

Part I: Energy and Traditional Energy Infrastructure

1. What is energy? Circle the best definition. [1 point]

- a. The ability to radiate light or heat
- b. The ability to make matter change or move
- c. The ability to travel in the form of a wave
- d. An object in motion

2. Energy comes in six basic forms:

Chemical	Mechanical	Radiant
Electrical	Nuclear	Thermal

From where you are located right now, look for examples of three of these forms of energy and describe them in a couple words. For full credit, you must provide correct examples for three different forms of energy. [3 points]

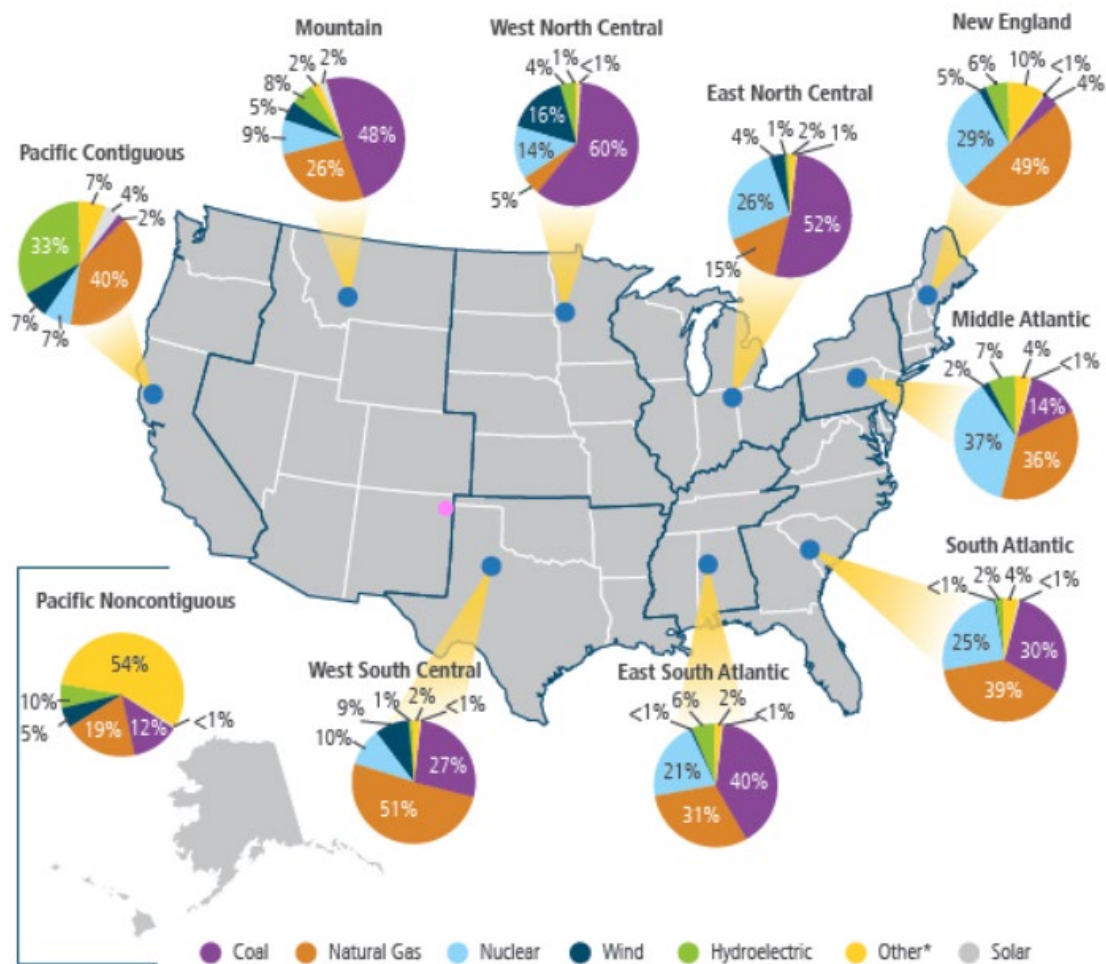
Energy Form	Example Seen at This Site

3. In the United States, which one of these sectors uses the largest portion of energy resources? [1 point]

- a. Agriculture
- b. Electricity generation
- c. Industry
- d. Residential and commercial
- e. Transportation

____ / 5 points

4. Oregon is located in the Pacific Contiguous Region shown in the infographic below. Looking at the following diagram, what is one way this region is unique among all the U.S. regions, in terms of how it gets its power? [1 point]



Electric Power Regional Fuel Mixes. 2015

5. The U.S. electric power system (the “grid”) is a complex system-of-systems comprising generation, transmission and distribution subsystems, and many institutions involved in its planning, operation and oversight. Which one of these statements is TRUE about the reliability of the U.S. grid? [1 point]
- a. The U.S. grid is not very reliable.
 - b. Almost all power outages in the U.S. are due to long-distance transmission issues.
 - c. If one part of the U.S. grid fails, it can cause an outage of the whole system.
 - d. Regulations at the state, regional, and federal levels require individual utilities or grid operators to maintain grid reliability.

____/ 2 points

6. Match the following elements of the grid (on the left) with its function (from the list on the right). [2 points. ½ point for each correct answer]

- | | |
|-------------------------|---|
| _____ Transformer | a. Converts motion- or fuel-based power to electric power |
| _____ Generator | b. Carries electricity to consumers |
| _____ Distribution line | c. Connects an electrical device to an electric supply |
| _____ Transmission line | d. Carries high-voltage electricity over long distances |
| | e. Increases and decreases voltage |

_____/ 2 points

Part II. Renewable Energy and Infrastructure

7. What is renewable energy? Circle the best definition. [1 point]

An energy source that:

- a. is clean and free to use
- b. can be converted directly into heat and electricity
- c. can be replenished by nature faster than it is used
- d. does not produce air pollution

9. What are two advantages of renewable energy sources? [2 points]

- a. _____
- b. _____

10. What are two disadvantages of renewable energy resources? [2 points]

- a. _____
- b. _____

11. Using the contents in the plastic bag at your station—and solar energy—make the propeller spin in two different directions. Draw a diagram of the circuit you created and describe what you did to change the direction. [3 points, 2 for diagram and one for description]

Diagram:

____/ 8 points

12. Is hydrogen fuel renewable or nonrenewable? Explain your answer. [2 points, 1 for correct answer, and 1 for explanation]

13. Describe one way that transitioning to more renewable energy resources can increase the resilience of the U.S. power grid? [2 points]

____/ 4 points

Part III: Renewable Energy and Natural Resources

14. Transforming the U.S. electric grid to renewable sources is challenging because renewable sources generate variable amounts of electricity depending on the amount of wind or sunlight available, and the best places to generate renewable energy are often far away from the areas that use the electricity. Which of the following is NOT a means to help meet these challenges? Circle the best response. [1 point]

- a. Tax renewables at a higher rate than fossil fuels
- b. Develop energy storage
- c. Provide backup generation
- d. Increase transmission lines to connect to long-distance power generation

15. Renewable power requires more land per unit of power produced than fossil fuels. One way to address this is through dual-use projects (sometimes called agrivoltaics) that generate renewable energy and agricultural products at the same time on the same land.

A Lane County vegetable farmer is considering solar development on their farmland. What are two benefits and two challenges of dual use projects they should consider? [4 points, one for each correct response]

Benefits

- a. _____

- b. _____

Challenges

- c. _____

- d. _____

16. Describe one thing Oregon could do to encourage more solar development in farm regions, while not reducing the amount of farmland? [2 points]

____/ 7 points

17. The U.S. Bureau of Ocean Energy Management (BOEM) has designated two potential offshore wind energy areas (WEAs) off the Oregon coast. The Coos Bay WEA is 61,204 acres and located approximately 32 miles from shore. The Brookings WEA is 133,808 acres and approximately 18 mi off the coast. If fully developed, the Final WEAs could support 2.4 gigawatts of energy production.

You have been asked to write an opinion article about these projects for a blog that focuses on Oregon coast issues. What potential pros and cons for Oregonians of these projects would you include in your article? Identify two pros and two cons. [4 points, 1 for each]

Pros

- a. _____

- b. _____

Cons

- c. _____

- d. _____

____/ 4 points

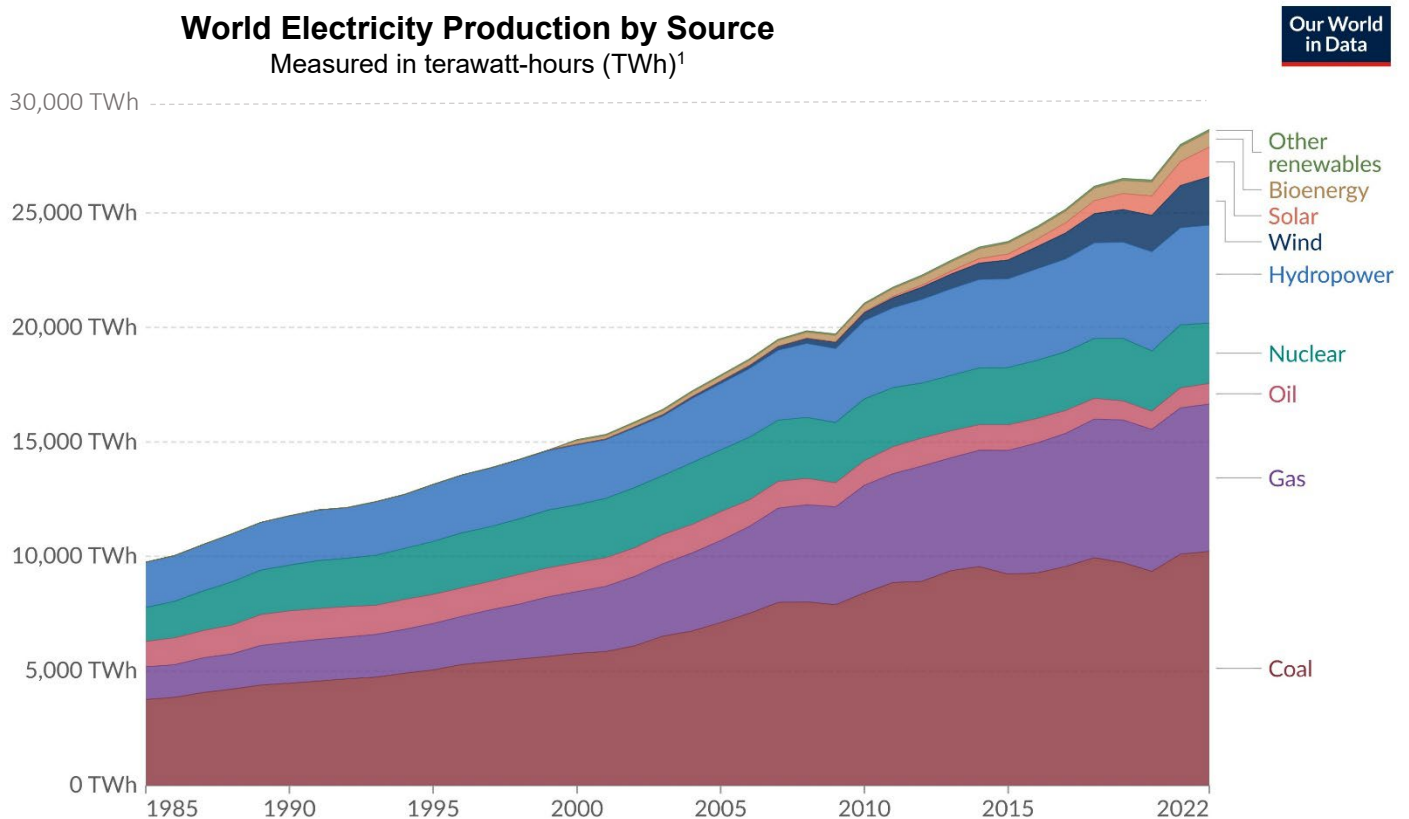
Part IV: Renewable Energy and Global Perspectives

18. The graph below shows the world's electricity production from 1985-2022, by energy source.

Looking at the graph, fill in the blanks in the following statements using the word bank below. (Use each term no more than once.) [3 points]

- a. The total amount of electricity produced worldwide has _____ in 37 years.
- b. While the percentage of renewable energy used to produce electricity has _____, so has the amount of coal used.
- c. Oil has _____ in use.

Word bank: decreased, doubled, halved, tripled



¹A watt-hour is the amount of energy delivered by one watt of energy for one hour. A terawatt-hour is 1 trillion watt-hours. Other renewables include waste, geothermal, wave and tidal.

____/ 3 points

19. United Nations Secretary-General Antonio Guterres identified five actions the world needs to take to speed up the shift to renewable energy. Which of the following is NOT one of the five actions necessary to transform the world's energy systems. [1 point]

- a. Improve global access to components and raw materials
- b. Level the playing field for renewable energy technologies versus fossil fuels
- c. Make renewable energy technology a global public good
- d. Minimize investments in renewables
- e. Shift energy subsidies from fossil fuels to renewable energy

20. Currently only a small percentage of electricity is generated from renewable energy, especially in developing countries. Numerous barriers prevent renewable energy from effectively competing with traditional energy.

For each of the following common barriers, indicate whether it is a social barrier (S), economic barrier (E), technical barrier (T), or regulatory barrier (R). [4 points, ½ point for each correct answer]

___ a. Bureaucratic and administrative hurdles

___ e. Lack of communication with local communities

___ b. Complexities of energy storage

___ f. Lack of financial institutions

___ c. Concerns about disruption of lifestyle

___ g. Lack of information about the benefits

___ d. High initial capital

___ h. Lack of investors

___ / 5 points

Part IV: Local Action and Energy Equity

21. According to climate activist Eleanor Stein, an “energy just” world involves equitable sharing of benefits and burdens involved in the production and consumption of energy services. Which of the following is an example of energy justice in practice? Circle the best answer. [1 point]
- a. A tax credit is made available to homeowners for installing rooftop solar panels.
 - b. A community owns and controls its sources of energy production and involves community members in decision-making about it.
 - c. The extraction of coal causes physical harm to miners and degrades the environment around the coal mine.
 - d. Low-income households in the US pay nearly 9% of their income in energy costs, three times the percentage that middle- and high-income households pay.
22. Indigenous communities have often been harmed by—rather than benefitting from—energy development projects. For example, in the U.S., over 1.1 million acres of tribal land have been flooded under the reservoirs of dams, and tribal land has often been targeted for high-impact fossil fuel extraction (like oil, natural gas, and coal mining).

In recent years, many tribes have planned and developed small-scale renewable energy projects such as solar and wind on their land. For example, the Coquille Indian Tribe has installed rooftop solar on its Community Center building.

What are environmental, economic and social benefits of Indigenous renewable energy projects like these? Name two benefits for each type.

Environmental benefits [2 points]

- a. _____

- b. _____

Economic benefits [2 points]

- c. _____

- d. _____

____ / 5 points

Social benefits [2 points]

e. _____

f. _____

23. There are many different things a person should consider before installing a home renewable energy system. Which one of the following is the LEAST important factor? [1 point]

- a. Cost of different options
- b. Present electricity use
- c. How long it would take to recoup the investment
- d. Local codes and requirements
- e. Behavioral changes to reduce electricity use
- f. Equipment color
- g. Whether to operate the system on or off the grid

24. Home renewable energy systems are expensive, and not everyone owns their home or can afford the investment. Describe two low- or no-cost actions individuals can take to help transition their personal energy use to renewable energy, or to support more renewable energy development in their community? [2 points, 1 for each action]

a. _____

b. _____

____/ 5 points