

# Centralized Exam Study Guide

## Chapter 11: Natural Resources



Grade 6

## **Focus:**

### Chapter 11

#### 11.1 Energy Resources

#### 11.2 Renewable Energy Resources

#### 11.3 Land Resources

Section 1
<ul style="list-style-type: none"><li>● What are the main sources of nonrenewable energy?</li><li>● What are the advantages and disadvantages of using non renewable energy resources?</li><li>● How can individuals help manage nonrenewable resources wisely?</li></ul>
Section 2
<ul style="list-style-type: none"><li>● What are the main sources of renewable energy resources?</li><li>● What are the advantages and disadvantages of using renewable energy resources?</li><li>● What can individuals do to encourage the use of renewable resources?</li></ul>
Section 3
<ul style="list-style-type: none"><li>● Why is land considered a resource?</li><li>● What are the advantages and disadvantages of using land as a resource?</li><li>● How can individuals help manage land resources wisely?</li></ul>

- ★ Please also refer to your Chapter notes when studying
- ★ Make sure to go through the REVIEW and STANDARDIZED TEST questions at the end of this pack.

## What are the main sources of nonrenewable energy?

Nonrenewable resources are used faster than they can be replaced by natural processes.

Examples:



oil



natural gas



coal

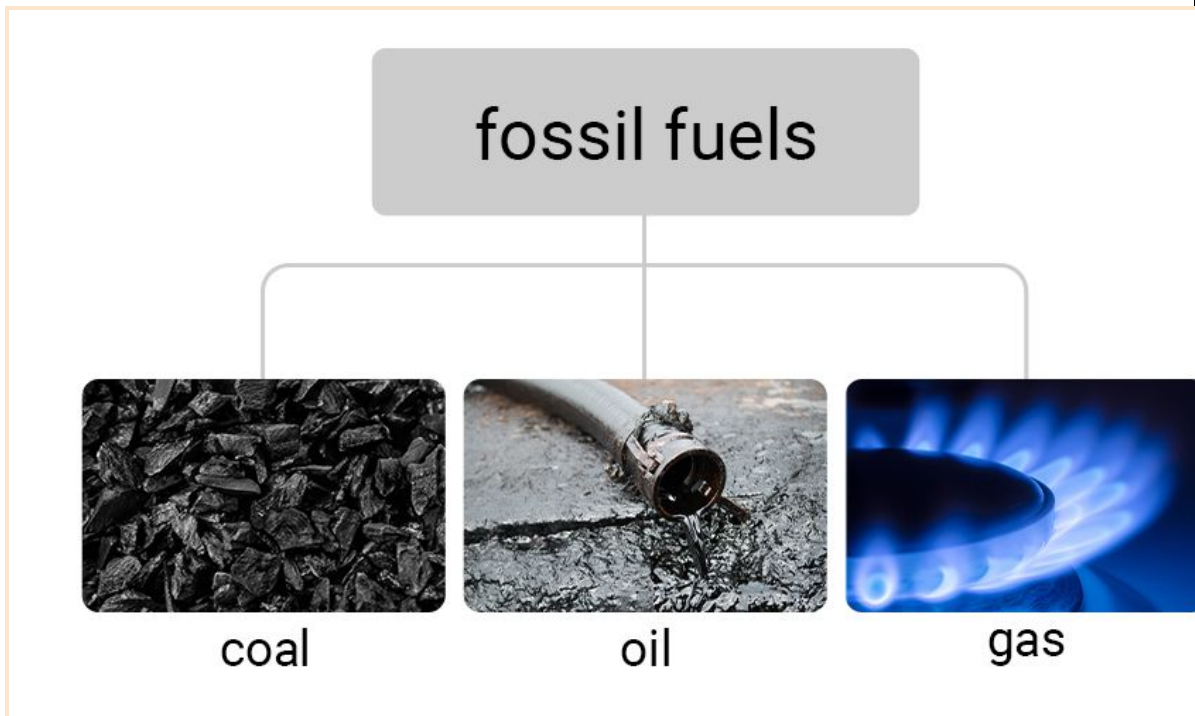


nuclear energy

- **Fossil fuels**

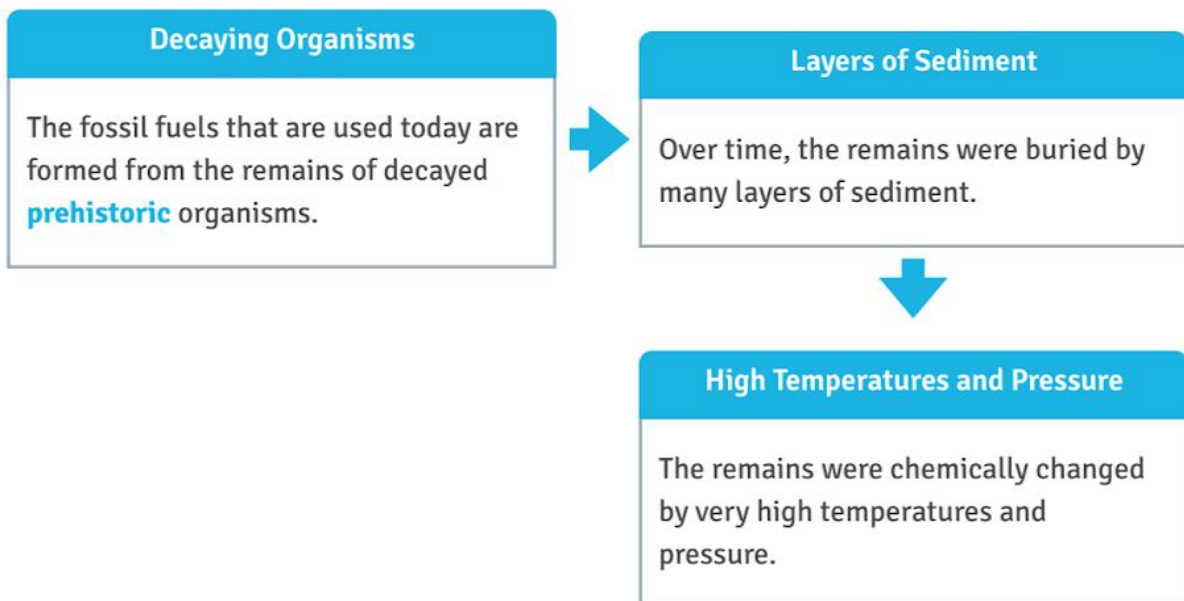
are nonrenewable resources that took millions of years to form and exist in limited supply. It will take millions of years for Earth to produce more fossil fuels.

**There are three types of fossil fuels.**



- Fossil fuels contain **chemical energy**. When they are burned, chemical energy is **transformed into different forms of energy**
- **Uses:**  
the main source of **electrical and thermal energy**. They can also be used in the production of **plastics and medicines**

How are fossil fuels formed?



Fossil fuel formation depends on three factors:



Prehistoric Organisms



Temperature and  
Pressure



Time

Energy From atoms:

- Energy can be produced by the atoms of certain elements. **Uranium** is used to produce nuclear energy and is a nonrenewable resource.

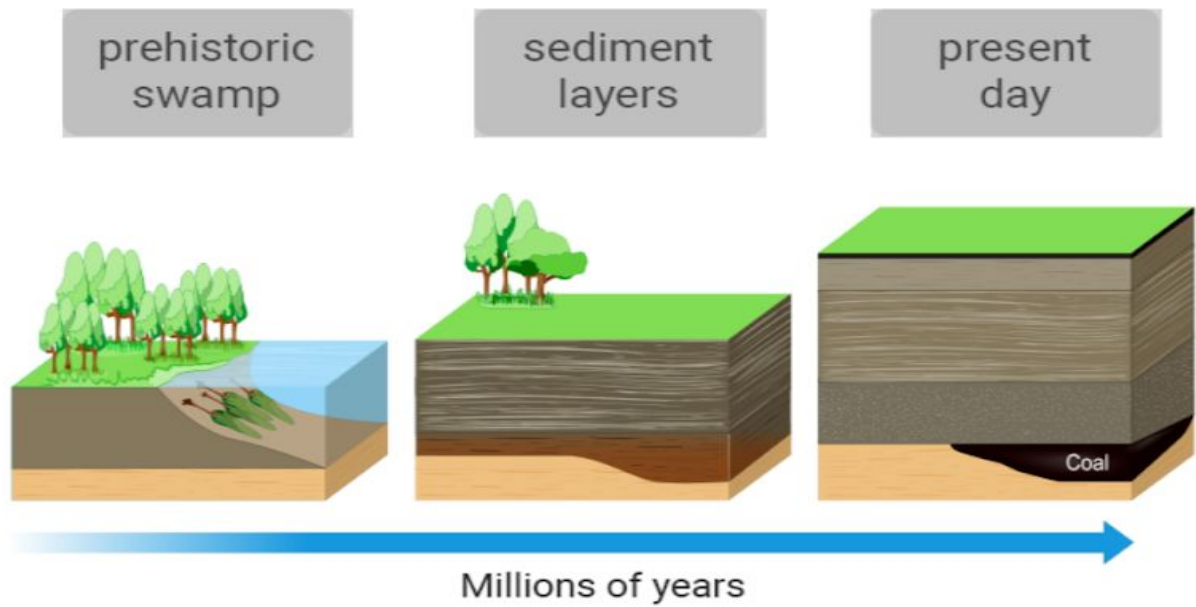
### 1. Coal

- Coal, commonly used in barbecues, is a type of fossil fuel.
- Coal is formed from a brownish material, called **peat**

Peat: was formed from the **remains of prehistoric plants**.

Over time, more sediment layers compacted the peat, which eventually changed to harder and harder types of coal.

- The **hardest coal is anthracite**. It contains about 98% carbon and produces lots of energy when it is burned.



## **2. Oil & Natural Gas:**

- Oil and natural gas formed millions of years ago from the remains of tiny organisms that lived in the ocean known as **plankton**

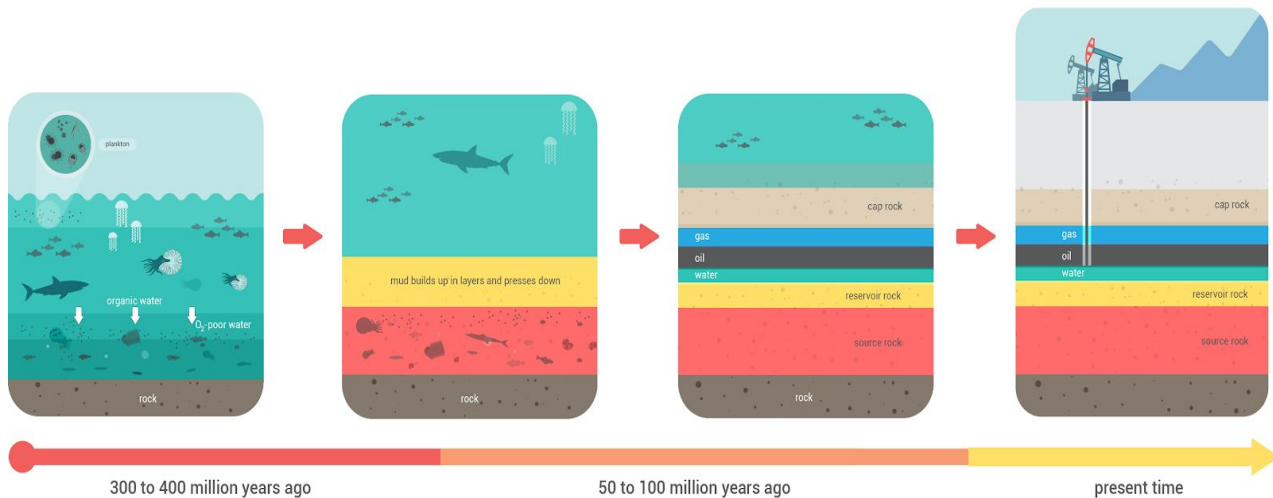
1. Plankton that lived millions of years ago, died and fell to the bottom of the ocean floor.

2. The plankton remains were buried by many layers of sediment.

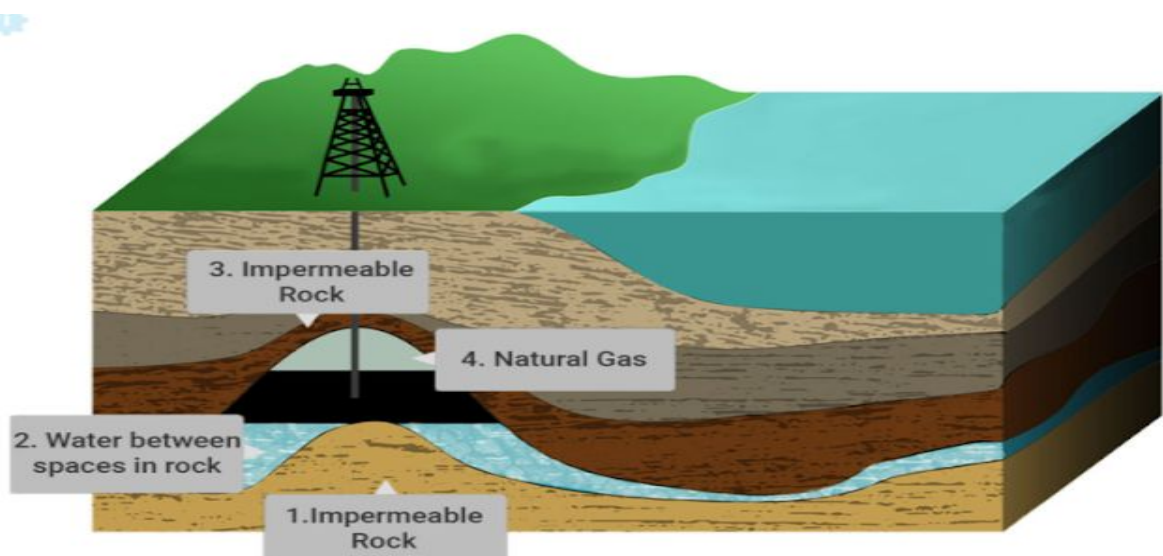
3. Bacteria broke down the organic matter. More sediment layers fell on top, increasing the temperature and pressure.

4. Oil formed first from the heat and pressure.

5. Natural gas formed as the heat and pressure increased.



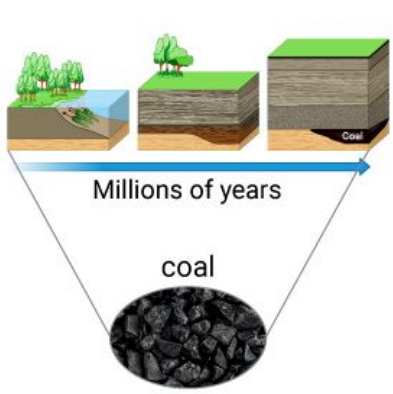
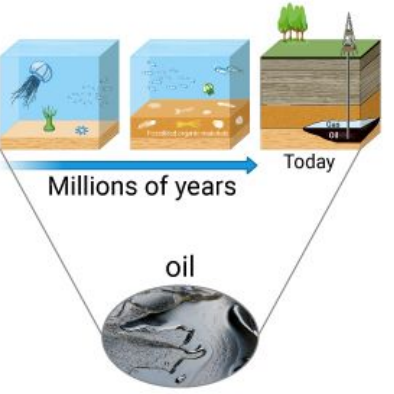
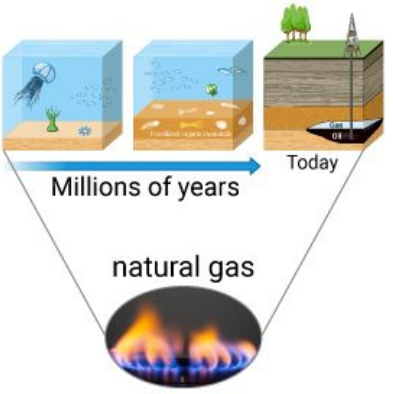
- Oil and natural gas commonly form where areas of rock are **uplifted** and tilted. Allowing the oil and natural gas to rise in gaps between the rocks.





### 3. Natural gas:

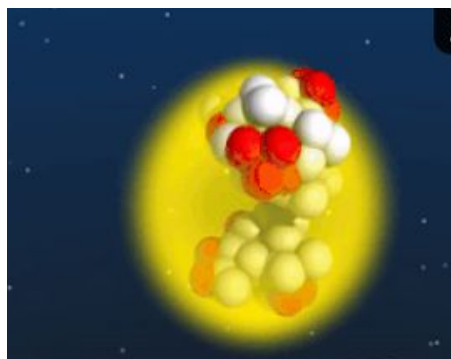
- Natural gas forms in the same way as oil, it is the gas given off.

Coal formation	Oil formation	Natural gas formation
 <p>Millions of years</p> <p>coal</p>	 <p>Millions of years</p> <p>oil</p>	 <p>Millions of years</p> <p>natural gas</p>
Coal forms from dead plant material that gets buried and is exposed to heat and pressure for millions of years.	Oil forms from dead aquatic plants and animals that get buried and is exposed to heat and pressure for millions of years.	Natural gas forms in the same way as oil. It is the gas given off by the organic material that gets trapped under tightly packed rock layers.

### 3. Nuclear Energy:

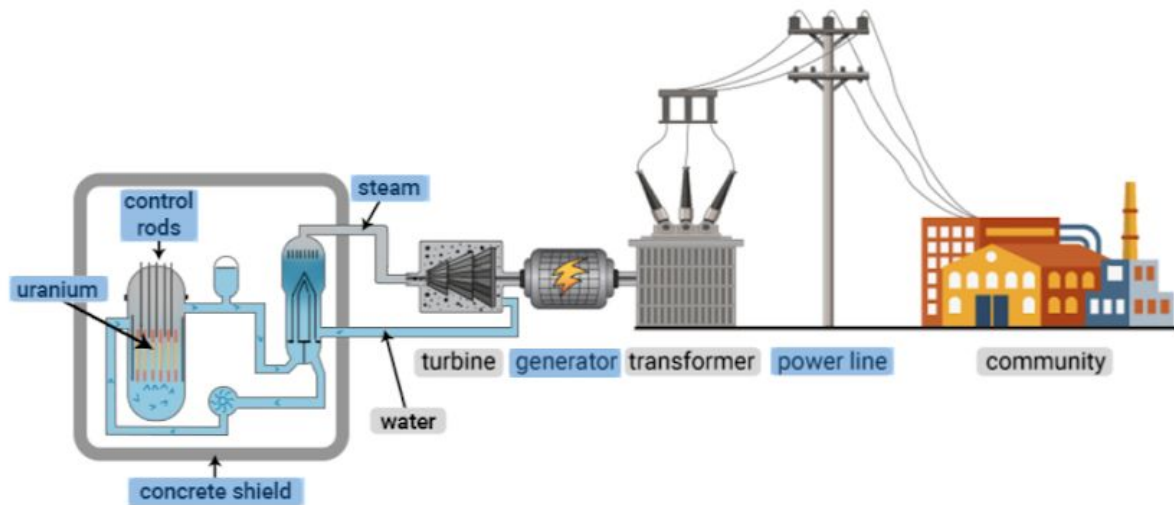
- Nuclear energy is released from **atomic reactions**. Atoms can **fuse** together or break apart to produce a lot of energy!

→ **Nuclear fission** is a nuclear reaction that **splits** (separates into 2) the nucleus of an atom when it collides with another particle





## Nuclear Power Plants:



These plants produce electricity using nuclear fission. It uses the atom uranium.

What are the advantages and disadvantages of using non renewable energy resources?

### 1. Advantages and Disadvantages of using **Fossil fuels:**

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Large amount of energy released</li><li>• Requires few steps</li><li>• Fairly cheap</li><li>• Easy to transport</li></ul>	<ul style="list-style-type: none"><li>• Limited supply (cannot get them easily)</li><li>• Pollution: damages to the environment by extraction and burning</li><li>• Disruption to habitats: fossil fuels are found Earth or the sea</li></ul>

### 2. Advantages and Disadvantages of using **Nuclear Energy** (Uranium)

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Small amounts of uranium can produce large amounts of energy</li><li>• Low levels of pollution is used correctly</li></ul>	<ul style="list-style-type: none"><li>• Everytime a neutron breaks down uranium it releases thermal energy (overheat) Overheating can release radioactive substances into the environment (like what happened in Chernobyl)</li><li>• Disposal: Nuclear waste can be very harmful to living organisms for a very long time. Waste is dumped under ground or under water to keep humans safe</li></ul>

How can individuals help manage nonrenewable resources wisely?

### **Solutions:**

1. **Reclamation:** mined land must be recovered with soil and replanted with vegetation. Drilling and mining must be environmentally safe
2. **Regulations:** Laws that protect people from nuclear emission and radioactive waste

### **What can you do???**

1. Use renewable energy sources
2. Use transportation alternatives. (take the bus or ride a bike)
3. Reduce energy use by turning off all unused electrical appliances. (avoid vampire energy)

What are the main sources of renewable energy resources?

Renewable resources can be replaced by natural processes in a short period of time.

Examples:



solar energy



wind energy



hydroelectric energy








geothermal energy

Nonrenewable resources are used faster than they can be replaced by natural processes.

### **Renewable resources:**

- are natural resources that can be replaced by natural processes in a short amount of time.

Examples of natural renewable resources are:		
1. Sun	Solar energy from the Sun is captured and transformed into electricity through solar panels	
2. Land	Biomass energy is created by burning the organic remains of plants and food scraps.	
3. Wind	Wind turbines in a wind farm transform wind energy into electrical energy.	
4. Water	Energy from moving water is used to produce electricity.	
5. Earth	Geothermal energy from inside the Earth is used to generate heat and electric energy.	

What are the advantages and disadvantages of using renewable energy resources?

## Advantages and Disadvantages of using **Renewable Resources**:

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• They are renewable and will be available for millions of years</li><li>• Produce less pollution than fossil fuels</li></ul>	<ul style="list-style-type: none"><li>• Some are costly/expensive</li><li>• Some are limited to certain areas</li></ul>

Advantages and Disadvantages of each renewable resource:

### Biomass Energy

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• reduces the amount of organic waste material thrown away in trash landfills</li><li>• available in the United States</li><li>• increased use in the United Arab Emirates</li></ul>	<ul style="list-style-type: none"><li>• burning some forms of biomass causes air pollution</li><li>• less energy efficient than fossil fuels</li><li>• more expensive to transport</li></ul>

### Wind Energy

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• does not cause pollution</li><li>• inexpensive</li><li>• available in the United States</li><li>• will be used in the United Arab Emirates in the future</li></ul>	<ul style="list-style-type: none"><li>• use is limited to areas with strong winds</li><li>• wind farms are typically far from cities</li><li>• can negatively affect bird populations</li></ul>

### Solar Energy

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• does not cause pollution</li><li>• available in the United States</li><li>• available in the United Arab Emirates</li></ul>	<ul style="list-style-type: none"><li>• cloudy days reduce the amount of energy produced</li><li>• energy is not produced at night</li><li>• solar panels are expensive</li><li>• requires large spaces</li></ul>

### Geothermal Energy

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• reduced amount of pollution produced</li><li>• available in the United States</li><li>• planned for use in the United Arab Emirates</li></ul>	<ul style="list-style-type: none"><li>• use is limited to areas that are <b>tectonically</b> active</li><li>• building power plants affects other land resources</li></ul>

### Water Energy

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• does not cause pollution</li><li>• available in the United States</li></ul>	<ul style="list-style-type: none"><li>• use is limited to areas with fast-flowing rivers and tidal differences</li><li>• marine ecosystems are disrupted</li><li>• drought affects electricity production</li></ul>

What can individuals do to encourage the use of renewable resources?

Why is land considered a resource?

- Land is a natural resource that is used for purposes like growing crops, feeding animals, making furniture, homes, and paper.

- Natural resources are materials that naturally occur and can be used in different ways to meet an organism's needs.



Soil is a very useful land resource. Soil is used to grow crops.

The trees in a forest produce oxygen for us to breathe. Trees can also be used to make wood for houses and furniture as well as paper.

Minerals are mined from the ground. They are used in a wide range of building materials.

What are the advantages and disadvantages of using land as a resource?

### **Advantages and Disadvantages of Using Land Resources**



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Land resources such as soil and crops <b>are easy to access and widely available</b></li> <li>Crops are <b>easy to grow</b> where there is soil. Crops and plants can grow quickly</li> </ul>	<p>1. <b>Deforestation:</b> cutting of large areas of forests This can lead to:</p> <ul style="list-style-type: none"> <li>a. Soil erosion</li> <li>b. Habitat loss</li> <li>c. Climate change</li> </ul>
	<p>2. <b>Pollution:</b> The main source of pollution from mineral mines is runoff.</p> <p>Runoff from mineral mines contains chemicals that pollute the waterways and soil in an area. This could be harmful to the organisms in that area</p>

How can individuals help manage land resources wisely?

**Land Resource Management**

- Some resources are renewable and others are nonrenewable.
- As the global population increases, there is more competition for space and resources

Management Solutions:

Government	<p>Governments can pass laws that preserve forests and ecosystems. The laws are created to control:</p> <ul style="list-style-type: none"> <li>• logging</li> <li>• mining for minerals</li> <li>• the development of land</li> </ul> <p>On preserved land, cutting down trees is not allowed unless new trees are planted to replace those that were cut down</p>
Farmers	<p>Farmers can help to manage the land used for farming and grazing by protecting the soil from erosion. This is done by leaving crop stalks in the soil after crops are harvested.</p> <p>Farmers can also use organic farming methods that do not harm the environment with chemicals</p>
<p>What can you do?</p> <p>You and your community can help conserve land resources by:</p> <ul style="list-style-type: none"> <li>• recycling any products made from land resources</li> <li>• making compost</li> </ul> <p>Compost is decayed organic material used as a fertilizer for growing plants. It consists of bacteria, other organisms, and a small amount of water.</p> <p>Compost is collected and used as a fertilizer for farming by returning nutrients into the soil</p>	

# 11 Review

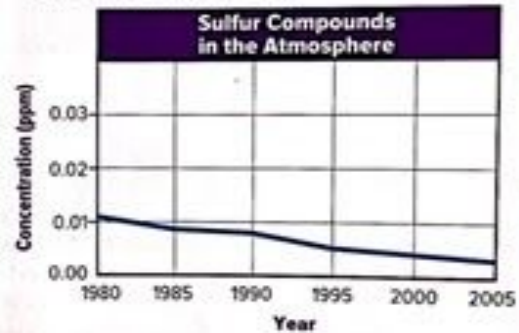
## Understand Key Concepts

- Which energy source produces radioactive waste?  
A. biomass B. geothermal  
C. hydroelectric power D. nuclear power
- The table below shows the energy sources used to produce electricity in the United States. What can you infer from the table?

Electricity Production	
Energy Source	Percent
Coal	48.5
Natural gas	21.6
Nuclear power	19.4
Hydroelectric power	5.8
Solar, wind, geothermal, biomass	2.5
Oil	1.6
Other	0.6

- About 19.4 percent of U.S. electricity comes from renewable sources.
  - Hydroelectric power is more widely used for electricity than nuclear power.
  - More than 90 percent of U.S. electricity comes from nonrenewable sources.
  - Oil is more widely used for electricity than hydroelectric power.
- Which factor would best determine whether a home is suitable for solar energy?  
A. difference in tidal heights  
B. strength of daily winds  
C. nearness to tectonically active areas  
D. number of sunny days per year
  - Which product comes from a metallic mineral resource?  
A. aluminum B. drywall  
C. gravel D. table salt
  - Which is a renewable land resource?  
A. forests B. minerals  
C. soil D. trees

- Where is most water on Earth located?  
A. lakes B. oceans  
C. rivers D. underground
- Which natural event can result in air pollution?  
A. burning fossil fuels  
B. littering a stream  
C. runoff from farms  
D. volcanic eruption
- The graph below shows how the amount of sulfur compounds in the atmosphere has changed since the passage of the Clean Air Act. Based on the data in the graph, what can you infer about the act?



- The act has helped decrease pollutants in the atmosphere.
  - The act has helped increase pollutants in the atmosphere.
  - The act has incentives for use of renewable resources.
  - The act has not impacted the amount of pollutants in the atmosphere.
- Organize the list of energy sources into renewable and nonrenewable energy resources.

• coal N.R.	• nuclear energy N.R.
• solar energy	• wind energy
• oil N.R.	• natural gas N.R.
• geothermal energy	• tidal power
• hydroelectric power	• biomass



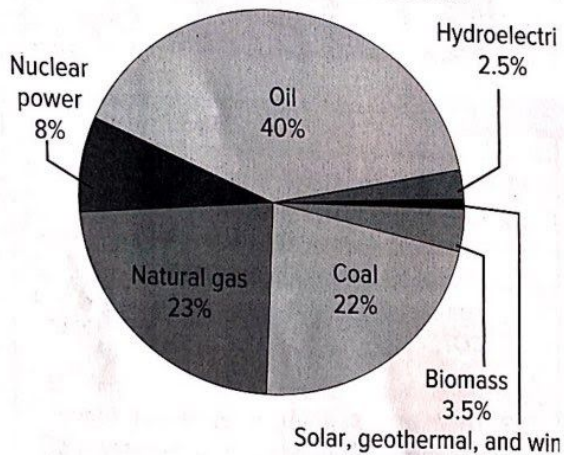
# Standardized Test Practice

## Multiple Choice aligned with TIMSS

- 1 Which activity does NOT reduce the use of fossil fuels?
- A riding a bicycle to school
  - B unplugging DVD players
  - C walking to the store
  - ☒ D watering plants less often

Use the graph below to answer questions 2 and 3.

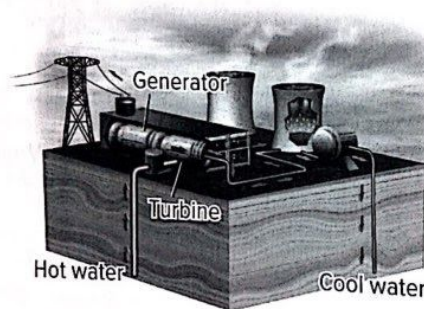
Sources of Energy Used  
in the United States in 2007



- 2 Which is the most-used renewable energy resource in the United States?
- ☒ A biomass
  - B hydroelectric
  - C natural gas
  - D nuclear energy
- 3 What percentage of the energy used in the United States comes from burning fossil fuels?
- A 40 percent
  - B 45 percent
  - ☒ C 85 percent
  - D 93 percent
- Handwritten notes:*  
 hydroelectric, biomass & others  
 oil → 40 %  
 coal → 22 %  
 gas → 23  
 85 %

- 4 Which practice emphasizes the use of renewable energy resources?
- A buying battery-operated electronics
  - ☒ B installing solar panels on buildings
  - C replacing sprinklers with watering cans
  - D teaching others about vampire energy
- 5 Which is a nonrenewable land resource?
- A crops
  - ☒ B minerals
  - C streams
  - D trees

Use the figure below to answer question 6.



- 6 Which alternative energy resource is used to make electricity in the figure?
- A solar energy
  - B tidal power
  - ☒ C geothermal energy
  - D hydroelectric power
- 7 Which practice is a wise use of land resources?
- ☒ A composting
  - B conserving water
  - C deforestation
  - D strip mining

## Standardized Test Practice

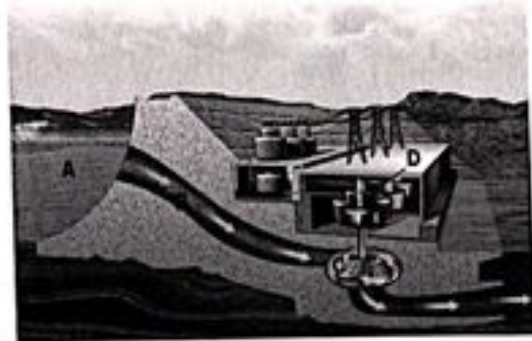
Use the figure below to answer question 8.



- 8 Which type of air pollution is labeled A in the figure?
- A acid precipitation
  - B fertilizer runoff
  - C nuclear waste
  - ☒ D photochemical smog
- 9 Approximately how much water on the Earth is in oceans?
- A 1 percent
  - B 3 percent
  - C 75 percent
  - ☒ D 97 percent
- 10 Which is a source of biomass energy?
- A sunlight
  - B uranium
  - C wind
  - ☒ D wood

### Constructed Response aligned with TIMSS

Use the figure below to answer questions 11 and 12.



- 11 Which resource powers the turbine in the figure? Describe what happens at steps A–D to produce electricity.
- 12 What are two advantages and two disadvantages of producing electricity in the way shown in the figure?
- 13 Describe an example of how forests are used as a resource. What is one advantage of using the resource in this way? What is a disadvantage?
- 14 Agree or disagree with the following statement: "Known oil reserves will last only another 50 years. Thus, the United States should build more nuclear power plants to deal with the upcoming energy shortage." Support your answer with at least two advantages or two disadvantages of using nuclear energy.

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Need Extra Help?														
If You Missed Question...	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Go to Lesson...	1	2	1	2	3	2	3	4	4	2	2	2	3	1



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