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Name: _____

Date: ____ / ____ / ____ Class Hour: ____

By The Numbers I

Student Response Guide

The Energy Economy

1. The energy consumed in America is provided by the five energy resources below. Match each energy resource to the percentage of energy it provides to the American economy: 37%, 32%, 11%, 11%, and 8%.

- Coal
- Natural Gas
- Nuclear Electric Power
- Renewable Energy
- Petroleum

2. Put these energy resources in order according to their appearance in American history: #1 to #7.

- Coal
- Biomass
- Hydroelectric
- Natural gas
- Nuclear power
- Other renewables
- Petroleum

3. Match the end use sectors below, to the percentage of energy they consume in the American energy economy: 32%, 28%, 21%, and 18%.

- Commercial
- Industrial
- Residential
- Transportation

4. America's transportation sector is powered by the four energy resources, below. Match each resource to the percent of the transportation economic sector it powers: 91%, 5%, 3%, and < 1%.

- a. Electricity**
- b. Natural Gas
- c. Petroleum
- d. Renewable Energy

**Electricity is a secondary energy source produced by converting primary sources of energy into electric power.

5. America's industrial sector is powered by the five energy resources, below. Match each resource to the percent of the industrial economic sector it powers: 40%, 34%, 12%, 9%, and 4%.

- a. Coal
- b. Electricity**
- c. Natural Gas
- d. Renewable Energy
- e. Petroleum

**Electricity is a secondary energy source produced by converting primary sources of energy into electric power.

6. America's residential sector is powered by the four energy resources, below. Match each resource to the percent of the residential economic sector it powers: 44%, 41%, 8% and 7%.

- a. Electricity**
- b. Natural Gas
- c. Renewable Energy
- d. Petroleum

**Electricity is a secondary energy source produced by converting primary sources of energy into electric power.

7. America's commercial sector is powered by the five energy resources, below. Match each resource to the percent of the commercial economic sector it powers: 49%, 39%, 9%, 3%, and < 1%.

- a. Electricity**
- b. Coal
- c. Natural Gas
- d. Renewable Energy

**Electricity is a secondary energy source produced by converting primary sources of energy into electric power.

8. America's electric power is generated by the following resources. Match each resource to its percent of generation: 38%, 23%, 20%, 17%, and 1%.

- a. Coal
- b. Natural Gas
- c. Nuclear Power
- d. Renewable Energy
- e. Petroleum



Name: _____

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By The Numbers II

Student Response Guide

Nonrenewable Energy Resources

1. Resource petroleum is used to power the following sectors of the American economy. Match each sector of the economy with the percent of petroleum going to it: 70%, 24%, 3%, 2%, and 1%.

- a. Commercial
- b. Electric Power
- c. Industrial
- d. Residential
- e. Transportation

2. Rank the following “states” in order of their crude oil production: #1 to #5.
 - a. Gulf of Mexico
 - b. New Mexico
 - c. North Dakota
 - d. Oklahoma
 - e. Texas

3. What is the trend in the United States with respect to petroleum production and petroleum imports over the last decade?
 - a. US production is up, and American imports are up
 - b. US production is up, and American imports are down
 - c. US production is down, and American imports are up
 - d. US production is down, and American imports are down

4. Rank the following in order of the volume of crude oil the US imports from each country: #1 to #5.
 - a. Canada
 - b. Colombia
 - c. Iraq
 - d. Mexico
 - e. Saudi Arabia

5. Petroleum was most likely formed over hundreds of millions of years from:
 - a. Fires which commonly occurred while the earth was forming
 - b. The remains of tropical and semi-tropical swamp plants
 - c. The remains of tiny sea plants and animals
 - d. Cosmic rays bombarding elements in the soil below the crust of the earth

6. Resource natural gas is used to power the following sectors of the American economy. Match each sector of the economy with the percent of natural gas going to it: 36%, 33%, 16%, 11%, and 3%.
 - a. Commercial
 - b. Electric Power
 - c. Industrial
 - d. Residential
 - e. Transportation

7. Rank the following states in order of their natural gas production: #1 to #5.
 - a. Louisiana
 - b. Ohio
 - c. Oklahoma
 - d. Pennsylvania
 - e. Texas

8. What is the trend in the United States with respect to natural gas production and natural gas imports over the last decade?
 - a. US production is up, and American imports are up
 - b. US production is up, and American imports are down
 - c. US production is down, and American imports are up
 - d. US production is down, and American imports are down

9. Natural gas was most likely formed over hundreds of millions of years from:
 - a. Fires which commonly occurred while the earth was forming
 - b. The remains of tropical and semi-tropical swamp plants
 - c. The remains of tiny sea plants and animals
 - d. Cosmic rays bombarding elements in the soil below the crust of the earth

10. Resource coal is used to power the following sectors of the American economy. Match each sector of the economy with the percent of coal going to it: 90%, 10%, and <1%.
 - a. Commercial
 - b. Electric Power
 - c. Industrial

11. Coal was most likely formed over hundreds of millions of years from:
 - a. Fires which commonly occurred while the earth was forming
 - b. The remains of tropical and semi-tropical swamp plants
 - c. The remains of tiny sea plants and animals
 - d. Cosmic rays bombarding elements in the soil below the crust of the earth

12. Most of the coal used in America comes from:
 - a. Suppliers east of the Mississippi River
 - b. Suppliers west of the Mississippi River

13. Most of the coal used in America comes from:
- a. Deep shaft mining (most Eastern coal is removed this way)
 - b. Surface mining (most Western coal is removed this way)
14. Why does most of the coal used in America come from the Western United States?

15. Rank the following states in order of their coal production: #1 to #5.
- a. Illinois
 - b. Kentucky
 - c. Pennsylvania
 - d. West Virginia
 - e. Wyoming
16. All of America's nuclear power (100%) goes to which sector of the economy:
- a. Commercial
 - b. Electric Power
 - c. Industrial
 - d. Residential
 - e. Transportation
17. The atomic fuel used in the process of generating nuclear power is an isotope of (Isotope – mass):
- a. Hydrogen – 1
 - b. Hydrogen – 2
 - c. Hydrogen – 3
 - d. Uranium – 235
 - e. Uranium – 238

18. Nuclear fission releases enormous amounts of energy when the forces holding the nucleus of certain atoms together are broken. Which equation below is an example of a nuclear fission equation?

- a. $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{radiant energy (sunlight)} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- b. a neutron + U-235 \rightarrow Ba-140 + Kr-93 + 3 neutrons + energy
- c. H-2 + H-3 \rightarrow He-4 + a neutron + radiant energy (sunlight)
- d. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

19. Where does the United States get its Uranium-235? Rank these countries in order of their share of U-235 supplied to the US: #1 (24%), #2 (20%), #3 (18%), #4 (13%), and #5 (10%).

- a. Australia
- b. Canada
- c. Kazakhstan
- d. Russia
- e. U.S. Suppliers

20. Rank the following states in order of their percentage of electricity generated by nuclear power: # 1 (61%), # 2 (56%), # 3 (54%), # 4 (44%), and # 5 (42%)

- a. Connecticut
- b. Illinois
- c. New Hampshire
- d. South Carolina
- e. Tennessee

21. Match the home energy uses to the percent of energy each is responsible for consuming in the average American home: # 1 (17%), # 2 (15%), # 3 (14%), # 4 (10%), and # 5 (7%).

- a. Air Conditioning
- b. Lighting
- c. Refrigeration
- d. Space Heating
- e. Water Heating

22. During which time of day is the greatest quantity of energy demanded and used in America:

- a. Morning, 6 am – noon
- b. Afternoon, noon – 6 pm
- c. Evening, 6 pm – midnight
- d. Night, midnight – 6 am

23. In general, over the last 50 years, energy consumption per person in the United States has:

- a. increased dramatically
- b. increased slightly
- c. remained about the same
- d. decreased slightly
- e. decreased dramatically

24. In general, over the last 50 years, carbon dioxide (CO₂) emissions per person in the United States have:

- a. increased dramatically
- b. increased slightly
- c. remained about the same
- d. decreased slightly
- e. decreased dramatically

25. In general, overall emissions of sulfur dioxide, nitrogen oxide, and carbon monoxide during the last 50 years in the United States have:

- a. increased dramatically
- b. increased slightly
- c. remained about the same
- d. decreased slightly
- e. decreased dramatically



Name: _____

Date: ____ / ____ / ____ Class Hour: ____

By The Numbers III

Student Response Guide

Renewable Energy Resources

1. Renewable energy is used to power the following sectors of the American economy. Match each sector of the economy with the percent of renewable energy going to it: 56%, 22%, 12%, 7%, and 2%.

- a. Commercial
- b. Electric Power
- c. Industrial
- d. Residential
- e. Transportation

2. The renewable energy consumed in America is provided by the seven renewable energy resources below. Match each renewable resource to the percentage of energy it provides in the American renewable energy economy: 24%, 22%, 20%, 20%, 9%, 4%, and 2%.

- a. Biofuels
- b. Biomass waste
- c. Biomass wood
- d. Geothermal
- e. Hydroelectric
- f. Solar
- g. Wind

3. All biomass fuels start with the process of photosynthesis. Plants convert energy from the sun into chemical energy in the form of glucose, a high-energy biomolecule. Glucose is then used by the plants that create it in a variety of ways. That same glucose can also be used in a number of different ways to produce biomass fuels. Which equation, below, correctly represents the process of photosynthesis?

- a. $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{radiant energy (sunlight)} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- b. a neutron + U-235 \rightarrow Ba-140 + Kr-93 + 3 neutrons + energy
- c. H-2 + H-3 \rightarrow He-4 + a neutron + radiant energy (sunlight)
- d. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

4. In what forms does the United States use biomass to produce renewable energy?

5. Which two make hydroelectric renewable power possible?

- a. Wind
- b. Earth revolving around the sun
- c. Sun
- d. Gravity

6. Rank the following states in order of their hydroelectric renewable energy production: #1 to #5.

- a. Alabama
- b. California
- c. New York
- d. Oregon
- e. Washington

7. What makes wind power possible?

- a. Uneven heating of land and water by sun
- b. Earth spinning on its axis
- c. Earth revolving around the sun
- d. Gravity

8. Rank the following states in order of their wind renewable energy production: #1 to #5.

- a. California
- b. Iowa
- c. Kansas
- d. Oklahoma
- e. Texas

9. Match each type of solar power to its description: Solar PV, Solar Thermal, and Passive Solar.

- a. Sunlight is converted into heat
- b. Sunlight is converted directly into electricity
- c. Building design features that naturally decrease energy use by taking advantage of:
 - the sun
 - efficient design features
 - energy efficient materials
 - natural characteristics of the site

10. Rank the following states in order of their utility-scale solar PV electrical energy production: #1 to #5.

- a. Arizona
- b. California
- c. Nevada
- d. North Carolina
- e. Texas

11. Rank the following states in order of their small-scale solar PV electrical energy production: #1 to #5.

- a. Arizona
- b. California
- c. Massachusetts
- d. New Jersey
- e. Texas

12. What are the two types of geothermal renewable energy called?

13. Which region of the United States has the best potential for harnessing geothermal power for the purpose of producing electricity?

- a. East-central States
- b. Eastern States
- c. West-central States
- d. Western States

14. Rank the following states in order of their geothermal renewable energy production: #1 to #5.

- a. California
- b. Hawaii
- c. Nevada
- d. Oregon
- e. Utah