



## MSOSW Curriculum Lesson Eight: How Can We Conserve Power?

Why do we focus on standby power?

**Overview:** In this lesson, students will examine ways to conserve power, specifically standby power and will understand that while it may not be a huge drain on their personal electricity bill, when taken on a national level, standby power is a large amount of wasted energy.

### Objectives:

#### The student will:

- Measure standby power use for a specific appliance.
- Generate realistic methods for conserving power in his or her daily life.
- Identify methods for conserving standby power.

### Standards Addressed:

Science as Inquiry: Think critically and logically to make the relationships between evidence and explanations; Recognize and analyze alternative explanations and predictions; Understandings about scientific inquiry

Physical Science: Transfer of energy

Earth Science: Structure of the Earth system; Earth's history; Earth in the solar system

Science and Technology: Design a solution or product; Understandings about science and technology

Science in Personal and Social Perspectives: Risks and benefits

**Suggested Grade Levels:** Middle School (6<sup>th</sup>-8<sup>th</sup>)

**Timeline:** 1 class period

### Materials:

**Day 1:** Analyzing Belkin data spreadsheet  
Note cards (or other small pieces of paper)

### Procedure:

#### Day 1: Why should we conserve standby power?

- Put the following problem on the board for the students to work out:
  - If a device, say your Playstation3, uses 2 watts of power when in standby mode and is in standby mode for about 20 hours each day...
    - How much standby power does it use in a day? (40 w/day)
    - In a week? (280 w/week)

- In a year? (40x365) (Convert that to kilowatts - 14.6 kWh in a year)
  - Explain that the final number is actually in kWh since they're looking at energy use over time. You can then multiply that by the average energy cost for your area to see how much money would be spent in a year on that device.
  - The reality is that it won't be that much. The students end up thinking, "So what?" Ask students to think about why this still matters. You may get several answers, but can help lead the students by having them think about the phrase, "Think Globally, Act Locally."
  - Suppose your home's monthly use of electricity is 1200 kWh (about \$144 at the common Texas rate of \$ 0.12 per kWh). By unplugging devices, you might save 5% or 60 kWh per month. That may not sound like much, but since power generation puts into the air about 1.1 pounds of CO<sub>2</sub> for every kWh of electricity used, then the wasted kWhs put about 66 pounds of extra CO<sub>2</sub> in the air each month. How long would it take to put that 66 pounds back into the ground so that it doesn't fuel global climate change? The Environmental Protection Agency estimates "A medium growth coniferous tree, planted in an urban setting and allowed to grow for 10 years, sequesters 23.2 lbs. of carbon." So your choice is simple: For each month you use 60 kWh serving no useful function (standby power), you can remain carbon neutral on the wasted part by planting 3 trees and taking care of them for 10 years ... or else you can simply unplug the devices.
  - While individual standby power use is fairly small, as you can show the students in the Analyzing Belkin Data spreadsheet, the total cost, both in energy production and actual dollars is VERY high.
  - Standby power may be a relatively small percentage of our TOTAL energy use, but unlike heating/cooling, the VAST majority of it is completely unnecessary. That is why we focus on reducing standby power usage in this project.
- Ask the students if they know what a Public Service Announcement is – this is an open discussion that will lead them into the next activity. Briefly discuss their ideas on what these are and give them some specific examples so they understand.
- Give each student a note card and have them write their names at the top. Each student should then spend about 10 minutes coming up with 3 things they (personally) could do to reduce standby power use. Encourage them to think creatively and not just write – Unplug stuff, Turn stuff off, etc. (These responses will be used to assign the groups

for the Educating Others project.) They should turn this in before they leave.

**Assessment Options for this Lesson:**

- Note card Ideas

<b>4 points</b>	<b>3 points</b>	<b>2 points</b>	<b>1 point</b>
Ideas all relate specifically to conserving standby power and show good thought.	Ideas all relate specifically to conserving standby power.	2 of the ideas relate specifically to conserving standby power.	Only 1 idea relates specifically to conserving standby power.

**Extension Options for this Lesson:**

- For a homework activity, students can involve their family members in completing the Personal Energy Meter (<http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/personal-energy-meter/>) from National Geographic. The students will enter data to determine their energy use (in tons of CO2 per year) compared to their region as well as the nation.
- An additional extension activity could be having the students calculate the number of trees they could save based on their total energy savings. The EPA site calculator is located at <http://energystar.supportportal.com/link/portal/23002/23018/Article/19252/s-there-a-calculator-to-convert-kWh-saved-into-trees-saved>.