SCHOOL APPLIANCE AUDIT INSTRUCTIONS

Adapted from EcoSpark's Wattwize: Teacher Guide, Handout #2, available at ecospark.ca.

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Purpose:

The purpose of this audit is to help students become more aware of the electricity used by each appliance within their school and through this investigation help students identify potential energy conservation target items.

Materials

- Plug-in electricity meter(s)
- Blank Appliance Audit Worksheets
- Calculators

Example of a plug-in electricity meter

Safety First!

Health and Safety tips while using the plug-in electricity meters

- Read the operating instructions for your specific electricity meter
- Demonstrate the proper use of the device for your students and supervise while using the devices
- Plug-in electricity meters are designed to operate within specific voltage ranges, only measure appliances within the acceptable range for your device
- When using plug-in electricity meters or other electrical devices use regularly maintained outlets and check outlet for sparks before students conduct their investigation

How to conduct your school's appliance audit

STEP 1 **As a class or EcoTeam brainstorm a list of all the appliances in your school that use energy** (i.e., computers, printers, smartboards, laptop carts, projectors, lamps, stoves, ovens, refrigerators, portable heaters, fans, mini fridges etc.).

STEP 2 **Choose 5 appliances to investigate:** We recommend that you choose appliances that are frequently used or that are numerous in your school (i.e., computers and printers).

STEP 3 **Complete the appliance audit worksheet:** When completing the worksheet students can fill-in the first two columns "in the field" and complete the other columns back in the classroom. Depending upon the age of your students, the size of your class or EcoTeam, and your access to plug-in electricity meters, you may consider dividing into 5 groups and assigning each group an appliance to investigate. Using the worksheet as a guide, students will investigate the following:

1. **Measure the power draw (watts):** Use your plug-in electricity meters to measure and record the power draw (Watts) for the *In Use, Standby* (if applicable)*, Phantom* modes for each of your 5 appliances.
   - **In Use draw =** power being drawn when the appliance is in use.
   - **Standby draw =** power being drawn when the appliance is in sleep or standby mode (may not apply to all appliances).
   - **Phantom draw =** power being drawn when the appliance is turned off.

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2. **Estimate the hours of use per week:** Estimate and record the average number of hours (h) each appliance is drawing energy in each mode. Be sure to include the weekend in your calculations if the appliance is not unplugged.
3. **Calculate the total electricity used in one week per mode for each appliance:** Total electricity use in one week (Wh) = (Power draw (W)) x (Hours of use per week per mode (h))
4. **Convert total electricity used to kWh: Total electricity in one week (kWh) =** (Total electricity used in one week per mode (Wh)) ÷ 1000
5. **Calculate total electricity used in one week per appliance:** Add together "Total electricity used in one week in kWh" for each mode for each appliance.
6. **Count (or estimate) the number each type of appliance being investigated in your school**
7. **Calculate the total electricity used by each type of appliance type in one week:** Total electricity consumed per appliance per week (kWh) = (Total electricity used per week (kWh)) x (# appliances)
8. **Calculate the GHG emissions emitted per appliance type per week:** GHG emitted = kWh of electricity consumed per appliance per week x 0.180 kg CO2 -e/ kWh

STEP 4 Analyze your collected data, identify target items, and outline strategies

Once you have collected your data from the five applicances, use the *Ontario EcoSchools Energy Conservation Action Plan* to translate your data into practical energy conservation strategies for your school.

- Based on your investigation and observations of daily practices identify the most common ways energy is wasted in your school.
- Identify practices in your school that can be targeted to reduce energy use and brainstorm strategies to accomplish this goal.
- Communicate the results of your investigation and the strategies from your *Energy Conservation Action Plan* with your school community.

Sample Appliance Audit for laptops

Mode	Power draw	Hours per week	Total electricity used in one week per mode	Total electricity used in one week per mode in kWh	Total electricity use in one week per appliance	# of appliances school	Total electricity used by appliances type per week	Consequent GHG emissions per week
Formula	Measure from watt meter	Estimate	= (Power Draw) x (Hours per week for each mode)	= (Total electricity used in one week per Mode) ÷ 1000	Add together "Total electricity used in one week in kWh" for each modes	Estimate or count	= (Total electricity use d /week) x (# of appliances)	= (Total electricity used/week) x (0.18 CO2-e/kWh)
APPLIANCE: laptop computer								
In Use Mode	Measured from plug-in electricity meter 20 W	3 hours/day x 5 days = 15	20 W x 15 hrs = 300 Wh	300 Wh ÷ 1000 = 0.3 kWh	0.3 kWh + 0.18 kWh + 0.25 kWh =	Counted or estimated	0.7 kWh x 30 =	21.9 kWh x 0.18 =
Standby Mode	6 W	6 hours/day x 5 days = 30	6 W x 30 hrs = 180 Wh	180 Wh ÷ 1000 = 0.18 kWh	0.73 kWh	30	21.9 kWh	3.94 kg CO_2e
OFF Mode (Phantom)	2 W	75 hrs/week + 48 hrs/ weekend = 123 hrs	2 W x 123 hrs = 246 Wh	246 Wh ÷ 1000 = 0.25 kWh				

APPLIANCE AUDIT WORKSHEET

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Using your plug-in electricity meter(s), fill-out the table below for each of your 5 appliances.

SCHOOL NAME: _____ STUDENT NAMES: _____ DATE: _____

Mode	Power draw	Hours per week	Total electricity used in one week per mode	Total electricity used in one week per mode in kWh	Total electricity use in one week per appliance	# of appliances school	Total electricity used by appliances type per week	Consequent GHG emissions per week
Formula	Measure from watt meter	Estimate	= (Power Draw) x (Hours per week for each mode)	= (Total electricity used in one week per Mode) ÷ 1000	Add together "Total electricity used in one week in kWh" for each modes	Estimate or count	= (Total electricity used/ week) x (# of appliances)	= (Total electricity used/ week) x 0.18 CO2-e/KWh
APPLIANCE #1:								
In Use mode	W	h	Wh	kWh	kWh		kWh	kg CO_2e
Standby mode	W	h	Wh	kWh				
Off mode	W	h	Wh	kWh				
APPLIANCE #2:								
In Use mode	W	h	Wh	kWh	kWh		kWh	kg CO_2e
Standby mode	W	h	Wh	kWh				
Off mode	W	h	Wh	kWh				
APPLIANCE #3:								
In Use mode	W	h	Wh	kWh	kWh		kWh	kg CO_2e
Standby mode	W	h	Wh	kWh				
Off mode	W	h	Wh	kWh				
APPLIANCE #4:								
In Use mode	W	h	Wh	kWh	kWh		kWh	kg CO_2e
Standby mode	W	h	Wh	kWh				
Off mode	W	h	Wh	kWh				
APPLIANCE #5:								
In Use mode	W	h	Wh	kWh	kWh		kWh	kg CO_2e
Standby mode	W	h	Wh	kWh				
Off mode	W	h	Wh	kWh				