



Activity 4.4: Personal Choices and the Planet

Grades 7 – 9

Description: Part 1 of this lesson focuses on positive steps students can take to reduce their carbon footprint. Part 2 engages students in a sustainability audit of their school, identifying areas where their school can be more sustainable.

Total Time: One to three class periods (depending on how deeply you want to get in the sustainability audit).

Materials:

- Computers with Internet access or classroom sets of printouts from the website
- Student notebook or journal
- Sustainability audit checklists
- Clipboards

National Science Education Standards:

F3.b Human activities can also introduce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal.

F4.d Important personal and social decisions are made based on perceptions of benefits and risks.

AAAS Benchmarks:

3C/M7 Societies influence what aspects of technology are developed and how these are used. People control technology (as well as science) and are responsible for its effects.

4B/H9 Although the Earth has a great capacity to absorb and recycle materials naturally, ecosystems have only a finite capacity to withstand change without experiencing major ecological alterations that may also have adverse effects on human activities.

4B/H6 ... The burning of fossil fuels in the last century has increased the amount of greenhouse gases in the atmosphere, which has contributed to Earth's warming.

5D/H3 Human beings are part of the Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.

Guiding Question:

- What steps can I take to reduce my impact on the planet?

Assessments

- Sustainability audit presentation to teachers, staff, principal, etc.

Background Information: In the final days of this unit the class will focus on positive steps they can take to help minimize their impact on the planet's climate and dwindling resources. The many problems we have been discussing can be quite disconcerting for some students and therefore it is critical to help students re-focus on the positive steps they can take as individuals, as well as families, schools, or other community groups. The goal of this unit, as well as the work with Project Budburst throughout all the units, is to excite students about the contributions they can make toward a healthy planet and to empower them.



Activity 4.3 ended with the students' exit slips/homework pertaining to ways they can reduce their carbon footprint. The online footprint calculators often have suggestions on this topic after you get your results, so students may have seen some suggestions there. In this lesson students will build on that by also going to National Geographic's "Green House." They will generate a list of things they can do to reduce their carbon footprint and present them to the class.

During the opening of the lesson you will also revisit the concept of energy use. Check for students' understanding that their carbon footprint will go down whenever they use less energy. Most of the energy in this country comes from fossil fuels. Therefore when less energy is consumed, fewer fossil fuels are burned and less CO₂ and other pollutants are put into the atmosphere.

Part 1: What can I do?

Procedure:

1. Open the lesson with a quick review. Tell the students that we will be looking at ways to reduce the carbon/ecological footprints from the day before. Many of these involve using less energy. Then ask, "But if I turn off a light when I leave the room, for example, how will that help with climate change?" Then take student answers and help lead them to the fact that less energy means less fossil fuel use. This will result in less CO₂ in the atmosphere and less warming of the atmosphere.
2. After the introduction/review, the students will start developing their list of things they can do to reduce their carbon footprint.
3. To help generate ideas, they can go through the National Geographic "Green House" <http://www.nationalgeographic.com/everyday/greenhouse/index.html>. Have students get out their homework: the list of ten ways my family and I decided that we could realistically reduce our carbon footprints.
4. Have students visit the website and answer questions about the house or apartment where they live. The students will be led through a simulated home and asked a series of 18 questions. The choices they make can be about their actual home, or what they think might be the best choice. The point of the activity does not have to be a perfect quiz about their home. It is simply to help them generate a list of possible improvements they could make in their own lives.
5. If computer access is limited, you could run off a class set of the quiz questions and have the students generate ideas at their desks.
6. If you have a way to project the teacher screen, another method is to go through the quiz as a class and look at the various choices and their impact. You can look at both options for one question and compare the effects.
7. Depending on the time remaining, the students can share their favorite change either in groups or individually. They can also make oral presentations over the next day or days by



having individuals or groups develop a short presentation outlining the changes they would make and the impact this would have on their carbon footprint.

Part 2: School Sustainability Audit

Time: Time depends on how deeply you would like students to go with the audit. Part 1 will take approximately one 45-minute class period to introduce, but may require additional class time or out of class time for students to collect their information. Analysis should take one to two 45-minute class periods. Creating the presentation may take from one to three 45-minute class periods depending on whether students present to each other, or to faculty, staff, and parents.

Background information: Students should have a basic understanding of the purpose of audits. If students have never done an audit, walk the class through a five-minute audit to understand that detail and precision that is needed. In an effort to take action, students may want to perform sustainability audits of the school and/or their homes. A sustainability audit is an inspection or examination of buildings or practices to determine our use of natural resources with the aim of reducing our use and the waste we produce. There are many great resources on the web to guide the students through audits they can perform. Some of these are listed below. If the students have never done an audit, you may want to walk them through a five-minute audit to understand the process as well as the detail and precision that are required.

Procedure:

Part 1: Information Gathering

1. Students divide up into several groups. Each group does an audit in the categories of energy, water, indoor air quality, and waste. Brainstorm other areas that the class wants to audit whether of school or household practices.
2. Students should plan out the five to ten different sites throughout the school. For example: classrooms, gym, cafeteria, computer lab, library, administrative offices, restrooms, etc. Each student should have a clipboard and a checklist with the exact procedures that they will follow as they perform the audit of their school or home. Each student should have a job within the group.
3. Give students enough time, either in class or as an outside assignment, to research and talk with appropriate faculty and staff at the school to collect the information they need for each audit area.

Part 2: Analysis

Students should complete their audit. A significant part of their time should be spent analyzing the audit in small groups. They should address these questions:

- Do these results make sense?
- What was the range of results?
- Describe some of the most surprising results. Why were they surprising?
- How would you revise the procedure if you were to do it again?
- What do these results tell you?



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- How will you change your habits?
- How can you help your school community change their habits?

Part 3: Presentation

1. Have students create a presentation. You may suggest a poster or PowerPoint presentation depending on your access to technology. Student groups may either present their findings to the class or they may combine their results into one larger presentation that can be given to faculty, staff, and/or parents.
2. Use all of the results to guide the discussion of what to do next, either as a class discussion or as a larger discussion within the school community.

Rubric: Sustainability Audit Presentation

Concept	Low	Medium	High
Understand what sustainability means in general.	Reference sustainability but do not explain what it means.	Explain what sustainability means, but do not specifically make connections to climate change.	Explain what sustainability means and why it is important for addressing climate change.
Collect appropriate and sufficient information on school practice in their area of focus.	They have not collected the relevant school data or done appropriate research.	They have collected relevant school data, and have done some research.	They have collected comprehensive school data and have cited research.
Illustrate the benefits of sustainability in their specific audit area.	Discuss results but do not describe the benefits of reducing use of resources	Discuss results and describe at least one benefit of reducing use of resources.	Discuss results and describe all the benefits of reducing use of resources, particularly in reference to mitigating climate change.
Make appropriate connections between sustainability in their audit area and mitigating climate change.	Do not make connections between sustainability in their audit area and climate change or make general statements about sustainability.	Draw connections between sustainability in their area of focus and climate change, but do not fully explain the end results in terms of reducing the school’s carbon footprint.	Draw connections between sustainability in their area of focus and climate change, and make connections between sustainability measures and the specific results in terms of reducing the school’s carbon footprint.
Propose practical measures to increase sustainability in their area of focus.	Do not propose any solutions or propose solutions that are not attainable for the school.	Propose solutions that are attainable by the school, but do not provide a plan for implementation.	Propose solutions that are attainable by the school, and provide a plan for implementation.



Useful websites:

- <http://www.energy.ca.gov/2007publications/CEC-180-2007-002/CEC-180-2007-002.PDF>
(Energy audit)
- <http://www.mde.state.md.us/assets/document/resaudit.pdf>
(Water audit)
- <http://www.nrdc.org/enterprise/greeningadvisor/wm-audits.asp>
(Waste audit)

Why Perform a Sustainability Audit?

Environmental Benefits

- Improve environmental performance and responsibility
- Reduce greenhouse gas emissions and global warming
- Improve air quality
- Reduce waste sent to landfill
- Reduce air and water pollution
- Reduce resource consumption

Social Benefits

- Improve employee health (physical and psychological)
- Improve personal responsibility and workplace health
- Expansion of sustainable practices to personal life
- Increase employee productivity and efficiency
- Improve indoor air quality

Economic Benefits

- Reduce water, energy, disposal, and materials purchasing costs
- Possible grant funding for sustainability program
- Support local business through purchasing locally
- Support of sustainable businesses—renewable energy, organic agriculture, sustainable products

Economic Costs

- Higher prices for some sustainable products and services
- Cost of end-of-use facilities (disposal)



SUSTAINABILITY AUDIT CHECKLIST: ENERGY

Use the following checklist to assess the state of energy use in your school. After researching the question, circle the answer, and fill in any information.

- 1. Is there someone in your school who has special responsibility for monitoring the consumption of energy (electricity, heating, etc.) in the school? YES NO
If there is, who is it? _____
- 2. Are the energy meters (e.g. electricity meters) easily visible to students? YES NO
- 3. Has your school taken any of the following low-cost steps to reduce heat loss through windows?

Sealed drafty windows	YES	NO
Solar reflecting film	YES	NO
Responsible class window monitors	YES	NO
- 4. Do the school windows have double glazing, triple glazing or energy-saving glass? YES NO
If YES, then in how many rooms? (If all, write ALL) _____
- 5. Are any external (outside) doors self-closing? YES NO
If YES, then how many doors are self-closing? (If all, write ALL) _____
- 6. Are low-energy light bulbs and fluorescent tubes used in school? YES NO
If NO, then in how many rooms? (If all, write ALL) _____
- 7. Does each classroom have its own heating thermostat? YES NO
If NO, then how many rooms have a thermostat? (If none, write NONE) _____
- 8. Are lights and electrical items turned off when not in use? YES NO SOMETIMES
- 9. Does the school have any of the following sources of renewable energy?

Wind Generator:	YES	NO	Solar Water PV Heating Panels:	YES	NO
Wood Fuel Boiler:	YES	NO	Ground Source Heat Pump:	YES	NO

ACTION ITEMS:



SUSTAINABILITY AUDIT CHECKLIST: LITTER

Use the following checklist to assess the state of energy use in your school. After researching the question, circle or check the answer, and fill in any information.

- 1. How serious is the problem of rubbish/litter in the school grounds? (Choose one)
 - a. Very serious, the place is a mess most of the time
 - b. Not too bad, but could be improved
 - c. The grounds are more or less litter free

2. Does your school have a clear anti-litter policy? YES NO

3. Are there garbage cans inside the school buildings? YES NO

How many of these are full / overflowing? _____

How many are about half full? _____

How many are less than a quarter full? _____

4. Are there any littered areas inside the school buildings where there are no garbage cans? YES NO

5. Are there enough garbage cans on the school's grounds? YES NO

How many of these are full / overflowing? _____

How many are about half full? _____

How many are less than a quarter full? _____

6. Are the garbage cans generally:

Big enough?	YES	NO
Correct design (holding trash in wind)?	YES	NO
Clean	YES	NO

7. Does each classroom have its own garbage can? YES NO

ACTION ITEMS:



SUSTAINABILITY AUDIT CHECKLIST: WASTE/RECYCLING

Use the following checklist to assess the state of energy use in your school. After researching the question, circle or check the answer, and fill in any information.

- 1. Does the school carefully control the use of resources such as paper, pencils, ink cartridges, pens, envelopes, etc.? (Choose one)
 - a. No, there seems to be little control
 - b. Yes, but control is not very tight
 - c. Yes, control of these materials is very strict

- 2. Does the school buy stationery products (paper, pencils, pens, etc.) made from recycled content? YES NO SOMETIMES

- 3. Are hand towels and other disposable paper products purchased with recycled content? YES NO SOMETIMES

4. List which products are and which aren't:

- 5. Does the school recycle any of the following items of school waste:

<input type="checkbox"/> Paper	<input type="checkbox"/> Cardboard	<input type="checkbox"/> Soda cans	<input type="checkbox"/> Glass bottles
<input type="checkbox"/> Plastic	<input type="checkbox"/> Inkjet cartridges	<input type="checkbox"/> Plastic bottles	<input type="checkbox"/> Other

Describe the "other" materials if there are any:

- 6. How much school food waste is composted?
 - None
 - 1–25 percent
 - 26–50 percent
 - 51–75 percent
 - 76–100 percent

- 7. Do you run any other recycling programs to raise money for the school and/or involve the local community? YES NO

- 8. Does the school encourage reuse of materials such as water bottles? YES NO

- 9. Does the school have any policies to reduce waste? YES NO

ACTION ITEMS:



SUSTAINABILITY AUDIT CHECKLIST: WATER

Use the following checklist to assess the state of energy use in your school. After researching the question, circle or check the answer, and fill in any information.

- 1. Does your school have a water meter to record water use? YES NO
- 2. Is the meter easily accessible to students? YES NO
- 3. Are students involved in taking water readings? YES NO
- 4. Are the toilets designed to reduce water loss, such as low-volume flush, flush on demand urinals, etc.? YES NO
If yes, how many are fitted with such devices (If all, write ALL) _____
- 5. Are hand-basin taps of the push-on or self-stopping type? YES NO
If yes, how many are fitted with such devices (If all, write ALL) _____
- 6. Are faucets left running? YES NO SOMETIMES
- 7. Are dripping faucets fixed quickly? YES NO
If no, then how long approximately do repairs take?
_____ 2-3 days _____ 4-7 days _____ more than 7 days
- 8. How often does the school run water saving campaigns?
_____ 2-3 days _____ 4-7 days _____ more than 7 days

ACTION ITEMS:



SUSTAINABILITY AUDIT CHECKLIST: TRAVEL/TRANSPORT

Use the following checklist to assess the state of energy use in your school. After researching the question, circle or check the answer, and fill in any information.

- 1. Do you monitor how pupils travel to school? YES NO
 If yes, how many pupils use the following transport to or from school? (Note total count of students) _____

_____ Walk	_____ Bus	_____ Taxi	_____ Drive
_____ Bike	_____ "L"	_____ Carpool	
- 2. Does your school have bike racks? YES NO
 Is there space for everyone? YES NO
 Are there bike lanes on the roads near the school? YES NO
- 3. Does the school have a network of safe routes to walk or cycle? YES NO
- 4. Do any of the school transport vehicles (buses, taxis, etc.) run on alternative fuels such as electricity, landfill gas, or vegetable-derived oils? YES NO
- 5. Does the school have a school travel plan? YES NO
- 6. Does the school hold regular "walk to school" or "cycle to school" events? YES NO SOMETIMES
- 7. Does the school have a pedestrian and bicycle entrance that is separate from vehicle access? YES NO

ACTION ITEMS:



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SUSTAINABILITY AUDIT CHECKLIST: BIODIVERSITY/ENVIRONMENT

Use the following checklist to assess the state of energy use in your school. After researching the question, circle or check the answer, and fill in any information.

- 1. Do the school grounds staff use chemical pesticides and herbicides?
YES NO OCCASIONALLY
- 2. Does the school have any plants in containers, pots, or beds on the school grounds?
NO A FEW YES, MANY
- 3. Does the school have a wildlife or conservation area? YES NO
If yes, is the area protected by fences or school rules, or both? YES NO

4. Does the school have any of the following:

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Bat boxes | <input type="checkbox"/> Squirrel feeders |
| <input type="checkbox"/> Bird boxes | <input type="checkbox"/> Species record |
| <input type="checkbox"/> Bird baths | <input type="checkbox"/> Log piles for invertebrates |
| <input type="checkbox"/> Bird feeders | <input type="checkbox"/> Woodland areas |
| <input type="checkbox"/> Pond | <input type="checkbox"/> Butterfly garden/plants |

If any of the above are checked, are students involved in looking after them? YES NO

5. What percentage of the school's grounds are:

- | | |
|--|---|
| <input type="checkbox"/> Grass/playing field | <input type="checkbox"/> Flower/vegetable gardens |
| <input type="checkbox"/> Long grass | <input type="checkbox"/> Play areas |
| <input type="checkbox"/> Conservation area | <input type="checkbox"/> Woodlands |
| <input type="checkbox"/> Path/roads | <input type="checkbox"/> Seating areas |
| <input type="checkbox"/> Blacktop/concrete | <input type="checkbox"/> Other (explain below) |

6. Does the school have links with any local or national environmental organizations? YES NO

If yes, then with whom? (List)

ACTION ITEMS:



Sample Sustainability Audit for Teacher Use

Modified from Sierra Club Sustainable Consumption Committee, January 1, 2005

Adapted from Susan E. Waller's "Walk the Walk" for the Australian Department of Premier and Cabinet. The checklist below is a sample of a professionally developed sustainability audit. **The student audit will focus on categories that they are familiar with and will not address staff issues.**

Institutional Sustainability Audit

Paper

GOAL: Minimize use, encourage recycling, and minimize disposal

- Paper recycling containers in each room and in cafeteria
- Central receptacles at copiers and printers
- Regular practice of printing on both sides of paper
- Use recycled-content paper towels and toilet paper
- Avoid printing documents when an electronic copy is sufficient (turn in homework electronically if possible, send messages to staff via e-mails)

Energy

GOAL: Reduce energy consumption, procure energy from renewable sources, and undertake initiatives to reduce the harmful effects of energy production

- Use of energy efficient appliances and equipment (copiers, lighting, dishwashers, etc.)
- Use timers for appliances and equipment
- Energy awareness program for staff, students, and parents
- Easy stair access, discouraging elevator use when appropriate
- Discourage staff from working overtime (saves energy)
- Purchase renewable energy
- Offer HVAC alternatives: open windows/doors for cross ventilation, blinds/curtains/awnings
- Turn off appliances and lights when not in use
- Use natural light when possible

Water

GOAL: Minimize water use and recycle and pre-treat before disposal where possible

- Use of low-flow sinks
- Use of dual flush toilets or other low-water models
- Water-wise landscaping and use of native species
- Use of non-phosphorous soaps
- Use of gray water (from sinks and rain) for landscape, toilets, and other appropriate applications



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- Capture rooftop runoff for garden use if feasible (test runoff for chemical content)
- Hire plumbers who understand water conservation
- Water HVAC system operating at optimal temperature level

Waste

GOAL: Focus on avoiding and minimizing waste; and reusing and recycling before final treatment and disposal

- Recycling of cardboard, aluminum, glass, plastics, and beverage cartons
- Return toner cartridges to manufacturer or office supply stores
- Recycle/compost organic waste
- Donate or recycle office furniture, computers, computer disks, telephones, and other items
- Offer reusable plates, utensils, mugs, and glasses in break rooms and in cafeteria

Purchasing

GOAL: Environmentally, socially, and economically sustainable purchase of goods and services

- Lifecycle impact assessment for purchased goods
- Recycled content products receive preference to virgin material products
- Recycled content (80 percent or higher) in copy paper, letterhead, and envelopes
- Support local suppliers
- Consider transportation costs from manufacturer to destination when selecting suppliers
- Purchase in bulk to reduce packaging and delivery vehicle emissions
- Develop a list of preferred environmentally friendly products
- Regular maintenance and inspection of equipment to maximize its life
- Use of environmentally friendly cleaning agents
- Low VOC (Volatile Organic Compounds) carpeting, paints, etc.
- Rent equipment that is used infrequently

Travel

GOAL: Encourage utilization of alternative transportation and lessen negative impacts of transportation use

- Choose fuel-efficient or low-emission vehicles
- Encourage students, parents, and staff to use public transit/walking/cycling
- Support public transit pass programs
- Easy access to bus/train timetables or other transit information
- Provision of facilities for bicyclists: racks, lock-up areas, showers, and changing rooms
- Organize a carpool program

Staff

GOAL: Increase staff understanding and awareness of environmental and social issues, and increase their ability to sustain productive effort

- Promote environmental understanding via meetings, surveys, information postings
- Established method (message board, meetings, e-mail) for disseminating information on recycling



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- Wellness or stress-reduction programs
- Ergonomic workspace (also plants and artwork)
- Teambuilding and social activities