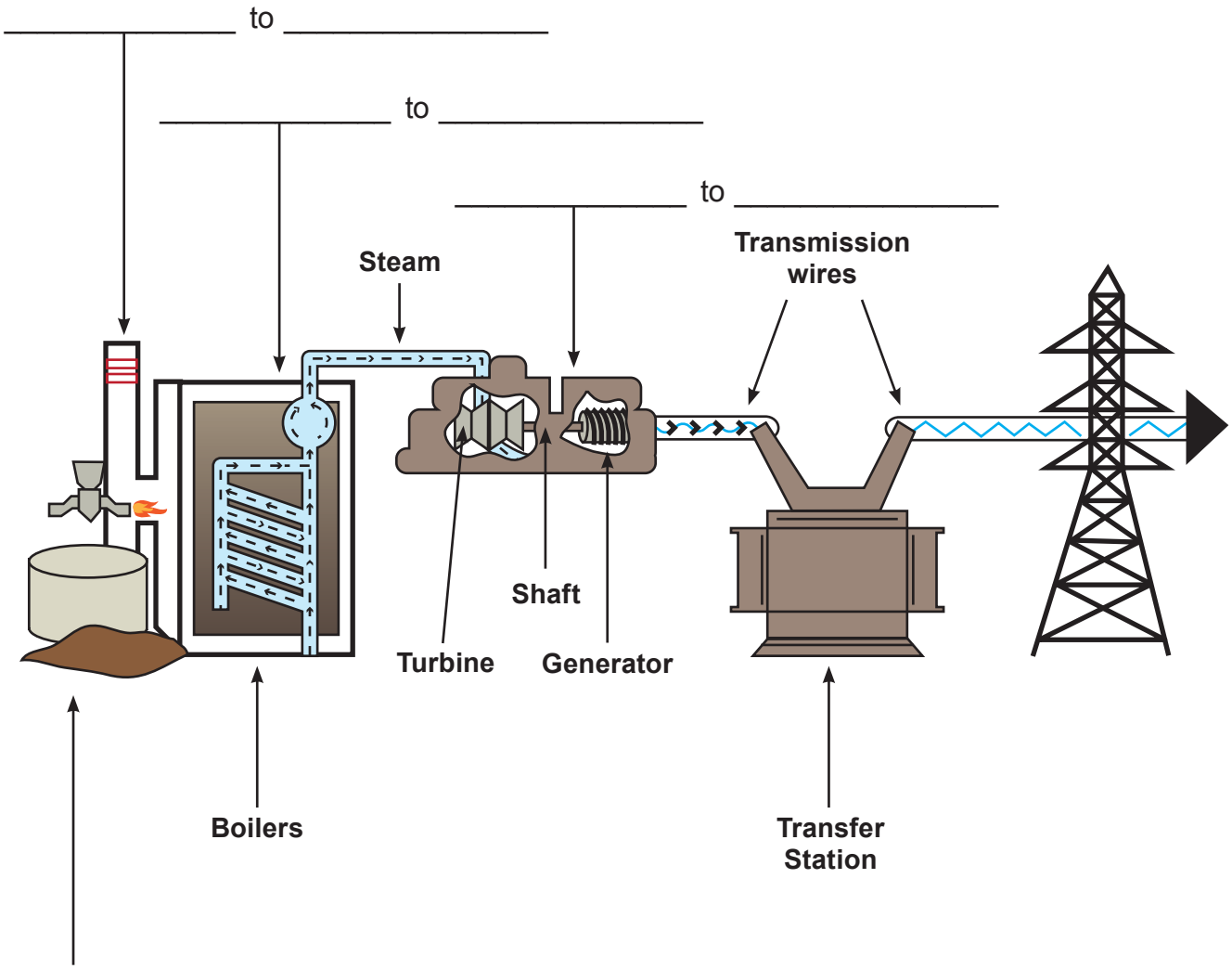
3. Why it is useful: _____
_____
_____

4. What "power mix" it is a part of: _____
_____
_____

Name: _____

Instructions: Label parts of the illustration below to show where energy conversions take place inside a power plant. Note which energy sources are used to generate electricity in the typical power plant (at the bottom of the page).

Energy conversions



Energy sources

Biomass	**Coal**	**Geothermal**
Natural Gas	**Nuclear**	

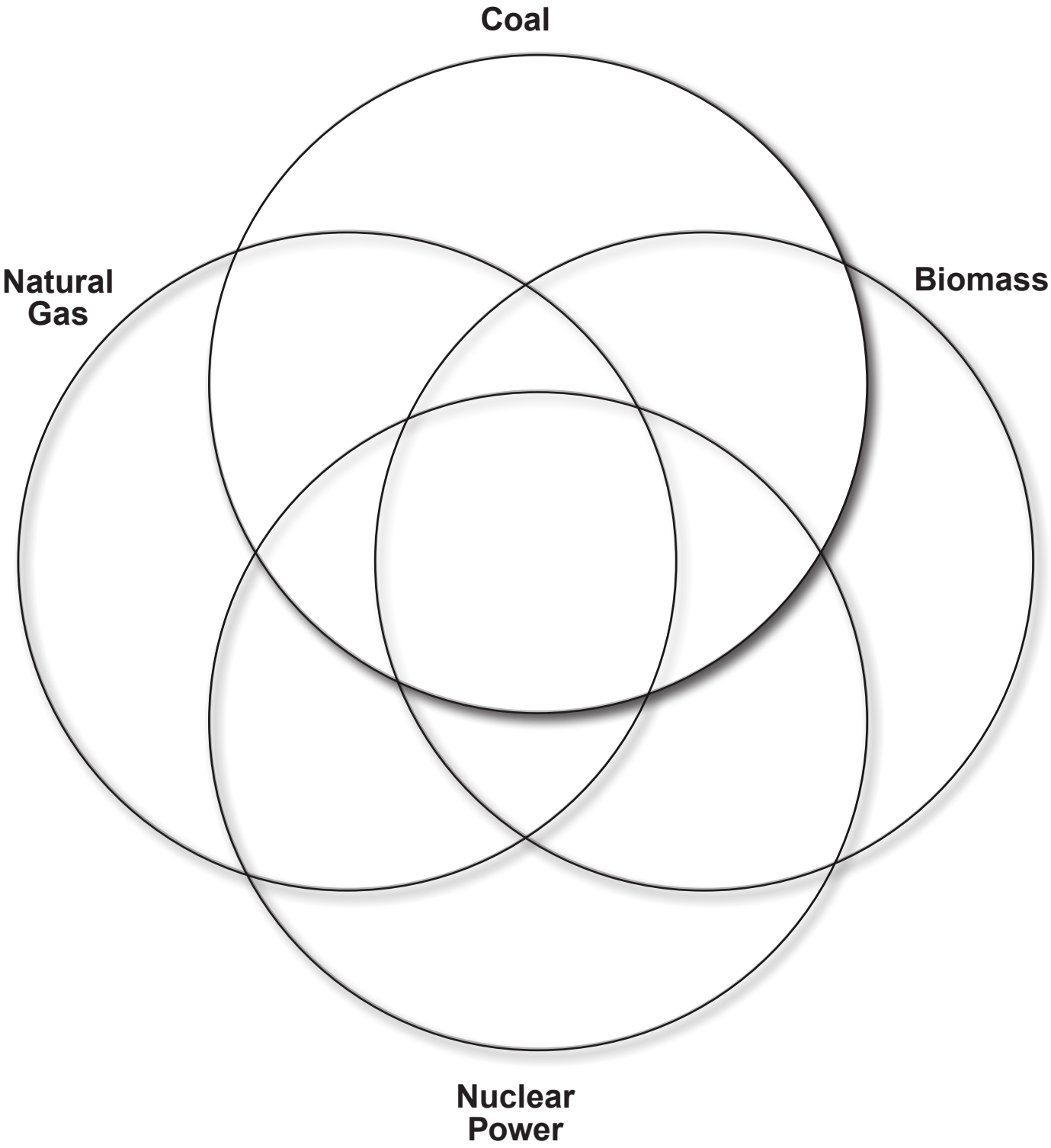
Name: _____

Instructions: Fill in the chart below with information on each of the energy sources listed. (1 point for each cell; 8 points total)

Source	What It Is	How We Get Energy from It
Biomass		
Coal		
Natural Gas		
Nuclear Power		

Name: _____

Instructions: Fill in the Venn diagram below with the similarities and differences between these four energy sources. (2 points for each source; 8 points total)



Name: _____

Instructions: Use information from today's lesson to answer the questions below. (2 points each)

1. What are the eight energy sources in California's power mix?

_____

_____

_____

2. Which energy sources used in California are burned to produce electricity?

_____

_____

3. What byproducts do all the energy sources that are burned release?

_____

_____

4. Which of the energy sources create radioactive byproducts?

_____

_____

5. Which energy sources create byproducts from mining?

_____

_____

6. Which energy sources in the California power mix produce heat as a byproduct?

_____

_____

7. Which of the energy sources require land and space to convert them to electricity?

_____

_____

Name: _____

Instructions: Fill in the chart below by finishing the paragraphs that have been started for you. Use the details in the left column to help you. Use Key Vocabulary words in your answers.
Note: Students are assessed on their use of vocabulary words, so they need to be told to use them.

Write your paragraphs in the spaces provided below.	
Paragraph 1 Details should: ▪ list or identify the byproducts ▪ explain what causes each byproduct	All of the energy sources we use to make electricity, heat our homes, or move our cars have byproducts. For example, ... _____ _____ _____ _____ _____
Paragraph 2 Details should include ways byproducts affect our environment.	The byproducts of the energy we use affect our environment. One way... _____ _____ _____ _____ _____ _____
Paragraph 3 Details should include: ▪ choices about energy sources based on byproducts ▪ choices in personal energy use	If we use less energy, we will not affect the environment as much. If we... _____ _____ _____ _____ _____ _____

The Effects of Our Choices Scoring Tool

Criteria	3 points	2 points	1 point
Recognizes that there are byproducts of energy production and consumption	Identifies that byproducts come from both generating electricity and obtaining the energy sources (mining, drilling, damming).	Identifies either that byproducts come from both generating electricity or obtaining the energy (mining, drilling, damming).	Identifies existence of byproducts, but does not say where they originate.
Describes the byproducts of energy production and consumption	Explains that the byproducts are gases, liquids, and solids.	Describes at least two byproducts that are either gases, liquids, or solids.	Describes one byproduct.
Identifies that byproducts enter and affect natural systems	Identifies multiple ways that byproducts enter natural systems and gives specific examples of effects on many things.	Identifies that byproducts enter natural systems in one or more ways and have effects, but does not give specifics.	Identifies that byproducts have effects on water, air, or soil.
Describes the relationship between our energy consumption and the effects on natural systems.	Explains that using less energy means fewer effects and that certain energy sources produce less dangerous byproducts.	Explains that using less energy means fewer effects or that certain energy sources have less dangerous byproducts.	Describes the need to conserve or use one source over another, but does not explain the relationship between the change and effects on natural systems.
Uses Key Vocabulary	Accurately uses two or more Key Vocabulary terms.	Accurately uses one or more Key Vocabulary terms.	Uses one or more Key Vocabulary terms, but the use is not accurate or the meaning is not clear.

Source: U.S. Department of Energy

Name: _____

Instructions: In the table below, list the costs and the benefits of using the energy source assigned to your group by your teacher. The energy source will be one of the eight in California's power mix.

Energy source: _____

Costs	Benefits

If your community needed more energy, what energy source would you recommend? Why? (Discuss the costs and benefits of your choice.)

_____

_____

_____

_____

_____

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