# Lab 14 Response: Impact of Energy Choices (For Groups)

This is a group lab. You are to work collaboratively in your group (and with the class as a whole) to complete it. Each group will submit one lab report. Make sure the names of all group members are recorded on this lab report form.

## Part 1: Analyzing Energy Graphs and Tables

1. Take a look at the graph titled **Average oil liquids net-energy production from 1950 to 2050, compared to the gross energy** in Part 1 of the lab instructions. What are your key takeaways from this graph? What evidence do you have to support that reading?
2. Now, consult the table **Calculated Potential of Renewable Energy Resources, 2020** in Part 1 of the lab instructions. What are your key takeaways from this table? What evidence do you have to support that interpretation?
3. Consult **Renewable Energy Production and Consumption by Source** in Part 1 of the lab instructions. What are your key takeaways from this graph? What evidence do you have to support that reading?

## Part 2: Impacts of Energy Choices

Your professor will assign you either an energy source or an energy group (Part 2a: Carbon-based fossil fuels, Part 2b: Non-carbon energy sources, or Part 2c: Carbon-neutral energy sources) to research.

As a group, complete whatever portions of the tables in 2a, 2b, or 2c you are assigned. Follow the directions above each table. You can use the [**Library Research Guide**](https://library.cod.edu/biolo1110/energy) to find good sources, or search on your own, but be sure that all sources you use are credible and authoritative (refer to [Lab 1](https://cod.pressbooks.pub/envirobiologylab/chapter/lab-1-introduction-to-the-scientific-method-information-literacy-and-data-literacy/) for more information about evaluating sources).

Once you have completed your assigned research work, finish part 2d and be prepared to present your work from Part 2 to the class.

### Part 2a: Carbon-based fossil fuels

1. For each energy type you are assigned, research the **convenience, applicability, environmental impact, social impact, economic impact, and health impact** **from energy capture to use.** In the source column, provide the author, title, and URL (if applicable) for the sources used for each type of fuel. **Remember that at least 3 sources must be included per energy choice.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Energy option** | **Pros** | **Cons** | **Source of information** |
| **Coal**Definition: |  |  |  |
| **Petroleum** Definition: |  |  |  |
| **Natural Gas**Definition: |  |  |  |

### Part 2B: Non-Carbon Energy Choices:

1. For each energy type you are assigned, research the convenience, applicability, environmental impact, social impact, economic impact, and health impact from energy capture to use. In the source column, provide the author, title, and URL (if applicable) for the sources used for each type of fuel. Remember that at least 3 sources must be included per energy choice.

|  |  |  |  |
| --- | --- | --- | --- |
| **Energy option** | **Pros** | **Cons** | **Source of information**  |
| **Nuclear (fission)**Definition: |  |  |  |
| **Geothermal**Definition: |  |  |  |
| **Hydropower**Definition: |  |  |  |
| **Wind**Definition: |  |  |  |
| **Solar**Definition: |  |  |  |

### Part 2c: Carbon-Neutral Energy Sources

1. For each energy type you are assigned, research the convenience, applicability, environmental impact, social impact, economic impact, and health impact from energy capture to use. In the source column, provide the author, title, and URL (if applicable) for the sources used for each type of fuel. Remember that at least 3 sources must be included per energy choice.

|  |  |  |  |
| --- | --- | --- | --- |
| **Energy option** | **Pros** | **Cons** | **Source of information** |
| **Biomass**Definition: |  |  |  |
| **Biofuel**Definition: |  |  |  |
| **Biogas**Definition: |  |  |  |

### Part 2d: Summarize and present your research

1. Find one additional map, chart, table, or graph related to the consumption, production, or environmental impact of the fuel or group of fuels you were assigned. Take a screenshot of that item and paste it here. (Not sure where to do this? [Look at the Library Research guide for this lab.](https://library.cod.edu/biolo1110/energy))
2. Cite it: who produced your map, chart, table, or graph? List the author (or corporate author), title of the object, date it was produced, and the URL where you found it.
3. Explain the key takeaways from your map, chart, table, or graph. Provide evidence: why did you draw the conclusions you did?
4. Pick the most expert of all of the sources you listed above and write it here. Now explain: why did you choose this source? What makes it credible? Use details such as date, authority, and other signs of expertise to make your argument.

Once you have finished Part 2, you will be asked to present your table entries and responses to questions in Part 2d to the class. Your professor will direct you to share your work with the class as a Google document, a discussion board post, or an alternate method.

## Part 3: Future Energy Portfolio of the United States

### Part 3a: Summarize and explain

1. **Summarize your own and your classmates’ research from Part 2 to fill out the following table.**Provide 3 key takeaways for each energy group, explain if we should limit usage of the energy group or reserve it for specific usages, and then explain your reasoning.

|  |  |  |  |
| --- | --- | --- | --- |
| **Energy Group** | **3 Key Takeaways** | **Limit Usage or Prioritize** | **Why?** |
| **Carbon-based fossil fuels** |  |  |  |
| **Non-carbon energy choices** |  |  |  |
| **Carbon-neutral energy usages** |  |  |  |

1. Are there any outliers (energy sources that are very different from the rest of the group) among the carbon-based fossil fuel energy sources that you would recommend a different prioritization for? If so, which ones and why?
2. Are there any outliers among the non-carbon energy sources that you would recommend a different prioritization for? If so, which ones and why?
3. Are there any outliers among the carbon-neutral energy sources that you would recommend a different prioritization for? If so, which ones and why?

### Part 3b: Current and Historical Energy Consumption Data

1. What are your key takeaways from the chart **U.S. primary energy consumption by energy source, 2023**? What evidence do you have to support that reading?
2. What are your key takeaways from the graph **U.S. primary energy consumption by major sources, 1950-2023**? What evidence do you have to support that reading?
3. Now compare your responses to the questions from part 3a to the chart **U.S. primary energy consumption by energy source, 2023**. How do you think this energy mixture should continue to change in the future? List three concrete changes we should make, using your research and your classmates’ research to support your argument. These proposed changes will serve as your group’s guiding principles for sustainable energy use.
4. Based on your guiding principles for sustainable energy use, enter percentages in the table below to represent your recommended energy consumption by energy source in the United States. Numbers from the 2023 data column are calculated from the U.S. primary energy consumption by energy source, 2023 chart.

|  |  |  |  |
| --- | --- | --- | --- |
| Energy Source | 2023 Data | 2050 (your ideal mixture) | Difference between 2023 and 2050 (Express as + or -) |
| Petroleum | 38% |  |  |
| Natural Gas | 36% |  |  |
| Coal | 9% |  |  |
| Nuclear | 9% |  |  |
| Geothermal | .09% |  |  |
| Solar | .99% |  |  |
| Hydroelectric | .9% |  |  |
| Wind | 1.62% |  |  |
| Biomass | 5.4% |  |  |

1. Discuss how your guiding principles for sustainable energy use were influenced by the 2023 data. What tradeoffs did you accept? (i.e., Did a certain choice prioritize the environment, the economy, our standard of living….)
2. How will your energy mixture serve societal needs for transportation, heating, and electricity?
3. What challenges would you expect to encounter if you attempted to implement your ideal energy portfolio?
4. What actions should we take (as individuals and as a society) to move our energy portfolio closer to the mixture that you propose?

**Each group will present and discuss their guiding principles for sustainable energy use and their future energy portfolio. After you have seen your classmates’ work, we will reflect on and discuss the similarities and differences in the guiding principles for sustainable energy use and the future energy portfolio proposed as a class.**