Classroom Audit Kit

This kit accompanies **Step 1: Conduct an Audit** and **Step 4: Monitor & Evaluate**. It includes:

- **Classroom Survey.** Use the Survey to gather data about classroom electricity use, heating, waste generation and recycling, and transportation both before and after the Challenge.
- **Classroom Carbon Calculator**. The enclosed worksheets will help you calculate classroom emissions based on the results of the Survey. You will compare before-and-after totals to measure your school's progress toward reducing its climate impact.
  - **To streamline calculations,** you can also use the Excel spreadsheet available at coolschoolchallenge.org.

Instructions:

You'll conduct the audit process twice: at the beginning as part of Step 1, where you will collect baseline information about current classroom behaviors that may be contributing to its carbon footprint, and then again in **Step 4** after you've implemented your Climate Action Plan, to see how well each classroom did at reducing its climate impact. This information will help you project the CO_2 reductions possible if the classroom continued climate-protecting behaviors for the entire school year.

1. Begin by reviewing the background information in the Classroom Survey.
2. Conduct the Survey.
3. Use the information gathered in the Survey to estimate classroom emissions in the Classroom Carbon Calculator.

   Hint: Be sure to keep your "Pre-Challenge" survey results and calculations from **Step 1** handy so you can compare results in **Step 4**.

Classroom Survey

Use the enclosed "Classroom Survey" form (or feel free to create your own!) to gather data about classroom electricity use, waste generation and recycling habits, heating and transportation. Survey each classroom twice: first at the beginning of the Challenge to gather preliminary data, and then again at the *end* of the Challenge, to see whether classrooms successfully met their CO_2 emission reduction goals. To help get you started, review this background information on each of the categories you'll be auditing.

Background information

Electricity

Electricity used by schools for lighting and powering computers, televisions and other devices contributes to emissions of carbon dioxide (CO_2), a greenhouse gas. Reducing the amount of electricity used can help lower CO_2 emissions. In this part of the Classroom Survey you'll take a look at how much energy is being used to light the classroom, and also hunt for energy 'vampires.'

LIGHTING

Most classrooms are lit by overhead light panels, commonly equipped with 32-watt fluorescent bulbs. In conducting your audit, look for the number and type of bulbs powered by each light switch, as well as for any other lights that might be in the classroom (such as desk lamps.) If you cannot find the wattage of the bulbs, use 32-watts as your default, or check with your custodian. Also find out how many hours the lights are kept on during a typical school day.

ENERGY "VAMPIRES"

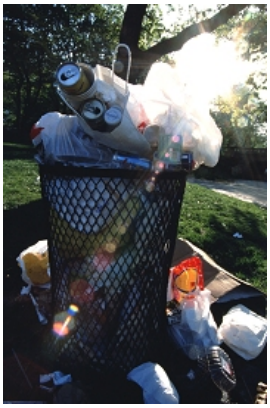
Lights aren't the only devices that use electricity. Take a look around the classroom. In addition to classroom lights, what else is using electricity? Are there any computers, projectors or DVD/VCR players? A lot of appliances suck up energy even when they are not being used – which is why they are sometimes referred to as "energy vampires." Vampires include devices with digital clocks (like DVD players), or internal remote control sensors (like some televisions), which draw energy just from being plugged in. Reducing vampire loads is as easy as plugging the appliance into a power strip and

then turning off the power strip when not in use. Because computers and other electronics are usually put to good use during school sessions, this exercise only focuses on what happens to electronic equipment *after* school hours to see how much energy is being wasted.

In this part of the Classroom Survey, take an inventory of the different electric devices and find out whether they are left on in "active" mode overnight, put to "sleep" or turned completely "off." (Refer to the table below for a description of the different operating modes.) If devices are plugged into a power strip, find out whether the power strips are actually turned off at the end of the day.

COMMON OPERATING MODES FOR ELECTRIC DEVICES

MODE	
"Active"	Device is on and serving its primary function. (Example: a DVD player playing a movie, or a computer running a program.)
"Sleep/Standby"	Device is in low-power mode. (Example: DVD player is on, but not playing a disc; computer is on, but in power-save/sleep mode.)
"Off"	Device is turned off, but still plugged in and ready for action. (Example: DVD player is turned off, but could be activated by remote. Digital displays will be visible.)
"Power strip/ Unplugged"	Device is plugged into a power strip, which is turned off at the end of the day. Or – the electronic device is unplugged. (Example: DVD player is receiving NO power. Digital display is NOT on and cannot be activated by remote.)



Solid Waste/Recycling

Every person in Washington generates about 8 pounds of waste per day.[i] Over the course of one school year (180 days), that adds up to 1,440 pounds of waste per person! Waste impacts the environment in a number of ways, ranging from the greenhouse gases released after it's dumped in a landfill to the emissions associated with transporting that waste to the landfill, to the emissions generated just to produce that item in the first place! According to the U.S. Environmental Protection Agency, each pound of waste produces roughly 1.75 pounds of greenhouse gas pollution as it journeys from your trash can to the landfill.[ii] Fortunately, there are many ways to shrink your waste – and greenhouse gases – by reducing, reusing, and recycling.

In this section of the Classroom survey look at how much trash each classroom generates in a week. Also examine whether wasteful habits are in practice – such as using only one side of paper for printing/copying, or drinking bottled water or coffee from a paper cup, instead of using a reusable container. Just one 'grande' size paper coffee cup is responsible for one-quarter pound of greenhouse

gas pollution.[iii] Does the classroom recycle? Americans use roughly 60 billion plastic bottles every year ~ nearly 7 million an hour ~ yet only one bottle out of every five is recycled.[iv] Filling a reusable water container or bringing your own mug helps reduce waste, save resources and cut down on emissions.

Transportation

How 'carbon-ated' is your commute? Different ways of getting to and from work affect our climate differently. Some options, such as driving alone in an inefficient, low mileage vehicle generate more carbon dioxide emissions than others, such as riding a bike, taking the bus or walking. For simplicity, the Classroom Survey focuses just on how the teacher of your assigned classroom gets to and from school. (For the über-dedicated climate crusaders, you can assess the transportation choices of the entire student body by conducting the Transportation Survey.) Find out how far and by what means each teacher travels day to and from school each day. For teachers that drive, ask what kind of mileage their vehicle gets. If they aren't sure, ask for the make and model of their car and look it up at www.fueleconomy.gov .

Heating

Keeping schools warm and cozy inside when it's cool outside uses a lot of energy, which in turn generates CO_2 emissions. Measuring these emissions and finding ways to reduce them can be challenging and depends on many variables. For example, the type of fuel used to generate heat, the number of windows, the quality of insulation, and the age and location of the school building all figure into energy use and related CO_2 emissions. Most of these are variables individual students and teachers have no control over. One thing students and teachers *can* do, though, is adjust classroom temperature, if there's a controllable thermostat. For this category of the Classroom Survey, find out if the classroom has a controllable thermostat, and if so – to what temperature it is set.

No control? Classrooms without controllable thermostats cannot do much to influence how much energy they use for heat, but there are other ways to save CO_2 through simple behavioral changes. For example, closing and opening windows or doors can help teachers impact the amount of energy that their classroom uses. Include some of these tips in your Action Plan.

[ii] *Source:* Washington State Department of Ecology, "Solid Waste in Washington State: 16th Annual Status Report." December 2007. http://www.ecy.wa.gov/pubs/0707048.pdf

[ii] Derived from the U.S. Environmental Protection Agency WARM Calculator. http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_Form.html

[iii] *Source:* Environmental Defense and Pew Charitable Trust, http://www.edf.org/documents/523_starbucks.pdf

[iv] *Source:* **Container Recycling Institute, http://container-recycling.org/images/plastic/graphs/PETrecsale-units-96-06.gif**

Classroom Survey

Survey conducted for_____

Survey conducted by_____ Date:_____

ELECTRICITY ~CLASSROOM LIGHTING

Switch	How many bulbs per switch?	Watts per bulb	# of hours per day the switch is on	
			Pre-Challenge	Post-Challenge
1				
2				
3				
4				
5				

ELECTRICITY ~ENERGY "VAMPIRES"

Electronic Device	How many?	End of Day: (check one)							
		"Active" (on and performing main function)		"Sleep/Standby" (on, ready-for-action but not in use)		"Off" (turned off, but still plugged in)		"Power strip" (Plugged into power strip, which is turned off at end of day)	
		Pre-Challenge	Post-Challenge	Pre-Challenge	Post-Challenge	Pre-Challenge	Post-Challenge	Pre-Challenge	Post-Challenge
Desktop computer									
Computer monitor-conventional (CRT)									
Computer monitor~ flat screen (LCD)									
Laptop computer									
Printer									
DVD/VCR Player									
LCD Projector									
Television									
DVR/TiVo									

SOLID WASTE, TRANSPORTATION & HEATING

CATEGORY		PRE-CHALLENGE	POST-CHALLENGE
SOLID WASTE/RECYCLING	1. Approximately how many full bins of trash does the classroom generate each week?	_____**Full bins**	_____**Full bins**
	2. Does the classroom recycle?	**Yes** **No**	**Yes** **No**
	⇨ If yes, what does the classroom recycle? *Check all that apply:*	_____Paper _____Plastic _____Aluminum cans _____Glass	_____Paper _____Plastic _____Aluminum cans _____Glass
	3. Approximately how many reams of paper are used by the classroom per week?	_____**reams**	_____**reams**
	⇨ What is the recycled content of the paper?	_____**% recycled**	_____**% recycled**
	⇨ Are both sides of the paper used for printing?	**Yes** **No**	**Yes** **No**
	4. If the teacher drinks bottled water, approximately how many plastic water bottles does he/she use each week?	_____**bottles**	_____**bottles**
	⇨ Most of the time, are the bottles usually recycled, or thrown away?	**Recycled** **Thrown away**	**Recycled** **Thrown away**
	6. If the teacher drinks coffee/tea or other beverage, does he/she use his/her own mug?	**Yes** **No**	**Yes** **No**
	⇨ Approximately how many disposable cups does he/she consume in a week?	_____**cups**	_____**cups**
TRANSPORTATION	1. What is the roundtrip distance the teacher travels to and from school each day?	_____**miles**	_____**miles**
	2. What mode of transportation does the teacher use to get to and from school most days?	_____Drive alone _____Carpool _____Walk, bike or bus	_____Drive alone _____Carpool _____Walk, bike or bus
	⇨ If the teacher drives either alone or in a carpool, what's the car's mileage?	_____**Miles per gallon**	_____**Miles per gallon**
	⇨ If unknown, what is the make and model of the car?		
	⇨ If the teacher carpools, how many people total are in the carpool?	_____**passengers**	_____**passengers**
HEATING	1. Is there a controllable thermostat in the classroom?	**Yes** **No**	**-- SAME --**
	2. If so, to what temperature is it set?	_____**degrees**	_____**degrees**

Classroom Carbon Calculator

With your completed Classroom Survey handy, it's now time to calculate the CO_2 emissions from each classroom you audited. Follow the steps below and record your information on the enclosed **Worksheets.** Note that you will complete this process twice: first to estimate the classroom's emissions *before* the Challenge, and then again at the *end* of the Challenge to measure progress toward meeting classroom Challenge goals.

The Classroom Carbon Calculator includes:

- **Section1:Electricity**
  - **Worksheet 1A**: Classroom Lighting
  - **Worksheet 1B**: Energy Vampires
  - **Electricity References**
- **Section2: Solid Waste/Recycling**
  - **Worksheet 2A**: Classroom Trash
  - **Worksheet 2B**: Classroom Paper Use
  - **Worksheet 2C**: Disposable Beverage Cups
  - **Worksheet 2D**: Plastic Water Bottles
- **Section3: Transportation**
  - **Worksheet 3**: Transportation
- **Section4: Classroom Heating**
  - **Worksheet 4:** Classroom Heating

Note: To streamline calculations, you can also use the Excel spreadsheet available at coolschoolchallenge.org.

Section 1: Electricity

To calculate emissions from classroom electricity use, first estimate the electricity consumed by classroom lights and energy vampires in kilowatt-hours. Next, calculate the CO_2 emissions generated from that electricity. Finally, compare the CO_2 emissions before and after the Challenge. Did the classroom shrink its footprint?

CLASSROOM LIGHTING

1. Estimate electricity from lighting in kWh

a. Record the data gathered in your Classroom Survey into the appropriate columns of **Worksheet 1a: Classroom Lighting**.

b. Calculate the total kWh used by classroom lights during the Challenge.

> **Electricity is measured in kilowatt-hours (kWh)**
> 1 kilowatt = 1000 watts
> kWh = kilowatts x hours the lights are on

2. Estimate CO_2 emissions from lighting

a. First, select the utility that provides electricity to your school from the box in **Section 1: Electricity References**. This will let you know how many pounds of CO_2 the utility creates per kilowatt-hour of electricity. This is called the "CO_2 conversion factor." If you do not know your school's electricity provider, or if it isn't listed, just use the national average.

b. Record the appropriate CO_2 conversion factor for your school's utility on **Worksheet 1A**.

c. Determine how many pounds of CO_2 the classroom lighting generates each day by multiplying the "Total kWh per day" by the utility's CO_2 conversion factor. Enter your result in Column 8.

> **Pounds (lbs) of CO_2 emissions = conversion factor x kWh**

3. Add it all up! How many pounds of **CO_2** would the classroom generate if it used the same amount of electricity for lighting *all year*? Record your answer in the "Summary of Results" box.

ENERGY VAMPIRES

Similar to your approach with classroom lighting, begin by first estimating the electricity consumed by energy vampires (appliances that suck up energy even when they aren't in use) in kWh; then calculate the associated CO_2 emissions. This will measure the "phantom load" of the classroom. Finally, at the end of the Challenge, compare CO_2 emissions before and after the Challenge, to see how much progress the classroom made toward shrinking its carbon impact.

1. Estimate electricity from energy vampires in kWh.

a. Record the data gathered in your Classroom Survey into the appropriate columns of **Worksheet 1B: Energy Vampires.**

b. Refer to **Section 1: Electricity References** to determine the wattage of each appliance in different operating modes and record your information into Worksheet 2. **For any appliance that is either unplugged, or plugged into a power strip AND turned off at night, record a "0" in the Watts per Hour column.**

c. Convert the watts to kilowatts and then to kilowatt-hours, based on a 16-hour 'night.' Record your answers in the "Classroom Results" section of Worksheet 1B.

Note:

⇨Assume the devices are actively being used during an 8-hour school day. This exercise will only measure kWh used during the 16 hours *outside* regular school hours to see how much energy is being wasted.

Electricity is measured in kilowatt-hours (kWh)
1 kilowatt = 1000 watts
kWh = kilowatts x hours the appliance is on

2. Estimate CO_2 emissions from energy vampires.

a. As you did with Classroom Lighting, first select the utility that provides electricity to your school from **Section 1: Electricity References**. This will let you know how many pounds of CO_2 the utility creates per kilowatt-hour of electricity. This is called the "CO_2 conversion factor." If you do not know your school's electricity provider, or if it isn't listed, just use the national average.

b. Enter the appropriate CO_2 conversion factor for your school onto **Worksheet 1B.**

c. Determine how many pounds of CO_2 energy vampires generate each day by multiplying the "Total kWh consumed per night" by the utility's CO_2 conversion factor.

3. **Add it all up!** How many pounds of CO_2 would the classroom generate if energy vampires sucked up the same amount of electricity *all year*? Record your answer in the "Summary of Results" box.

Name_____ Emissions calculated for (teacher/class)_____ Date:_____

Worksheet 1A: CALCULATE EMISSIONS FROM CLASSROOM LIGHTING

1. Enter the CO_2 Conversion Factor for your school's utility in the box, at right.
2. Record data from your Classroom Survey into the table below and calculate emissions from lighting by multiplying total kWh by the CO_2conversion factor.

Utility Conversion Factor
_____lbs CO_2 per kWh

INPUT CLASSROOM DATA HERE

CLASSROOM RESULTS:

1	2	3	4	5	6			8				
Switch	# of bulbs per switch	Watts per bulb	Total watts per switch	Kilowatts per switch	# of hours per day the switch is on			Total kilowatt-hours per day (Kilowatts x Hours)			Total pounds of CO_2 per day	
					Pre-Challenge	Post-Challenge		Pre-Challenge	Post-Challenge		Pre-Challenge	Post-Challenge
1							=			=		
2							=			=		
3							=			=		
4							=			=		
5							=			=		

Total lbs of CO_2 emissions from lighting per day:

SUMMARY OF RESULTS

1. Enter the pre-and post-Challenge daily CO_2 totals into the appropriate boxes, to the right.
2. Now estimate the *annual* emissions, and enter the results in the appropriate boxes to the right. (*Hint: there are 180 days in a typical school year*.)

	CO_2 Emissions per day (lbs)	CO_2 Emissions per 180-day school year (lbs)
Pre-Challenge		
Post-Challenge		

Name_____ Emissions calculated for_____ Date:_____

Worksheet 1B: CALCULATE EMISSIONS FROM ENERGY VAMPIRES

1. Enter the CO_2 Conversion Factor for your school's utility in box at right.
2. Record data from your Classroom Survey into the table below.
3. Refer to **Section 1: Electricity References** to find the "Watts per Hour" for the operating mode of each device.
4. Calculate emissions from ENERGY VAMPIRES by multiplying total kWh by the CO_2 conversion factor.

Utility Conversion Factor
_____lbs CO_2 per kWh

INPUT CLASSROOM DATA HERE

CLASSROOM RESULTS:

Electronic device	How many?	End of day operating mode		Watts per hour		Total kWh consumed overnight			Total CO_2 emissions per 16-hour "night" (lbs)	
		Pre-Challenge	Post-Challenge			Pre-Challenge	Post-Challenge		Pre-Challenge	Post-Challenge
Desktop computer					=			=		
Computer monitor - conventional (CRT)					=			=		
Computer monitor - flat screen (LCD)					=			=		
Laptop computer					=			=		
Printer					=			=		
DVD/VCR Player					=			=		
LCD Projector					=			=		
Television - Conventional or LCD					=			=		
DVR/TiVo					=			=		

Total lbs of CO_2 emissions from vampires per 'night':

SUMMARY OF RESULTS

1. Enter the pre-and post-Challenge "nightly" CO_2 totals into the appropriate boxes, to the right.
2. Now estimate the *annual* emissions, and enter the results in the appropriate boxes to the right. (*Hint: there are 180 days in a typical school year.*)

	CO_2 Emissions per 'night' (lbs)	CO_2 Emissions per 180-day school year (lbs)
Pre-Challenge		
Post-Challenge		

Section 1: Electricity References

Here you will find information about utility conversion factors (how many pounds of carbon dioxide are emitted per kilowatt-hour of electricity, as well as the different operating modes and wattages for energy *vampires.*

Utility CO_2 Conversion Factors	
Pounds (lbs) CO2 per kWh by utility	
Utility	**Lbs CO_2 per kWh**
Puget Sound Energy	1.06
Seattle City Light	0.02
Snohomish County Public Utilities District	0.18
Tacoma Power	0.06
Washington state average	0.47
National average	1.36

Source: 2008 Utility Fuel Mix Report, State of Washington Department of Community, Trade & Economic Development (CTED), 2007. http://www.cted.wa.gov/site/539/default.aspx

WATTAGE OF SELECT ENERGY VAMPIRES IN COMMON OPERATING MODES

COMMON OPERATING MODES FOR ELECTRONIC DEVICES	
MODE	**DESCRIPTION**
"Active"	Device is on and serving its primary function. (Example: a DVD player playing a movie, or a computer running a program.)
"Active"	Device is on and serving its primary function. (Example: a DVD player playing a movie, or a computer running a program.)
"Off"	Device is turned off, but still plugged in and ready for action. (Example: DVD player is turned off, but could be activated by remote. Digital displays will be visible.)
"Power strip/ Unplugged"	Device is plugged into a power strip, which is turned off at the end of the day. Or – the electronic device is unplugged. (Example: DVD player is receiving NO power. Digital display is NOT on and cannot be activated by remote.)

Appliance	Off (but plugged in) (watts)	"Sleep": On but not in use (watts)	Active (on and in use) (watts)
Desktop Computer	4 watts	17 watts	68 watts
Laptop Computer	1 watt	3 watts	22 watts
Conventional (CRT) Monitor	2 watts	3 watts	70 watts
Flat screen (LCD) Monitor	1 watt	2 watts	27 watts
Multi-Function Printer/Scanner/Copier	6 watts	9	15 watts
LCD Projector	3 watts	6 watts	230 watts
Television, <40" CRT or LCD	1.5 watts	-	72 watts
DVD/VCR player	1 watt	5 watts	11 watts
DVR/TiVo	37 watts	37 watts	37 watts

Sources: Compiled from Puget Sound Energy and ECOS Consulting, 2006: Final Field Research Report for the California Energy Commission; available from the American Council for an Energy Efficient Economy; http://aceee.org/consumerguide/electronics.htm

Section 2: Solid Waste/Recycling

Using the findings from the Classroom Survey, calculate the classroom's CO_2 emissions and savings from solid waste and recycling. At the end of the Challenge you'll explore how well the classroom did in reducing, reusing, and recycling, and how generating less waste and using materials more efficiently helped the climate!

CLASSROOM TRASH

Follow the instructions on **Worksheet 2A: Classroom Trash** to:

1. **Estimate the amount of trash (in pounds) generated by the classroom each week;**
2. **Estimate CO_2 emissions from classroom trash;** and
3. **Add it all up!** How many pounds of **CO_2** would the classroom produce if it generated the same amount of garbage *all year*? Record your answer in the "Summary of Results" box.

CLASSROOM PAPER USE

1. **Estimate CO_2 emissions from paper use.**
   a. Enter data from the Classroom Survey into **Worksheet 2B: Classroom Paper Consumption**.
   b. Paper made from recycled paper generates less climate pollution than paper made from raw materials. Refer to the "Conversion Factors – Paper" table on **Worksheet 2B** to see how many pounds of **CO_2** the classroom's paper generates per ream. Enter the factor that matches the recycled content of the paper used in Row 3. For example, a classroom that uses paper with 30% recycled content generates "13 lbs of **CO_2**" per ream.
   c. Calculate the **CO_2** emissions from classroom paper consumption.
   d. If the classroom usually prints on both sides of the paper, it emits half as much climate pollution. Divide your total in "C" above by 2.

Lbs of emissions = # of reams x CO_2 conversion factor

2. **Add it all up!** How many pounds of **CO_2** would the classroom generate if it used the same amount of paper *all year*? Record your answer in the "Summary of Results" box.

DISPOSABLE BEVERAGE CUPS

1. **Estimate CO_2 emissions from disposable beverage cups.** Follow the instructions on Worksheet 2C: Disposable Beverage Cups.

> **1 16-oz "grande" size cup = 0.25 lbs of CO_2**

2. **Add it all up!** How many pounds of CO_2 would be produced if the same amount of disposable cups were used *all year*? Record your answer in the "Summary of Results" box.

PLASTIC WATER BOTTLE CONSUMPTION

One pound of plastic generates 2.3 pounds of greenhouse gases, from the extraction of raw materials to produce the plastic, to the manufacturing of the bottles, to the transporting the bottles to the store, etc. Recycling plastic water bottles can help reduce that impact by shrinking the need to create brand new bottles. To determine the climate impact of this classroom's plastic water bottle habit, first determine how many pounds of plastic are used, and whether water bottles are usually recycled.

1. **Estimate the amount of plastic (in pounds) generated by the number of plastic water bottles used each week.**
   a. Enter your data from the Classroom Survey on Worksheet 2D: Plastic Water Bottle Consumption.
   b. Estimate the amount of plastic used each week.

> **Lbs of plastic = # of bottles x 0.04 lbs**
> (One 16 oz plastic water bottle weighs approximately 0.04 lbs)

2. **Estimate CO_2 emissions from plastic water bottles.**
   a. Determine the CO_2 emissions created from the plastic in the water bottles. Enter your total on Worksheet 2D**.**

> **1 Lb of plastic = 2.3 lbs of CO_2**

   b. If water bottles are usually *recycled,* the climate impact can be reduced. Each pound of plastic that is recycled *saves* 1.6 pounds of CO_2. Estimate CO_2 savings by multiplying lbs of plastic (from Step 1 above) by 1.6, and then subtracting that from the total in 2a. This is the new CO_2 total.

3. **Add it all up!** How many pounds of CO_2 would be produced if the same amount of plastic water bottles were used *all year*? Record your answer in the "Summary of Results" box.

Name_____ Emissions calculated for_____ Date:_____

Worksheet 2A: CLASSROOM TRASH

To determine how many pounds of CO_2 each classroom generates from the trash they throw away, you'll first need to figure out how many pounds of trash they create. Rather than weigh every classroom's trash can, you will estimate this by using your own classroom's bin as a model. Because the size and type of trash receptacles in schools varies, for simplicity we suggest using the trash bin in your classroom as the standard for your school. Ambitious challengers are welcome to audit every trash can in the school for more accurate results! Just copy this procedure for each classroom participating in the Challenge.

1. Weigh your own classroom's trashcan when it's empty, to see how heavy the can is by itself.
2. Weigh the bin again when it's full.
3. Subtract the weight of the empty bin from the weight of the full bin.
   The difference = # of pounds of trash in a full classroom trash can.
4. Enter this value in Column 1 of the table below.
5. Record your answer from the Classroom Survey in Column 2.
6. One pound of trash generates roughly 1.75 lbs of CO_2. Calculate how many pounds of CO_2 the classroom generates each week.

1 lb of trash generates 1.75 lbs CO_2

INPUT CLASSROOM DATA HERE: **CLASSROOM RESULTS:**

Column 1	Column 2			Column 3		Column 4	
Pounds per full trashcan (enter from #3 above)	How many full trash bins per week?			Pounds of trash per week		Pounds of CO_2 per week (lbs trash x 1.75 lbs CO_2)	
	Pre-Challenge	Post-Challenge	=	Pre-Challenge	Post-Challenge	Pre-Challenge	Post-Challenge

Total lbs CO_2 from classroom trash generated per week

SUMMARY OF RESULTS

1. Enter the pre-and post-Challenge weekly CO_2 totals into the appropriate boxes, to the right.
2. Now estimate the *annual* emissions, and enter the results in the appropriate boxes to the right. (*Hint: there are 36 weeks in a typical school year*.)

	CO_2 Emissions per week (lbs)	CO_2 Emissions per 36-week school year (lbs)
Pre-Challenge		
Post-Challenge		

Name_____ Emissions calculated for (teacher/class)_____ Date:_____

Worksheet 2B: CLASSROOM PAPER CONSUMPTION

Lbs of emissions = # of reams x CO_2 conversion factor

INPUT CLASSROOM DATA HERE:

Paper Consumption	Pre-Challenge	Post-Challenge
1. How many reams of paper are used by the classroom per week, on average?		
2. What is the recycled content of the paper?		
3. Enter the CO_2 per ream, refer to the "Conversion Factors – Paper" table below.		
4. Are both sides usually used for printing? (Yes or no?)		

CLASSROOM RESULTS:

Carbon Impact	Pre-Challenge	Post-Challenge
Calculate weekly CO_2 emissions and enter your totals in the columns to the right. If you print double-sided, you waste less paper and generate half the greenhouse gas emissions. Divide your total by 2.		

Conversion Factors- Paper	
Pounds (lbs) CO_2 equivalent per ream of paper, by recycled content	
Recycled content (%)	**Lbs CO_2 per ream**
0-30%	13
40-50%	12
60-70%	11
75-80%	10
90-100%	9

Notes: Unit of measurement is CO2 equivalents and includes CO2 emissions from burning fossil fuels as well as methane from paper decomposing in landfills. Estimates based on a standard, 5-lb ream of copy paper. Environmental impact estimates were made using the Environmental Defense Paper Calculator. For more information visit http://www.papercalculator.org.

SUMMARY OF RESULTS

1. Enter the pre-and post-Challenge weekly CO_2 totals into the appropriate boxes, to the right.
2. Now estimate the *annual* emissions, and enter the results in the appropriate boxes to the right. (*Hint: there are 36 weeks in a typical school year*.)

	CO_2 Emissions per week (lbs)	CO_2 Emissions per 36-week school year (lbs)
Pre-Challenge		
Post-Challenge		

Name_____ Emissions calculated for (teacher/class)_____ Date:_____

Worksheet 2C: DISPOSABLE BEVERAGE CUPS

Enjoying a daily coffee or cocoa in a paper cup adds up to a lot of waste! Bringing your own mug helps reduce waste, save resources and cut down on emissions. If in the Classroom Survey **SOLID WASTE/RECYCLING** section the teacher answered "yes" to drinking beverages from disposable cups, complete this section to estimate the CO_2 implications of those choices.

A typical 16-oz "grande" size beverage cup with lid and sleeve generates 0.25 lbs of CO_2

INPUT CLASSROOM DATA HERE:

Beverage Cup Consumption	Pre-Challenge	Post-Challenge
If the teacher drinks coffee, tea or other beverage, does he/she usually use his/her own mug? (Yes or No)		
Approximately how many disposable cups does he/she use in a week?		

CLASSROOM RESULTS:

Carbon Impact	Pre-Challenge	Post-Challenge
Calculate weekly CO_2 emissions and enter your totals in the columns to the right. *1 cup = 0.25 lbs CO_2 emissions*		

SUMMARY OF RESULTS

1. Enter the pre-and post-Challenge weekly CO_2 totals into the appropriate boxes, to the right.
2. Now estimate the *annual* emissions, and enter the results in the appropriate boxes to the right. (*Hint: there are 36 weeks in a typical school year*.)

	CO_2 Emissions per week (lbs)	CO_2 Emissions per 36-week school year (lbs)
Pre-Challenge		
Post-Challenge		

Name_____ Emissions calculated for (teacher/class)_____ Date:_____

Worksheet 2D: PLASTIC WATER BOTTLES

Plastic Water Bottle Consumption	Pre-Challenge	Post-Challenge
If the teacher drinks bottled water, approximately how many plastic water bottles does he/she go through each week?		
Most of the time, does the teacher usually **recycle** the water bottles, or **throw them away**? ("Recycle" or "Toss")		

Resource Impact	Pre-Challenge	Post-Challenge
How much plastic is that? (lbs) 1 water bottle = 0.04 lbs plastic.		
If the water bottles are usually **recycled**, the carbon impact is reduced by 1.6 lbs of CO_2 per lb of plastic.		

Carbon Impact	Pre-Challenge	Post-Challenge
1. Emissions: Each pound of plastic creates 2.3 lbs of CO_2.		
2. Savings from recycling bottles:		
3. **Total Emissions** (subtract #2 from #1, above)		

SUMMARY OF RESULTS

1. Enter the pre-and post-Challenge weekly CO_2 totals into the appropriate boxes, to the right.
2. Now estimate the *annual* emissions, and enter the results in the appropriate boxes to the right. (*Hint: there are 36 weeks in a typical school year*.)

	CO_2 Emissions per week (lbs)	CO_2 Emissions per 36-week school year (lbs)
Pre-Challenge		
Post-Challenge		

Section 3: Transportation

Using the findings from the Classroom Survey, calculate the teacher's CO_2 emissions from his/her commute to and from school.

1. **Estimate the amount of fuel burned per day from the teacher's commute.**
   a. Enter your data from the Classroom Survey on Worksheet 3: Transportation.
   b. If the teacher **walks, bikes or rides the bus to school, fuel burned = ZERO**.

Gallons used per day = Miles traveled per day ÷ mpg

Lbs of CO_2 per day = 20 lbs CO_2 x gallons used per day

2. **Estimate CO_2 emissions from the teacher's commute.**
   a. If the teacher carpools, divide total emissions by the number of people who share the ride.
   b. If the teacher walks, bikes or rides the bus to school, CO_2 emission equal ZERO[1].

3. **Add it all up!** How many pounds of **CO_2** would be produced if the teacher commuted the same way *all year*? Record your answer in the "Summary of Results" box.

[1] Although buses produce emissions, they run regardless of the number of passengers they carry. For the purpose of this exercise it is assumed that a teacher who rides the bus is not generating any *additional* emissions.

Name_____ Emissions calculated for (teacher/class)_____ Date:_____

Worksheet 3: TRANSPORTATION

INPUT CLASSROOM DATA HERE:

Transportation Mode		Pre-Challenge	Post-Challenge
If the teacher usually commutes by DRIVING, either alone in a carpool:	What is the roundtrip distance traveled per day? (# of miles)		
	What is the mileage of the vehicle? (mpg)		
	If the teacher carpools, how many people total share the ride?		
If the teacher usually commutes by walking, biking or riding the bus:	These are "zero pollution" ways to commute. Enter "O" in the appropriate column.		

CLASSROOM RESULTS:

Carbon Impact	Pre-Challenge	Post-Challenge
⇨ Gallons of gasoline burned each day, just traveling to and from school:		
⇨ Pounds of CO_2 emitted per vehicle:		
⇨ Pounds of CO_2 emitted per person:		
⇨ Commuting by foot, bike or bus are climate-friendly modes of transportation which do not generate any additional greenhouse gases.		

SUMMARY OF RESULTS

1. Enter the pre-and post-Challenge daily CO_2 totals into the appropriate boxes, to the right.
2. Now estimate the *annual* emissions, and enter the results in the appropriate boxes to the right. (*Hint: there are 180 days in a typical school year*.)

	CO_2 Emissions per day (lbs)	CO_2 Emissions per 180-day school year (lbs)
Pre-Challenge		
Post-Challenge		

Section 4: Heating

Complete this section only if the classroom has an adjustable thermostat and during the Challenge, turned down the temperature. Rather than calculate the emissions *generated* from heating as in other sections, here you will estimate the emissions that could be *saved* by turning down the heat.

1. **Find out how your school is heated.** Is your school heated by natural gas? Fuel oil? Electricity? If electricity, who is your school's utility? The type of fuel used to heat your school affects its carbon impact. Refer to the "Conversion Factors" table below to find the source of energy that most closely fits your school. If you don't know how your school is heated, just use the "National Average." Enter this value in the appropriate place in **Worksheet 4: Classroom Heating**.
2. **Estimate CO_2 emissions from classroom heating.**
   a. Enter data from the Classroom Survey into the appropriate columns.
   b. Did the classroom turn down its thermostat during the Challenge? If so, by how many degrees?
   c. Calculate emissions savings by multiplying the number of degrees the thermostat was turned down by the conversion factor for your utility.

Conversion Factors			
Pounds (lbs) of CO_2 saved per year per degree thermostat is turned down, by utility and energy source.			
Utility	**Electricity**	**Natural gas**	**Fuel oil**
Puget Sound Energy	397.5		
Seattle City Light	7.5		
Snohomish County Public Utilities District	67.5		
Tacoma Power	22.5		
National Average	510		
Other		113.5	167.8

Name_____ Emissions calculated for (teacher/class)_____ Date:_____

Worksheet 4: CLASSROOM HEATING

Heating data	Pre-Challenge (degrees F)		Post-Challenge (degrees F)		Difference?		Utility conversion factor		Total classroom CO_2 *savings* from adjusting the thermostat (lbs CO_2 per year
To what temperature is the thermostat set?		-		=		X		=	

Add it all up!

Now that you've calculated the classroom's emissions from electricity, solid waste and transportation and heating, add them up to determine the total carbon footprint.

As you complete the Pre-Challenge and Post-Challenge, record the values from each Worksheet into the table below. At the end of the Challenge, subtract your "Post-Challenge" results from your "Pre-Challenge" results to estimate the potential emissions savings if each classroom took action on climate change the entire school year.

Audit category	Estimated CO_2 Emissions per year				Potential emissions savings (lbs)
	Pre-Challenge (lbs)		Post-Challenge (lbs)		
Classroom lighting		-		⇨	
Energy 'vampires'		-		⇨	
Transportation		-		⇨	
Heating	N/A	-	N/A	⇨	
Classroom trash		-		⇨	
Classroom paper		-		⇨	
Plastic water bottles		-		⇨	
Beverage cups		-		⇨	
TOTAL:				⇨	