# Lab 13 Response: Our Changing Climate

## Part 1 Questions

1. Per the video, humans have not experienced climate warming this much in at least \_\_\_\_\_\_\_\_\_\_\_\_ years. Explanations for this climate change are based on over \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ scientific publications.
2. What is the greenhouse effect? What are key greenhouse gases and their anthropogenic (human-based) sources?
3. How is the climate changing and what problems do these changes it create for humans?
4. Study **Figure 13.2**. Compare each graph and explain whether human or natural drivers, and which types, contribute more to average global temperature change.

## Part 2 Questions

1. Explain which butterfly life stages are directly dependent on lupine plants.
2. Insert a screenshot of the simulation page showing your graph of Phenology of the System with the default settings.
3. Describe the butterfly life stages that overlap with “realized lupine,” the population sizes of each organism, and the relationships to the trend in the air temperature of the system.
4. Insert a screenshot of the simulation page showing your graph of Phenology of the System with the 1-degree Celsius temperature change.
5. Explain how the 1-degree Celsius temperature change affected the system, including phenology of the organisms.
6. Hypothesize how your new temperature will affect the phenology and population sizes of the butterfly and lupine.
7. Insert a screenshot of the simulation page showing your graph of Phenology of the System with your unique temperature setting.
8. Explain your results. Did they support your hypothesis?
9. Describe other settings you changed and the results you obtained. Based on your trials, which settings appeared to have the greatest impact on butterfly population size?
10. You saw the impacts of temperature change on the butterfly population. Discuss potential long-term effects on lupines and the extent to which butterflies might influence this.

## Part 3 Questions

1. What is the projected temperature change at the end of the 21st century in the baseline scenario?
2. Is global primary energy projected to increase, decrease, or remain the same through the end of this century? What trends do you see in the types of major energy sources used over this time period?
3. **Table 13.1. Results of En-ROADS model manipulations on net greenhouse gas emissions and global temperature change.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Policy Sector** | **Global Temp. Change in 2100** | **Greenhouse Gas Net Emission in 2100** | **Greatest contributing factor and how it was changed** |
| **Energy Supply** |  |  |  |
| **Transport** |  |  |  |
| **Buildings and Industry** |  |  |  |
| **Growth** |  |  |  |
| **Carbon Dioxide Removal** |  |  |  |
| **Other Sources of Greenhouse Gases** |  |  |  |

1. Include a screenshot of the En-ROADS scenario yielding the greatest reduction in greenhouse gas emissions and global temperature, changing variables in only one policy/sector at a time.
2. Which policy change and factor resulted in the greatest reduction of greenhouse gas emissions and global temperature change? How difficult do you think it would be to achieve?
3. Which policies did you choose to manipulate and why? What was the lowest reduction in greenhouse gas emissions you achieved? What was the temperature change in 2100?
4. Explain how realistic you think it will be to achieve this scenario. Describe challenges you perceive in international cooperation and standard of living changes.