Connecticut Energy Education
www.ctenergyeducation.com

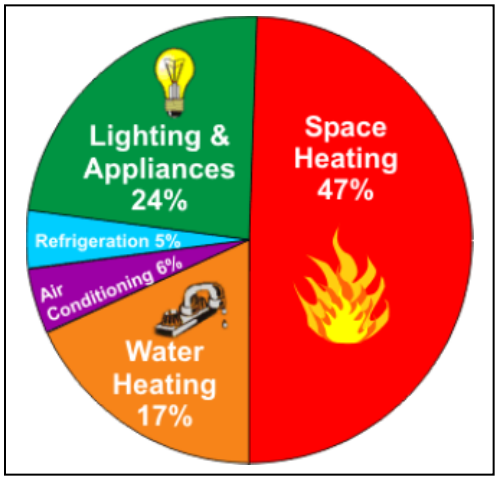
Introductions to Energy Use

Background: About the Energy We Use (Energy Information Administration, http://www.eia.doe.gov/kids/energyfacts/uses/residence.html)

The ability to maintain desired temperatures is one of the most important accomplishments of modern technology. Our ovens, freezers, and homes can be kept at any temperature we choose, a luxury that wasn't possible 100 years ago. Keeping our homes comfortable uses a lot of energy. Almost half of the average home's energy consumption is used for heating. Another 17 percent is used for water heating, 6 percent for cooling rooms, and 5 percent for refrigeration.

Almost one-fourth of the energy used in homes is used for lighting and appliances. Lighting is essential to a modern society. Lights have revolutionized the way we live, work, and play.

How Energy is Used in Home
Due to rounding, percentages may not add to exactly 100 percent.



Most homes still use the traditional incandescent bulbs invented by Thomas Edison. These bulbs convert only about ten percent of the electricity they use to produce light, the other 90 percent is converted into heat. With new technologies, such as better filament designs and gas mixtures, incandescent bulbs are more efficient than they used to be. In 1879, the average bulb produced only 14 lumens per watt, compared to about 17 lumens per watt today. By adding halogen gases, the efficiency can be increased to 20 lumens per watt.

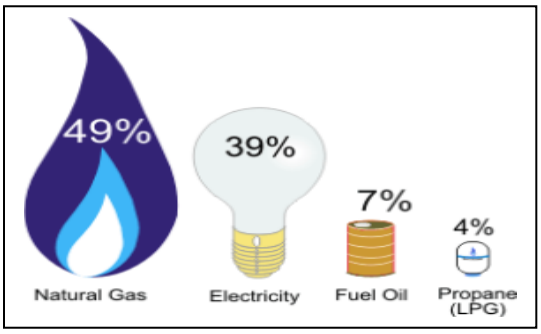
Compact fluorescent bulbs, or "CFLs", have made inroads into home lighting systems in the last few years. These bulbs are more expensive to purchase, but last much longer and use much less energy, producing significant savings over the life of the bulb.

Appliances such as water heaters, refrigerators, washing machines and dryers are also more energy efficient than they used to be. In 1990 Congress passed the National Appliance Energy Conservation Act, which requires new appliances to meet strict energy efficiency standards. Learn more about energy efficient light bulbs and appliances, and other ways to save energy at home.

Types of Energy Used in Homes

Natural gas is the most widely used energy source in American homes, followed by electricity, heating oil and propane. Natural gas and heating oil (fuel oil) are used mainly for home heating.

Electricity may also be used for heating and cooling, plus it lights our homes and runs almost all of our appliances including refrigerators, toasters, and computers. Many homes in rural areas use propane for heating, while others use it to fuel their barbecue grills.



Types of energy used in homes

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Energy Use in Different Types of Homes

About 80 percent of residential energy use is consumed in single family homes, while 15 percent is consumed in multi-family dwellings such as apartments, and 5 percent is consumed in mobile homes.

Suggestions for using Introductions to Energy Use in your classroom:

Introductions to Energy Use can be used to open different kinds of Energy Units, including different energy sources, climate change related to energy used, and energy efficiency studies. The introductions can be used to illustrate to students the historical perspective of Energy Use over time in the US.

Introductions to Energy Activities:

HOME FOR THE HOLIDAYS (Adapted from NESEA's Cars of Tomorrow and the American Community)
Find out what your students know about our ever-changing transportation and energy systems.

Discussion: Home for the holidays

1. Ask students to think about getting their family together for a holiday dinner (or traveling 50 miles or more to see a family member): How do they travel? How long does it take? What equipment, fuel, and resources are needed? Describe the public infrastructure that exists to support travel. What food is on the table? (turkey? burgers? pasta? rice? fruit and vegetables?) Where did the food originate? How was it delivered to their community? How did they get it from the market to their home? How was the food processes before it came to the home? How was the food prepared in the home and stored?
2. If this same dinner were held in 1850, 1890, 1920, or 1950, how would the answers change? What issues were probably raised when the internal combustion engine first replaced the horse and buggy (for example, noise, smell, danger, health, refueling)? How have transportation options changed the kinds of foods that are available to Americans over the years?

How did the community and the country change to accommodate new forms of transportation? How has electricity in the home changed how the meal is prepared or stored?

3. If this same dinner were held in 2020 or 2050, what kinds of changes would the students expect to see?

PUTTING ENERGY IN PERSPECTIVE

Have students read Union of Concerned Scientist's *A Short History of Energy*
http://www.ucsusa.org/clean_energy/fossil_fuels/offmen-a-short-history-of-energy.html

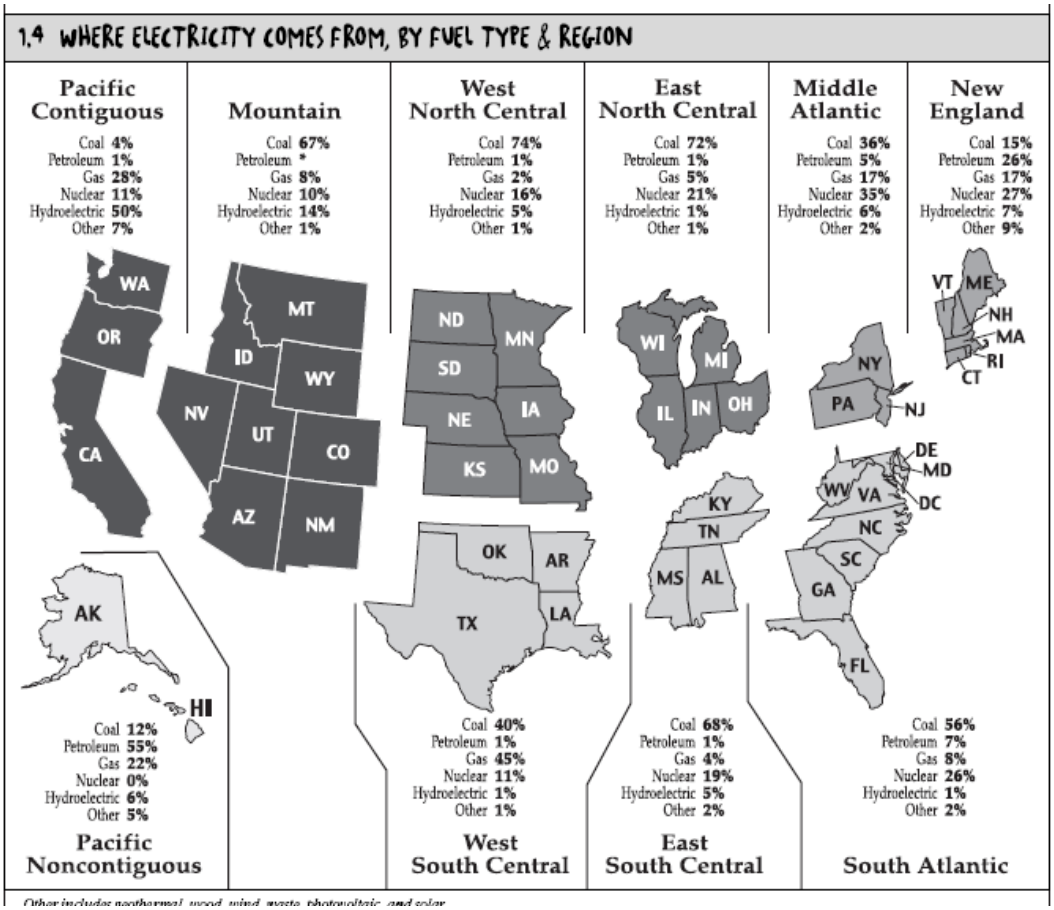
1. Have students create a timeline of energy from 1800 till today. What events and inventions in the article do you think have had the greatest effect on how we live today? Are there other events and inventions that you think should be added to the timeline? Why
2. Think about the future—If you extend the timeline to 2100, what events and inventions may change the energy use of the future? Add your projections to the timeline. Write a paragraph about each event or invention you chose: Why did you choose that? Why did you put it at that place on the time line? What affects do you expect the event or invention to have?

WHERE ELECTRICITY COMES FROM
(Adapted from NESEA's *Cars of Tomorrow and the American Community*)

Energy sources used to make electricity vary from region to region in the United States (and abroad.) There are many factors that affect this, including history, economics, resource availability, politics and personal viewpoints.

Using the energy sources graphs from the 2006 CT Energy Plan and the New England regional information below:

- Where do New England and Connecticut get their electricity?
- Are they the same or different?
- How do we compare to the nation?
- How have energy sources changed in the last 5 years and how do you expect them to change in the next 10-20 years?



From Cars of Tomorrow and the American Community, Information Source: EIA's Electric Power Annual 2000

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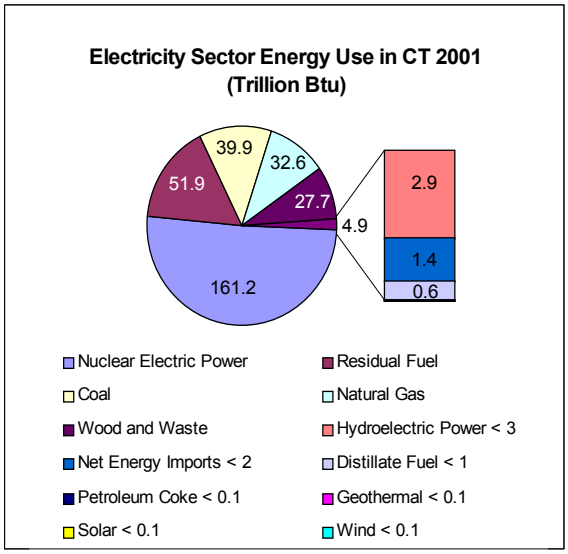
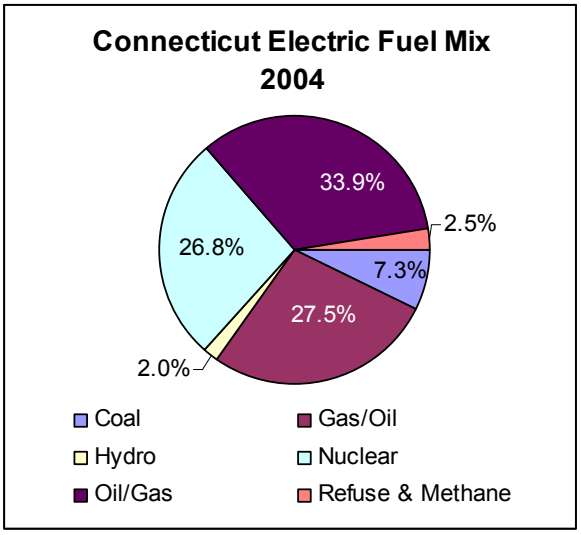
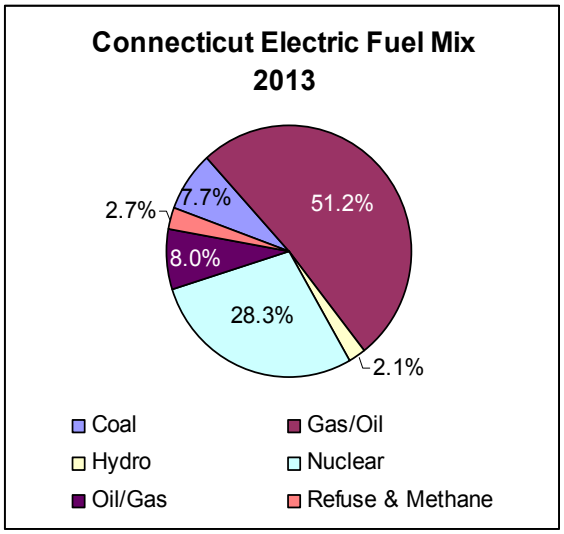
Energy Use for Electricity (CT 2006 Energy Plan)

Electric sector energy use in 2001 was characterized by a predominant use of nuclear fuel, followed by residual fuel, coal, natural gas, and wood and waste.

2004-2013 Projections It is projected that Connecticut's fuel use for generating electricity will shift from and oil/gas dominance to that of gas/oil. Nuclear is projected to remain a strong generating power source.







Sources:
Electricity Sector Energy Use in Connecticut 2001
Source: http://www.eia.doe.gov/emeu/states/sep_use/total/pdf/use_ct.pdf

Connecticut Electricity Fuel Mix 2004 and Connecticut Electricity Fuel Mix 2013
Source: Connecticut Siting Council Draft 2005 Forecast
http://www.ct.gov/csc/lib/csc/DRAFT_CSC_FORECAST_REPORT.pdf.pdf

INTRODUCTIONS TO ENERGY USE RESOURCES:

NESEA's *Cars of Tomorrow and the American Community*:
Start at http://www.nesea.org/education/edmaterials/ Click on Cars of Tomorrow --scroll down and click on the word download under Availability -- fill out and submit the form and it will bring you to the pages where you can download the chapters.

Union of Concerned Scientist's *A Short History of Energy*
http://www.ucsusa.org/clean_energy/fossil_fuels/offmen-a-short-history-of-energy.html

Motorizing the Developing World by Daniel Sperling and Eileen Claussen
http://www.uctc.net/access/24/Access%2024%20-%2003%20-%20Motorizing%20the%20Developing%20World.pdf
University of California's Access Magazine.

http://www.eia.doe.gov/kids/energyfacts/uses/residence.html

2006 CT Energy Plan Connecticut Energy Advisory Board, http://www.ctenergy.org/

Feedback on Introductions to Energy Use:

Share your suggestions to enrich, expand and improve this lesson. How did you use this lesson in your classroom?

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