

Exploring Energy

Eco-Schools Topic:

Renewable Energy

Grade Level:

Grades K-8

Standards:

N/A

Guiding Question:

How does sustainable energy work?

Key Questions, Attitudes and Behaviors to Teach:

- What kind of renewable energy sources do we have in Virginia? Name one. (K)
- I would like to see solar panels on my home and school. (A)

Lesson Objectives:

- Students will be able to identify types of renewable resources
- Students will be able to understand how different appliances use different amounts of energy
- Students will be able to identify ways to reduce their energy usage at home

Materials:

- *Energy Word* cards
- Tape
- Voltmeter
- Small appliances (laptop with charger, hairdryer, boombox, etc.)
- Interactive Energy toys (if available)
- Notecard

Prep:

- Print and cut *Energy Word* cards (don't print back to front)
- Print *Energy Usage* data sheet (one copy per voltmeter group)
- Familiarize yourself with using the voltmeter by experimenting with small appliances
- Place small appliances (and toys) around the room and number them with a notecard

Engaging Intro (10-12 minutes)

- Review the energy terms introduced in the first lesson by playing *Energy Words* (similar to the game Hedbanz)
 - Tape a *Energy Word* card on the back of each student so that they cannot see what the card says.
 - Have students walk around and take turns asking each other YES or NO questions to figure out what energy term they are.
 - Once the student figures out what their energy term is, they should stick their card on a designated wall so that all the terms are displayed. Students can then continue to help their friends figure out their terms until the whole group is finished.
- Quickly review the terms with the group by using the *Energy Word* cards stuck on the wall for reference.



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Exploratory Activity (30 minutes)

- State: Today we will be exploring how much energy different appliances use.
- Show students the voltmeter and explain how it works
 - Connect the voltmeter to an electric current
 - Voltmeter measures the amount of energy being used in kiloWatt hours
 - **KiloWatt Hours:** A unit of measure to describe how much energy is being used over time
- Divide into groups and walk around the room, testing to see how much energy each appliance uses
 - Remind students of electricity safety (Don't put your fingers in a electrical socket)
 - Let each student take turns using the voltmeter and reporting the data
- Have one person in the group be the note taker on the *Energy Usage* page and write down the number of kWhs used
- At the end, have all students look at the data and order the appliances from least energy usage to greatest energy usage

Meaningful Discussion (5 minutes)

- What appliances take up the most energy? The least energy?
- Did the amount of energy an appliance used surprise you? If so, why?
- What are good ways of using and saving energy at home?
- Why should we use renewable resources to power our homes and schools?

Additional Background Terms for Volunteers' Understanding

- **Electric current**
 - The rate of electron flow, measured in Amps (Ex. # of electrons/ sec, 1 Amp = light bulb)
- **Circuit**
 - The path of an electric current
- **Voltage (volts, V)**
 - A measure of the force for electrons to flow
 - Ex. A big vs. small push
- **Kilowatt hour (kWh) and Megawatt hour (MWh)**
 - A measure of total energy used over a period of time
 - 1,000 kWh=1 MWh
- **Watts (W)**
 - Unit for Power, Power: rate of energy transfer
- **The Water Hose Example**
 - Current (Amps): the water flowing through hose
 - Voltage (Volts): the force pushing the water to move
 - Power (Watts): the amount of water plants receive per second
 - Energy (KWh or J): the total amount of energy plants receive

Links and Resources

- KiloWatt Hours and Energy: <http://www.energylens.com/articles/kw-and-kwh>
- How Does a Voltmeter Work: <https://www.hunker.com/13414445/how-does-a-voltmeter-work>

ATTACHED BELOW:

Energy Word cards, Energy Usage data sheet



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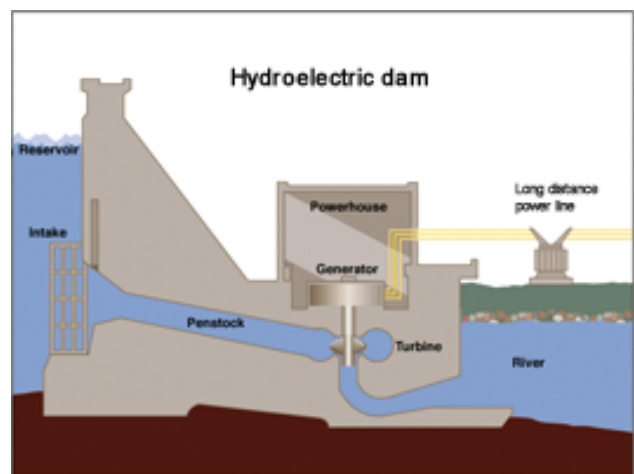
COAL

- Black rock
- Mined from mountains
- Used in power plant
- Nonrenewable
- Makes greenhouse gases



HYDROPOWER

- Needs a river
- Has a dam
- Renewable energy
- Uses moving water to make electricity



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WIND POWER

- Uses a big turbine
- Looks like a pinwheel
- Renewable energy



SOLAR POWER

- Photovoltaic cells
- Can be on your house
- Works best if it's sunny
- Renewable energy



RENEWABLE ENERGY

- Won't ever run out
- Ex: Solar, wind, hydropower



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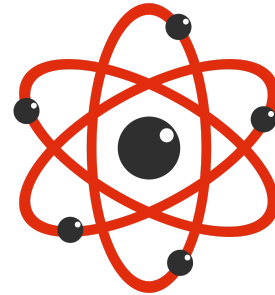
NON-RENEWABLE ENERGY

- We can use it up
- Fossil fuels
- Oil, gas, coal



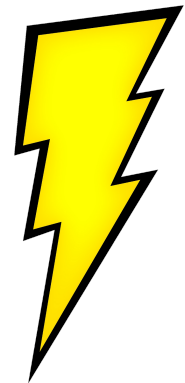
ELECTRON

- Very small
- Part of an atom
- When it moves, it makes electricity



ELECTRICITY

- Used to turn on lights
- Made by electrons moving
- Comes from renewable & non-renewable energy sources



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Energy Usage Data Sheet

APPLIANCE	Energy Used in Watts
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	



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