

# **TITLE**

Sources of Energy and the Impact of Nanotechnology on the World Energy Crisis.

## **GRADE LEVEL/SUBJECT**

Integrated Science, Chemistry


Grades 8-12

Phyllis Frick and Sylvia Noga

# OVERVIEW

- ✦ Students will explore different energy sources
- ✦ Students will be able to compare different energy sources and learn about alternatives to fossil fuels.
- ✦ Students will be introduced to nanoscale materials as means of as a means of solving energy storage problem

# LEARNING OBJECTIVES

- ◆ Define energy, list sources of energy
  - ◆ Understand energy crisis, global warming, impact on student's lives.
  - ◆ Compare and contrast renewable vs nonrenewable energy
  - ◆ Create and interpret hand drawn and computer generated graphs from data sets.
  - ◆ Research renewable energy sources and impact on the global energy crisis.
- 

# ACTIVITES

- ◆ Introduction to Energy
- ◆ Non-renewable vs. renewable sources of energy, graphing data, world energy crisis
- ◆ Solar energy and greenhouse gas labs/demos
- ◆ Solar energy, photovoltaics, nanotechnology energy storage solutions
- ◆ Final Project RAFT

# ACTIVITY ONE

## DEFINE ENERGY, ANALYZE ELECTRIC BILL DATA

- ◆ Hook
- ◆ Define Energy
- ◆ Energy knowledge pretest  
Think/Pair/Share
- ◆ Analyze Electric Bill, make data table  
from graph

# JOURNAL: What do all of these pictures have in common?



# Energy Pre-Quiz

[http://www.eia.doe.gov/kids/energy\\_fun\\_games/index.html](http://www.eia.doe.gov/kids/energy_fun_games/index.html)

## Energy Kid's Page

energy information administration



### energy facts

sources of energy  
how oil, gas & coal  
use of energy  
advances of energy  
saving energy



### fun & games

quiz  
puzzles  
field trips  
coloring book



### energy history

energy timelines  
famous people in energy



### classroom activities

for students (K-12)  
experiments  
energy mess  
classroom resources



### related links

other energy programs  
& education sites



### glossary



and you know it!

# ACTIVITY TWO

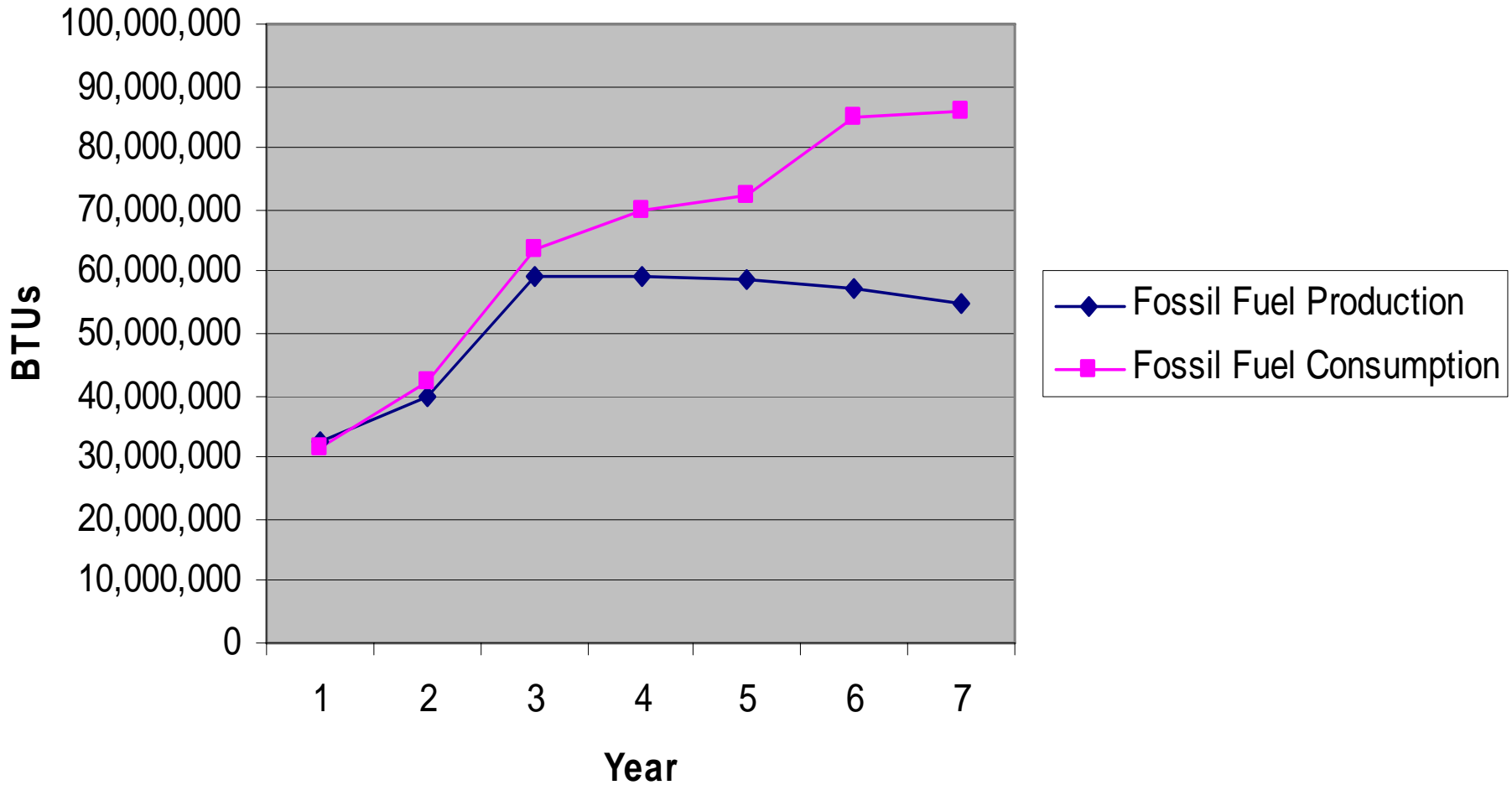
## Non-renewable vs renewable sources of energy, graphing data, world energy crisis

- ◆ Non-renewable Energy Sources KWL
- ◆ Graphing and interpretation of energy production and consumption from EIA website generated data  
<http://www.eia.doe.gov/emeu/aer/overview.html>

## Energy Production in Mega BTUs From EIA Website

Year	Fossil Fuels	Nuclear	Renewable	Total
1950	32.562	0.000	2.977	35.540
1960	39.869	0.006	2.928	42.804
1970	59.186	0.200	4.075	63.501
1980	59.008	3.000	5.485	67.232
1990	58.528	6.000	6.258	70.791
2000	57.254	7.900	6.173	71.289
2005	54.971	8.100	6.061	69.165
2010	?	?	?	?
2020	?	?	?	?
2030	?	?	?	?
2040	?	?	?	?
2050				

# Fossil Fuel Production and Consumption



# Renewable Energy Sources

## Jig Saw Activity

- Solar Energy
- Wind Energy
- Tidal/Wave Energy
- Hydroelectric Energy
- Biomass Energy
- Geothermal Energy
  - Internet resources:
    - EIA Kid's Page Energy Facts  
<http://www.eia.doe.gov/kids/energyfacts/index.html>
    - Power for Sustainable Future  
<http://www.sustainableenergy.qld.edu.au/sources/index.html>

# ACTIVITY THREE

## Greenhouse gas, global warming

- ◆ Storing Solar Energy Lab or Demo using four types of particles in cans.
- ◆ Global Warming Lab or Demo: Carbon Dioxide and the Greenhouse Effect using baking soda and vinegar in sealed bags.

# ACTIVITY FOUR

## Solar energy and photovoltaics Energy storage solutions, using nanotechnology

- ◆ *Teacher led presentation of notes on Solar Energy Challenges and Opportunities* by George Crabtree, Materials Science Division, Argon National Laboratory.
- ◆ EPI , Kids Energy Page, Solar Energy  
<http://www.eia.doe.gov/kids/energyfacts/sources/renewable/solar.html#Photovoltaic%20Energy>

# ACTIVITY FIVE

## RAFT Presentation on solar energy

- ◆ ROLE: Students advisory on energy usage in school
  - ◆ AUDIENCE: School board
  - ◆ FORMAT: Student choice, persuasive speech, rap song, comic strip, etc.
  - ◆ TASK: Convince school board to switch to solar power
- 