


Managing Energy Resources

<https://www.learner.org/wp-content/interactive/envsci/energy/energy.html>

Introduction - Before the industrial revolution, the world's atmospheric CO₂ levels were below 280 parts per million (ppm). Levels have now risen over 400 ppm. In order to limit the worst effects of climate change, many scientists believe we must keep peak atmospheric CO₂ to no more than double the pre-industrial concentration, or about 550 ppm. Different political, economic, and ecological factions have varying ideas about which energy sources would be most efficient, cost effective, and least harmful to the environment.

Your mission - Demand for energy is rising 2% per year. You must meet the ever-rising demand, but find the best mix of energy sources in order to keep the total atmospheric CO₂ under 550 ppm. Eight energy sources are provided, each with its own limits and issues.

1. Look at the graphs
 - a. What does the top graph show? What are the units?
 - b. What does the bottom graph show? What are the units?
2. Click the add energy box
3. Play with the sliders
4. What does the yellow circle represent? (on the sliders)
5. When you met the demand required for that decade, click apply,
6. How did your supply/demand graph move? Did you oversupply the demand or exactly meet the demand?
 - a. If you oversupplied, how did you adjust the energy sources?
 - b. Are you on track to stay under the CO₂ limit
7. What are the parameters that come up for the various sources? Oil has been done for you. (remember you slide the slider all the way to get to yellow and the parameter will come up on the bottom)

Energy Source	Limits and Issues
Oil	 After 2030, must decrease 10% per decade
Coal	
Gas	
Biofuel	
Hydro	
Nuclear	
Wind	
Solar	

8. What things did you figure out? Were you able to stay below your target CO₂

Part 2 Energy Efficiency

1. Click the energy efficiency drop down menu from the top
2. Think about how much more efficiency you think is reasonable to expect from people and technology.
3. Look at the advanced options
 - a. Play with the sliders
 - b. What do you think energy demand changes (which line supply/demand) ?
 - c. What do you think energy efficiency changes(which line supply/demand) ?
 - d. What are the units for carbon capture?
 - e. What do you think are ways we can do Carbon Capture (think about carbon cycle from unit1)
4. Pick some advanced options- record what you pick
5. Redo the simulation to 2110, try to keep fossil fuel use to a minimum, change renewable energy sources first, you may also chose to ignore the yellow limits, but write down
 - a. Describe what you tried and the results

The problem of meeting the world's energy needs while limiting dangerous atmospheric CO₂ concentrations is neither easily solved nor insurmountable. As you've seen, no energy source is a magic bullet. And energy efficiency is also key because energy that isn't expended is the cleanest energy of all. There may also be technologies on the horizon that will help with some of our fuel sources.

[Annenberg Video 28 mins Energy Challenges](#)