

## Title: Energy and Air Quality

Name \_\_\_\_\_

**Phenomenon:** Watch as your teacher demonstrates the effect of car exhaust on Bromothymol Blue (an acid/base indicator)

**What questions do you have?**

- 1.
- 2.

**Introduction-**Poor air quality affects the valleys of Utah during the winter for a variety of reasons. The picture below shows what an “inversion” looks like during a period of high pressure.




<https://www.deseret.com/2010/12/3/20157865/mucky-air-blankets-northern-utah>

Inversions may last days or weeks. They are harmful to human health and are monitored to warn people when they should avoid outdoor activities. Car exhaust is the number one factor (40%) in polluting the air followed by home heating and cooling (30%).

A variety of solutions have been proposed to develop, manage, and adapt energy resources based on cost-benefit ratios on large and small scales. In this activity, you will define the problem, identify criteria and constraints, analyze available data on proposed solutions, and determine an optimal solution. Read through the data provided and then fill in the table.

**1. Define the problem:**

**2. Possible solutions:**

Solution	<b>3. Criteria (how effective will this be, will it clean the air)?</b> 1 2 3 4 5 	<b>4. Constraints (what will limit the application of this solution). le. Too expensive</b>
<b>Carpool whenever possible</b>		
<b>Limit cold starts and combine trips</b>		
<b>Use public transportation</b>		
<b>Purchase energy-efficient engines or electric cars</b>		
<b>Idle (leave the car running) less or not at all</b>		
<b>Ride a bike or walk</b>		
<b>Turn down the thermostat at home to 65 degrees</b>		
<b>Add solar panels to rooftops to reduce natural gas use.</b>		

**5. Summarize:**

What solution or combination of solutions do you think will be best? Why?

**6. Conclusion:** Answer your questions from the phenomenon. If you can't, explain what information you still need to be able to answer them.

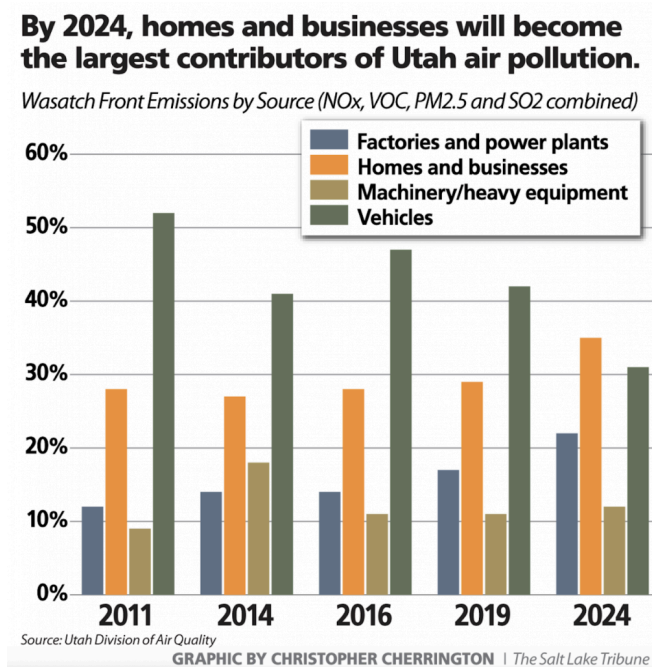
**Part 2:** Each group will research an Energy Source in Utah, make a poster and present their findings to the class. The questions addressed will be:

- Where in Utah is it found?
- How does this energy and examine the energy transfers?
- How much energy is produced from this source? [This link](#) can be very useful.
- As a class vote on which energy source may be the best one for Utah to use.

## Slide Deck

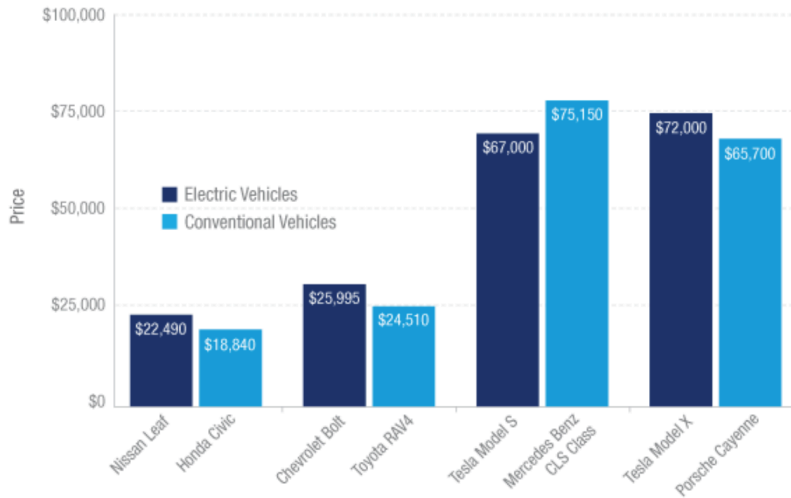
Data:

**Figure 1: Contributors to Utah Air Pollution**



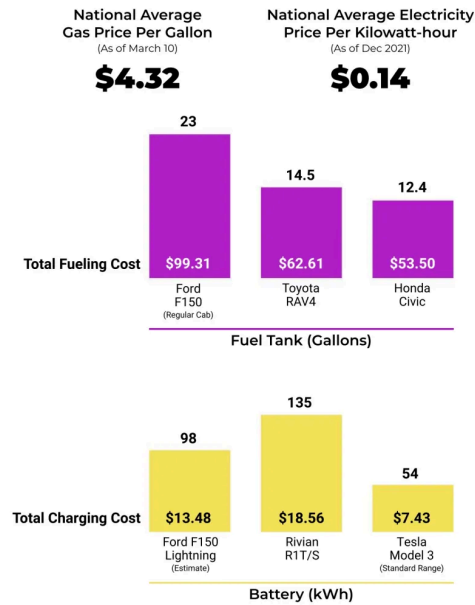
**Figure 2: Price of Electric Vehicles vs Gas-Powered Vehicles**

Price of Electric Vehicles vs Conventional Vehicles (2018)



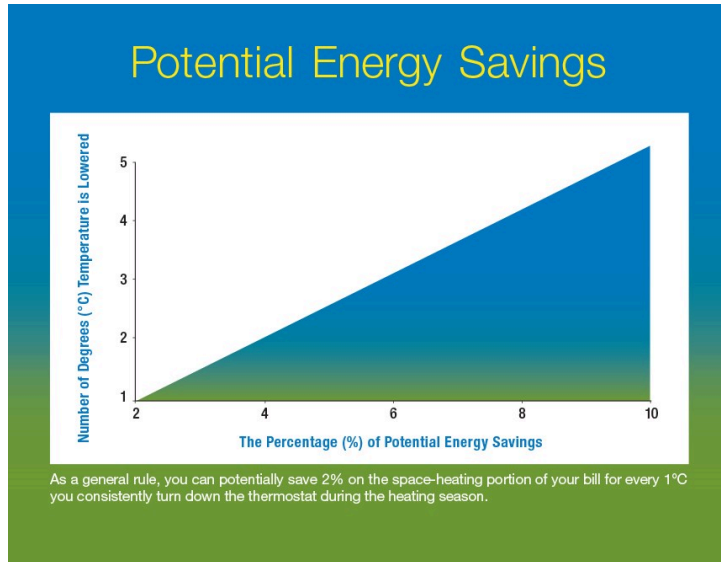
<https://www.energysage.com/electric-vehicles/electric-car-cost/>

Figure 3: Costs of Fuel for Electric vs Gas-Powered Vehicles



<https://electrek.co/2022/03/22/electric-cars-3-to-6-times-cheaper-to-drive-us-high-gas-prices/>

Figure 4. Energy Savings for Thermostat Lowering



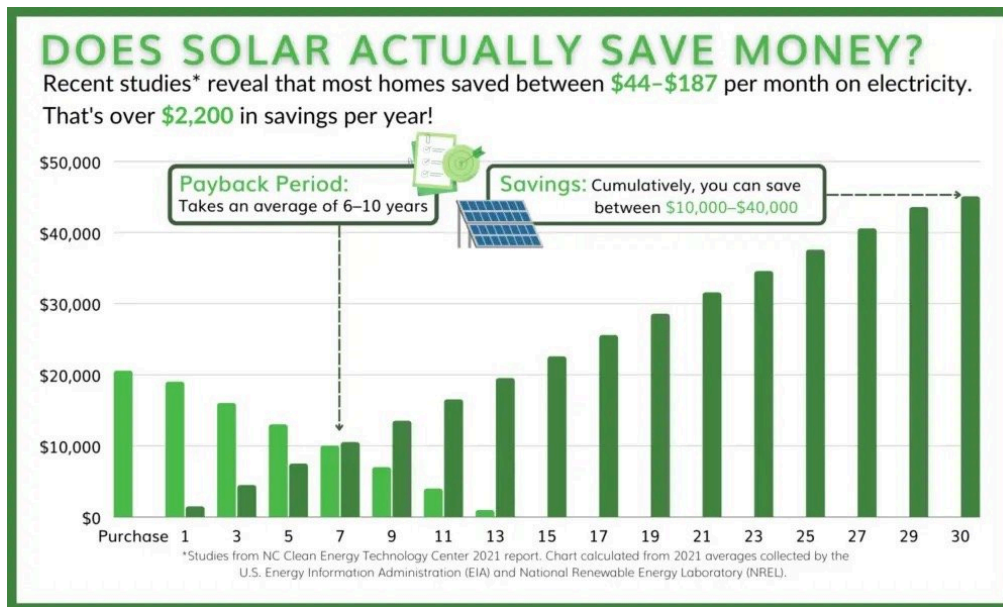
<https://www.warmup.com/blog/avoided-thermostat-key-energy-savings>

**Figure 5. Savings for Less Idling in a Car**



<https://www.picklewix.com/post/idling-cars-outside-schools>

**Figure 6: Solar Energy Savings**



<https://www.esssolarpower.com/blog/is-solar-worth-it-ut>

**Figure 7: Effects of Cold Start**

