

INVESTIGATION 24: CO₂ EMISSIONS FROM FOSSIL FUEL BURNING

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| WHAT TO TURN IN: | Graph 1 | Graph 2 | Questions #1-8 |
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Objectives

To track long-term energy production (1842 to near present) and correlate the data to emissions and atmospheric concentrations of CO₂

To investigate the effects of CO₂ and other greenhouse gases on global temperatures

Introduction

In this activity, you will graph and analyze worldwide energy production historically and its effect on the accumulation of carbon dioxide in Earth's atmosphere. You will access statistics from 1751 continuing to the near present. The data will also track the history of technology as humans have proceeded from a mostly coal-burning economy to one exploiting all types of fossil fuels.

Procedure

1) Access the data from the CDIAC Carbon Dioxide Information Analysis Center web site. The main site is <http://cdiac.esd.ornl.gov>, and the data should be at the following link: http://cdiac.esd.ornl.gov/ftp/ndp030/global.1751_2013.ems. You should have data for over 250 years.

GRAPH 1:

- 2) Set up a line graph plotting time (x) vs. level of CO₂ (y).
- 3) Do the graph by hand, on graph paper. Plot every fifth year (if it fits), beginning at 1842.
- 4) Using three different colors, plot values for all three fossil fuels on the same graph:
 - coal (listed in the data as "solid")
 - oil (listed in the data as "liquid")
 - natural gas (listed in the data as "gas").

GRAPH 2:

5) Set up a new line graph, plotting time (x) vs. per capita data (y). The per capita data begin at 1950. Plot every two years.

Questions

- 1) How do your plots reflect the history of fuel use in the world?
- 2) What do the *per capita* data trends imply? Why does the shape of the plotted data look as it does?
- 3) If the total mass of Earth's atmosphere is about 5.1×10^{18} kg and is approximately 0.037% CO₂, what was the percent increase of CO₂ as a result of the 2000 emissions? Show all calculations and units.
- 4) Identify and describe at least two *carbon sinks* in the natural world.
- 5) Describe how humans may be interfering with or inhibiting the carbon sinks you mentioned in #4.
- 6) Identify and describe two other anthropogenic greenhouse gases and their sources.
- 7) See your answer for #6. Compare their heat-holding capacities to that of carbon dioxide.
- 8) See your answer for #6. How have their concentrations varied over time?