Energy Resource Use

Unit Essential Question:

☆ How do we use Earth's energy resources in our everyday lives?
☆ How does humanity's use of Earth's resources impact our environment?
☆ How do we balance the need to maintain our lifestyle with preserving our resources?

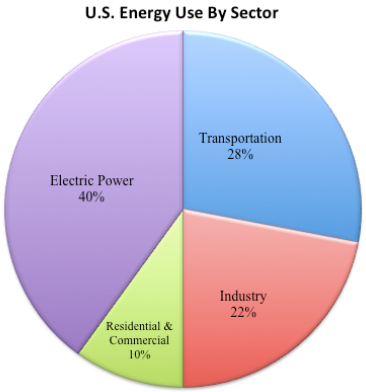
Presentation Objectives:

- Identify the different sectors of society that use energy and explain how they use the energy.
- Explain how biomass and geothermal can be used to heat a home.
- Differentiate between passive and active solar heating.
- Discuss the current and future car technologies that might replace the internal combustion engine.
- Identify the energy resources used to generate electricity.

Q1

Who Uses Energy Resources?

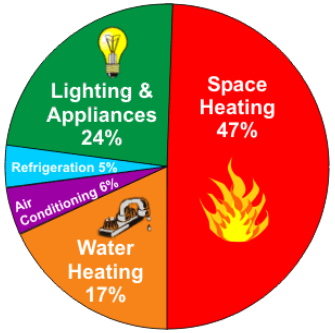
- We need energy to maintain our way of life.
  - All aspects of life require the use of energy resources.
- Society is divided into different sectors.
  - Each sector of society uses energy in different ways.
    - Certain resources will be better than others.



Q2

Home Sweet Home!

How do you use energy in your house?



- Heating
  - Space & Water
- Cooling
  - A/C and Refrigeration
- Electricity
  - Lights and appliances

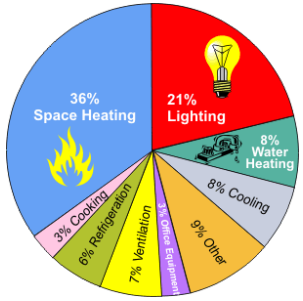
These percentages will vary house to house.
What factors might influence the amount used for each activity?

The type of energy resources used will also vary from house to house!

Q3

It's Off To Work We Go!

- Commercial buildings are very similar to our homes in terms of their energy use.
  - Offices, hospitals, schools, police stations, places of worship, warehouses, hotels, barber shops, libraries, shopping malls, etc..



Like houses, the amount of energy and the type of energy varies from one commercial building to another.

Warming Things Up!

Q4&5

- Overall, most energy is used for heating.
  - Most homes use natural gas, oil, or propane.
  - The renewable options for heating a house or building include biomass, solar, and geothermal.
- Biomass is used to heat a home through the process of combustion.

Chemical —Combustion→ Thermal

- Biomass has always been used historically, but is becoming more popular as oil prices increase.

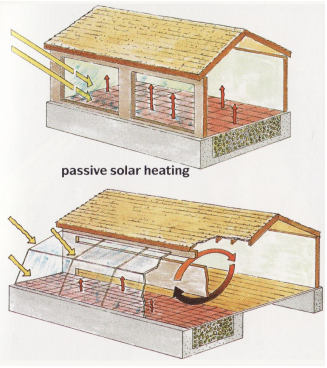
In homes, people use fireplaces or wood pellet stoves to provide heat.

Here Comes The Sun!

Q6

- There are two ways that we can use the sun's energy to heat our homes and buildings.

- **Passive Solar Heating**
  - Buildings are designed to allow sunlight inside.
    - Have lots of windows!
  - Insulation and surfaces are used to trap the heat inside.
  - Once inside, the air circulates to distribute the heat.



Radiant ⟶ Thermal

Active Solar Heating

Q7

- **Active Solar Heating**
  - Uses a collector to gather the sunlight.
  - Uses pumps, fans, or other devices to circulate the heat.
  - Sometimes these systems store the heat.

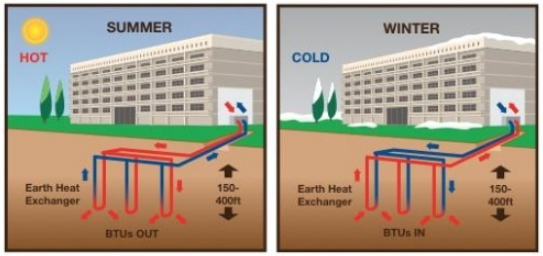
Dud Shemesh דוד שמש

Active Solar Heating Collectors are NOT the same as Solar Cells!

Geothermal

Q8

- Geothermal heating uses temperature differences with the ground to heat buildings.
  - In the winter, heat is transferred from the ground into the building.
  - In the summer, heat is transferred from the building into the ground.



- Geothermal heating requires pipes to be put deep into the ground.

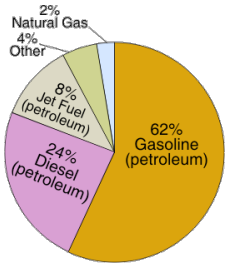
Getting From Here To There

- Transportation accounts for 28% of the total energy use in the United States.
  - While there are various ways to travel, most Americans rely on cars, trucks, motorcycles, and buses to get around.

In the year 2011, these vehicles were used to drive nearly ***3 trillion miles***.

That's driving to the Sun and back 13,440 times!

As with heating, most of the energy resources used for transportation are fossil fuels.



Q9

Current "Green" Transportation Options

- **Hybrid Technology**
  - Combines a combustion engine and an electric motor to power the car.

- **The Electric Car**
  - Contains rechargeable batteries that are used to run an electric motor.
  - Could be recharged at home or a "battery park"

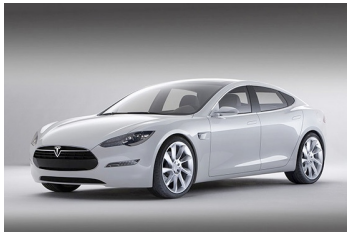
- First created in 1996 by GM
  - EV1

Do to insufficient demand, GM stopped making the EV1 in 2002.

New Electric Cars

Nissan LEAF

Chevy VOLT



Tesla Model S

GE Chargers

Q10

Current "Food" Transportation Options

- Biofuels
  - Fuels that are generated from biomass materials.
- Ethanol is made from sugars found in grains.
  - Corn, sorghum, wheat, potato skins, rice, sugar cane, sugar beets, and yard clippings.

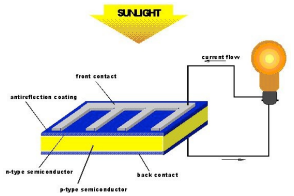
- Biodiesel is made from vegetable oil or animal fat.
  - Soy bean oil, natural oils, grease.

UConn Bus uses cooking oil from the dining halls!

The Future: Solar Cars

Q11

- The Solar Car uses solar panels and photovoltaic cells to power the engine.
  - A photovoltaic (PV) cell transforms solar energy into electricity.



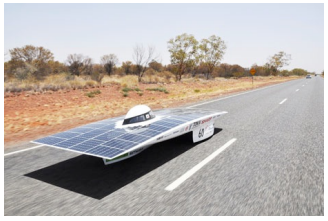
Radiant --> Electrical

Friendly Competition

Competition to design, build, and race solar-powered cars in a cross-country event.

It's A Worldwide Endeavor

Competition in Australia, the winner of which is the first to arrive in Adelaide from Darwin, a distance of about 3000 km (~1860 miles)



1st Place: Japan
Avg: 57 mph

2nd Place: Holland
Avg: 55 mph

3rd Place: USA
Avg: 52.4 mph

Hydrogen?

Q12

- Scientists believe that hydrogen is a promising energy resource for the future.
  - NASA currently uses hydrogen fuel cells to power the electrical systems of the shuttle.
- Scientists and automakers are currently developing cars that use **hydrogen** fuel cells.
  - Known as ***fuel cell vehicles***.
- Why is it a good choice?
  - Waste products are water and heat!
  - Available for use and can be stored!
- There are a number of barriers that will have to be overcome first before they will become readily available.

Cheaper Hydrogen?

- Another option for hydrogen is to burn it.
  - Internal combustion engine is modified to burn hydrogen instead of gasoline.
  - Known as ***H2ICE.***

Last But Not Least!

- All sectors of society require ***electricity***.
  - Most of the energy resources can be used to generate electricity.

- Traditional Resources:
  - Coal
  - Natural Gas
  - Petroleum
  - Nuclear
  - Water


Coal


Uranium

- Alternative Resources:
  - Wind
  - Solar
  - Geothermal
  - Biomass


Wind


Sun