Energy Audit Redux

Overview: Students will engage in an energy scavenger hunt determine what household items use the most electricity.

Keywords: Watt, Power, Mechanical Energy, Electrical Energy, Energy Conservation

Age / Grade Range: **5th-6th Grade students**

Background: Electricity is the movement of electrons. Different appliances have different electrical requirements in order to function. Refrigerators use electricity when the compressor runs to cool off the food inside. Alarm clocks require constant electricity to run. There are some electronics that are considered phantom/vampire electronics; they still use electricity when in "off" mode. An example would be a TV.

Watts are a measurement of electricity used. Watts are the amount of electricity being used at a specific moment. A 60 watt bulb will use 60 watts the time it is turned on. (http://www.ucsusa.org/clean_energy/our-energy-choices/how-is-electricity-measured.html#.VPzqP-Gs6Dg)

Watt-hours is the amount of electricity an appliance uses over a 1 hour time frame. The same light bulb left on for 1 hour will be rated as using 60 watt/hours.

Watts and watt/hours are measurements when considering energy efficiency. Older appliances use more watts than newer appliances. Upgrading would use less watts and increase energy conservation.

When studying household conservation, watts are measured in kilowatts since there are many devices that draw on electricity in a house.

Next Generation Science Standards & Common Core:

Goals: Students will explore the effort required to generate watts, which devices draw the most watts, and discover a pattern in what do high watt devices do.

How can we use watts to measure energy conservation?

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Objectives:

Watts can be used to evaluate energy efficiency of a device.

Leaving devices that draw on electricity all the time negatively effects the environment.

Materials:

K-Tor Hand generator
Multi-light setup
1x 60 watt incandescent
1x 40 watt incandescent
1x 60 watt CFL
1x LED
Watts up
Various household devices
Recording sheet

Set up:

Clear space for the K-Tor generator and light display

Classroom Time:

30 minute community chore

Note: Text in "quotations" signifies suggested dialogue to engage students in and is not intended to be a script. Use your best judgment when delivering these lessons.

Introduction (Engage):

"What in your home uses electricity?" (field answers)

"Does anyone know what unit we use to measure electricity use?" (Field answers)

"We're going to do a scavenger hunt and try and solve which household items use the most electricity. We're also going to learn about Watts"

"Watts are a unit that we use to measure the amount of electricity a device uses. The higher the watts, the more electricity. This device can measure the amount of watts a device uses. (hold up the watts-up probe)"

Activity (Explore):

"Before we start I thought you'd like to experience what it's like to generate watts. Here we have a generator and some different light bulbs, you'll get to feel what it's like to generate watts. When using the generator move the pedals away from your body. Who would like to try first? You'll want to generate enough electricity to power the bulb, when it lights up fully don't crank any faster, you might destroy the bulb. (Sort through who would go first, let them go as long to power the bulb, have them move at a steady pace no rabbit starts. Also when using lower wattage bulbs just have them go until it lights up too much power will burn the bulbs out faster. After they

powered one bulb cycle down in wattage. Start with 60 watt incandescent to CFL to LED, or you can go in reverse. You can let multiple students try as you have time for.)

"How did that feel as we went from incandescent to LED" (field answers, should get easier, or if you went in reverse, harder)

"These bulbs require different amounts of watts to power and because of that require different amounts of energy from you." (If there is time later you could turn them all on and see if they can power them, you should devote time to testing next)

"Now that we know what it takes to power these bulbs lets go see how much these devices use and what do they do!" (You can have a recorder, plug finder, data reader roles for students. These roles can rotate through the group so everyone has something to do)

"After looking at our data, which devices use the most wattage? Which devices use the least? What do these devices do? Did we find any readings where the device drew power while it was off? Are there any patterns you can find?" (field answers)

(Note this explanation might be covered by the program host during the morning meeting so you might skip this portion)

Explanation

"Devices that heat or cool take up the most amount of electricity. This is a energy intense process. Remember how much energy you had to do to power just 1 bulb? Imagine doing that for any of these devices we found. When we bring up energy conservation, like a light bulb being left on, think back to powering that bulb. Every second you leave that light when it's not needed is like you powering that bulb or device when no one's' using it. That energy to power the bulb has to come from somewhere and we should conserve what we have."

Content Tie-in

This activity ties-in with Toil for Oil,

Toil for oil: Students explored the sources of electricity, this activity explores how those sources are used by devices.

Elaboration:

Evaluation:

With your field group discuss ways to reducing the amount of watts being used by coming up with a conservation plan they can use at home.

Additional resources: Where can the teacher go to learn more? List websites or books that might be useful.

MOSS Appliance Energy Usage Chart

Item plugged into Watts Up Pro	Prediction if it will be higher or lower then the first tested device	Reading (watts)	Device turned on? (yes/no)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

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