



Energy Campaign

Turn it Off – Electronics

Background

Technology like computers, monitors, projectors, interactive white boards, photocopiers, printers and more, can use a lot of energy. The purpose of this campaign is to identify if equipment is used efficiently, and ensure the power is shut down when the devices are not in use. Focus on these actions:

- Use sleep settings
- Shut devices down when not in use
- Unplug devices, or turn off power bars
- Buy ENERGYSTAR® devices.

Pre-Campaign Audit:

Audit the technology in your school or home to find out if it is being used efficiently. As well as your own investigations, you may need to talk to office staff and the people who look after the computers in your school, and school division. With this information you can decide whether action to turn off electrical devices will save energy.

Check the power use of each device with one of the following methods:

Method 1: Watt Meter (use audit chart for “watt meter”)

Use the information in the [How to use a watt meter](#) box below to check the power used by devices while they are in use, as well as when they are shut down (phantom load).

Method 2: No Watt Meter (use audit chart for “no watt meter”)

- If the device has an ENERGYSTAR® logo on it both power use and phantom load will be smaller than non-ENERGYSTAR computers. Record this information.
- If devices are not ENERGYSTAR assume that both energy use and phantom load are higher than necessary and take action to save energy.
- Even ENERGYSTAR devices will use less energy if unplugged or if power bar is turned off.





Phantom load, also known as *standby power*, is the electric power used by equipment even when it is turned off. It is using that power in order to be ready to come back on quickly. Although the amounts of power for each device may be small, the energy consumption from all the electrical devices in your school or home that have a phantom load adds up to a lot of wasted electricity. It is using some power if it:

- has a clock,
- has a remote control,
- has a visible light (usually green or red) when not in use,
- is programmable,
- is instant on, or
- is a SMART device.

By reducing phantom load by 50%, the average home saves 350 kWh/year, 210 kgCO_{2e}/year and \$5/month.

How to use a watt meter:

Watt meters are used to measure the actual power and energy consumption of individual appliances; both when they are in use, and to measure phantom load. Also known as a *Power meter, Circuit Monitor or an Energy Use Monitor*.

There are several watt meters on the market. The functions of the meters vary. Use the User's Manual for your watt meter to modify this activity.

Be sure you have permission to unplug something before testing it. If you unplug a printer while someone is sending it a print job, or unplug a computer while someone is working, you may be unpopular!

Power (W):

- Plug the watt meter into the wall and plug the device into the watt meter.
- Set the meter to show watts (W).
- Turn the electrical device on and wait a minute for the numbers on the meter to stop changing. Be patient.
- The unit will read how many watts your device is consuming while in use. Record it on the audit chart in the "in use" column.

Phantom Load (W):

- Turn off the electrical device. Wait a minute for the numbers on the watt meter to stop changing.
- The unit will read how many watts the device is still consuming. This power is the **phantom load**. Note that if the power is less than 0.5 W, the unit will read 0-0.5 W. The meter is unable to read power smaller than 0.5 W. Record it on the audit chart in the "not in use" column.

Use the audit information to decide which devices to target in order to save energy. **Note:** Even if the decision is made to keep some electrical devices on to maintain programs, (e.g. photocopier) you can focus on other devices that could be shut down or unplugged when not in use, like computers, or microwaves.



Education and Monitoring

Meet with computer or office staff to find out what solutions work for your school. Focus on these actions:

Use Sleep Settings:

- Use sleep settings to save energy on computers, monitors, interactive white boards, photocopiers and more.
 - Sleep settings vary from 30 seconds to 3+ hours. Choose the shortest time that is practical to save the most energy.
 - Look up “how to change sleep settings” and follow the steps.

Shut devices down when not in use:

- Use timers to automatically turn devices off during inactive hours.
- Shut down computers at the end of each day. Schedule updates for a specific day (e.g. Monday night) to allow for devices to be shut down at other times.
- Shut down monitors, interactive white boards, etc. at the end of each day.
- Shut down other devices like coffee makers, speakers, etc. when not in use.

Reduce Phantom Load:

- Unplug devices when not in use.
- Plug devices into power bars that are turned off at the end of each day.
- Use **smart** power bars in situations where there are programmed devices. These power bars maintain phantom load to a programmed or network connected device, while shutting down power to other devices on the bar.

Buy ENERGYSTAR® devices:

- Speak to the people who buy devices at school or home and ask them to choose ENERGY STAR when replacing electrical devices. They use energy efficiently both while in use, and asleep.

Communicate your plan:

- Prepare posters, announcements and class presentations to explain how to save energy using sleep settings, shutting down devices, and unplugging devices.
- Place energy saving information on or near devices so it will be seen and will act as a reminder to students and staff.
- Prepare newsletter items to let families know how to take action in order to save energy and money.



Environmental
Education



A Better Planet
Begins In the
Classroom





Calculate Greenhouse Gas Emissions

Device	Energy(kWh)		Greenhouse Gas Emissions CO _{2e} = kWh/yr x 0.5kgCO _{2e} = kgCO _{2e} /yr	
	In Use	Not in Use	In Use	Not in Use
E.g.: computer	0.225 kWh x 195 school days/yr = 44 kWh/yr	0.058 kWh x 365 days = 21 kWh/yr	44 kWh x 0.5 kgCO _{2e} = 26 kgCO _{2e} /yr	21 kWh/yr x 0.5 kgCO _{2e} = 12.6 kgCO _{2e} /yr
Totals	Total in-use energy /year	Total phantom load energy/year	Total in-use CO _{2e} /yr	Total not in-use CO _{2e} /yr



Post Campaign Audit

Return to the same rooms that you checked for the pre-campaign audit and check the devices again. Return at approximately the same time of day that you did the pre-campaign audit. Record your readings on a new copy of the chart.

Compare pre and post audit results. Did you reduce energy use?

Discussion questions:

1. Which devices used the most energy when turned off?
2. Which solutions to reduce energy use worked in your school?
3. Did you reduce energy use at home? How? In which devices?
4. If you had a watt meter, do some math. Calculate the following: (see calculate greenhouse gas emissions chart)

Total energy:

- How much energy does the device use in a year? (see Energy, In Use column)
- How much does that cost in a year? (Multiply the kWh/yr x \$0.13/kWh)
- What are the CO_{2e} emissions each year from that energy?
(Multiply kWh/yr x 0.5kgCO_{2e})

Phantom load:

- What is the total energy per year the device consumed while not in use?
- How much does that cost in a year? (electricity is \$0.13/kWh)
- What are the CO_{2e} emissions each year from that energy?

Energy saved by actions:

- What is the total energy saved by your actions per year?
(Pre-audit kWh/yr – post-audit kWh/yr)
- How much money has that saved in a year? (electricity is \$0.13/kWh)
(Energy saved (kWh/yr) x \$0.13/kWh)
- How much have CO_{2e} emissions been reduced each year from that energy?
(Pre-audit kgCO_{2e} – post-audit kgCO_{2e})

5. If you didn't have a watt meter, compare the hours in-use in the pre and post audit.



Curriculum Connections

Grade 4 Mathematics: Outcomes N4.1 Demonstrate an understanding of whole numbers to 10 000 (pictorially, physically, orally, in writing, and symbolically). **N4.2** Demonstrate an understanding of addition of whole numbers with answers to 10 000 and their corresponding subtractions (limited to 3 and 4-digit numerals). **N4.3** Demonstrate an understanding of multiplication of whole numbers (limited to numbers less than or equal to 10). **N4.4** Demonstrate an understanding of multiplication (2- or 3-digit by 1-digit). **N4.5** Demonstrate an understanding of division (1-digit divisor and up to 2-digit dividend) to solve problems. **N4.7** Demonstrate an understanding of decimal numbers in tenths and hundredths (pictorially, orally, in writing, and symbolically). **P4.1** Demonstrate an understanding of patterns and relations. **SS4.1** Demonstrate an understanding of time. **SP4.1** Demonstrate an understanding of many-to-one correspondence.

Grade 5 Social Studies: Outcome RW5.1 Explain the importance of sustainable management of the environment to Canada's future.

English Language Arts: Outcomes CC5.1 Compose and create a range of visual, multimedia, oral, and written texts that explore and express personal thoughts shaped through inquiry. **CC5.4** Use a writing process to experiment with and produce multi-paragraph narrative and persuasive compositions that clearly develop topic and provide transitions for the reader. **AR5.1** Identify strengths in viewing, listening, reading, speaking, writing, and other forms of representing. **AR5.2** Set goals to enhance the development and improvement of the skills and strategies in viewing, listening, reading, speaking, writing, and other forms of representing and take steps to achieve goals.

Mathematics: Outcome N5.2 Analyze models of, develop strategies for, and carry out multiplication of whole numbers. **N5.3** Demonstrate, with and without concrete materials, an understanding of division (3-digit by 1-digit) and interpret remainders to solve problems. **N5.6** Demonstrate understanding of decimals to thousandths. **P5.2** Write, solve, and verify solutions of single-variable, one-step equations with whole number coefficients and whole number solutions. **SP5.1** Differentiate between first-hand and second-hand data.

SP5.2 Construct and interpret double bar graphs to draw conclusions.

Grade 6 Science: Outcome: EL6.1 Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose action to reduce those impacts.

Mathematics: Outcome: N6.3 Demonstrate understanding of the order of operations on whole numbers (excluding exponents) with and without technology. **N6.4** Extend understanding of multiplication and division to decimals (1-digit whole number multipliers and 1-digit natural number divisors). **P6.1** Extend understanding of patterns and relationships in tables of values and graphs. **SP6.1** Extend understanding of data analysis to include: line graphs; graphs of discrete data; data collection through questionnaires, experiments, databases, and electronic media; interpolation and extrapolation.



Grade 7 Science: Outcome: HT7.1 Assess the impact of past and current heating and cooling technologies related to food, clothing, and shelter on self, society, and the environment.

Mathematics: Outcome: N7.2 Expand and demonstrate understanding of the addition, subtraction, multiplication, and division of decimals to greater numbers of decimal places, and the order of operations.

SP7.1 Demonstrate an understanding of the measures of central tendency and range for sets of data.

Grade 8 Health Education: Outcome: USC8.6 Examine and assess the concept of sustainability from many perspectives and develop an understanding of its implications for the well-being of self, others, and the environment.

Mathematics: Outcome: N8.5 Demonstrate understanding of multiplication and division of integers concretely, pictorially, and symbolically.

SP8.1 Analyze the modes of displaying data and the reasonableness of conclusions.

Grade 9 Science: Outcome CE9.3 Assess operating principles, costs, and efficiencies of devices that produce or use electrical energy. **CE9.4** Critique impacts of past, current, and possible future methods of small and large scale electrical energy production and distribution in Saskatchewan.