

Name: _____ Date: _____ Class: _____

8th Grade Biology Summer Assignment- Summer 2025

Directions: Read the following article and show your annotations according to the attached annotation guide (or a method that works best for you). Fill out the vocabulary chart that follows and answer all questions. This will count as a **quiz** grade for the first marking period.

Comparative Analysis of Green Energy Alternatives vs. Fossil Fuels

Stimulus: The Debate for Green Energy: A Comparative Analysis

As the global demand for energy continues to rise, the debate over green energy versus fossil fuels becomes increasingly significant. This article explores various sources of alternative energy, such as wind energy, hydroelectric power, solar energy, geothermal energy, nuclear energy, and natural gas obtained through fracking. These are compared to traditional fossil fuels in terms of environmental impact, cost, and efficiency.

Wind Energy

- **Pros:**
 - Renewable and abundant.
 - Low operational costs after initial setup.
 - No greenhouse gas emissions during operation.
- **Cons:**
 - Intermittent and weather-dependent.
 - High initial investment.
 - Potential impact on bird and bat populations.

Hydroelectric Power

- **Pros:**
 - Reliable and consistent energy source.
 - Low emissions once constructed.
 - Can provide large-scale energy.
- **Cons:**
 - Ecological impact on aquatic ecosystems.
 - High initial costs.
 - Limited to suitable geographic locations.

Solar Energy

- **Pros:**
 - Abundant and renewable.
 - Reduces electricity bills.
 - Low maintenance costs.
- **Cons:**
 - Weather-dependent.
 - Requires significant space for panels.
 - High initial installation costs.

Geothermal Energy

- **Pros:**
 - Sustainable and reliable.
 - Low emissions.
 - Small land footprint.
- **Cons:**
 - High upfront costs.
 - Limited to regions with geothermal activity.
 - Potential for induced seismicity.

Nuclear Energy

- **Pros:**
 - High energy output.
 - Low greenhouse gas emissions.
 - Reliable and consistent.
- **Cons:**
 - Risk of nuclear accidents.
 - Disposal of radioactive waste.
 - High initial construction costs.

Natural Gas (Fracking)

- **Pros:**
 - Abundant and relatively cheap.
 - Lower emissions than coal and oil.
 - Flexible energy source.
- **Cons:**
 - Methane emissions.
 - Risk of groundwater contamination.
 - Earthquake potential due to fracking.

Fossil Fuels

- **Pros:**
 - Established infrastructure.
 - High energy density.
 - Cost-effective in the short term.
- **Cons:**
 - Significant greenhouse gas emissions.
 - Non-renewable and finite.
 - Environmental degradation from extraction.

Data Table: Comparison of Energy Sources

Energy Source	Energy Efficiency (%)	Startup Cost (\$/kW)	CO2 Emissions (g/kWh)
Fossil Fuels	35-45	1000-3000	450-1000
Wind Energy	35-45	1200-1700	0
Hydroelectric Power	40-50	1000-5000	10-30
Solar Energy	15-20	2000-4000	0
Geothermal Energy	10-20	2500-5000	0-50
Nuclear Energy	33-37	6000-9000	0
Natural Gas	45-55	700-1500	200-400

Part 1: Vocabulary Chart (Choose ten words that you are unfamiliar with)

Word	Definition (in your own words- do NOT copy and paste)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Part 2- Open Ended Question Set:

- 1. Which energy source from the table has the highest energy efficiency and the lowest CO2 emissions? Explain why this might be advantageous for reducing environmental impact.**

- 2. Explain how hydroelectric power affects aquatic ecosystems. What are the benefits of using hydroelectric power despite these impacts?**

- 3. Compare the startup costs of solar energy and nuclear energy. What are some potential reasons for the difference in their startup costs?**

Part 3- Addressing Misconceptions

Misconception: Renewable energy can't meet our energy needs on a large scale.

Leading the Way in Renewable Energy: Successful Countries

In recent years, many countries and regions have made impressive strides in meeting their energy needs through renewable sources. These efforts not only help reduce greenhouse gas emissions but also promote energy independence and sustainability. Here are some notable examples of places that have successfully integrated renewable energy into their energy systems.

1. Denmark

Denmark is a global leader in wind energy, generating over 47% of its electricity from wind turbines in 2019. The country has invested heavily in both onshore and offshore wind farms, making it a pioneer in the field. Denmark's ambitious goal is to become entirely fossil fuel-free by 2050. The government encourages investments in renewable technologies and has established policies that support the growth of clean energy.

2. Germany

Germany has made significant progress in transitioning to renewable energy through its "Energiewende" initiative. This policy aims to increase the share of renewable energy to 65% by 2030. In 2020, renewables accounted for about 50% of the country's electricity consumption. Solar and wind power are the main contributors, with Germany being one of the largest solar markets in the world. The government offers incentives for solar panel installations and supports research in energy storage technologies.

3. Costa Rica

Costa Rica is often cited as a model for sustainable energy. Since 2015, the country has produced more than 99% of its electricity from renewable sources, primarily hydropower. The government has prioritized environmental protection and sustainable development. Costa Rica's commitment to renewable energy has also helped boost its ecotourism industry, attracting visitors interested in its natural beauty and clean energy practices.

4. Iceland

Iceland is unique in that it utilizes geothermal energy and hydropower to meet nearly 100% of its electricity and heating needs. The country's geothermal resources are abundant, allowing it to harness energy from the Earth's heat, while its rivers and waterfalls provide ample hydropower. Iceland's focus on renewable energy not only fuels its economy but also reduces its carbon footprint significantly.







Conclusion

These examples illustrate how different countries and regions are successfully meeting their energy needs through renewable sources. By investing in wind, solar, hydropower, and geothermal energy, these places are not only addressing climate change but also paving the way for a sustainable future. As the world increasingly recognizes the importance of renewable energy, the experiences of these leaders can inspire other nations to follow suit.

1. What are two countries that use predominantly renewable energy sources? What renewable energy sources do they use? How have they been able to successfully implement renewable energy on a large scale? What do you think are some reasons the United States has not adopted a single type of renewable energy to depend on?

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Annotations

	Important Points, Key Details, and Main Ideas
	Something Is Confusing
	That's Surprising!
	Circle Words You Do Not Know (and Should)
	Underline or Highlight Things to Remember
	Write in the Margins: <ul style="list-style-type: none">• Summaries• Questions• Personal Connections• Thoughts• Definitions