



Waste watchers - Classroom solid waste/recycling audit

TEACHER GUIDE

Students will explore the connection between waste reduction, recycling and climate change. They will observe the current recycling habits within their classroom, know what can/cannot be recycled and identify opportunities to improve classroom recycling and thereby reduce greenhouse gas emissions.

Objectives:

Students will be able to:

- Define the connection between climate change and waste.
- Understand the benefits of waste reduction and recycling.
- Calculate the greenhouse gas emissions from classroom waste.
- Identify ways to decrease emissions through waste reduction and recycling

Class Time:

- 20 minute Waste/Recycling Audit Introduction to the Activity on day 1.
- 5 minute daily weighing of trash/recycling and data recorded on worksheet (25 minutes over the week)
- 30 minutes in class for General Questions on last day

Materials:

- Waste/Recycling Audit Introduction
- Waste/Recycling Audit Student Worksheet
- Recycling bin (or box) and regular garbage bin
- Weighing scales

Grade level: 7-9

Subjects:

Science, Math, Economics, Social Studies

Concepts:

Waste reduction; recycling; contamination.

Washington State EALRs:

Science: 1.1, 1.2, 2.1, 3.1, 3.2

Math: 1.1, 1.2, 3.3, 5.2, 5.3

Cool School Challenge – Waste Watchers Activity

- Large plastic sheet or reusable tarp
- Rubber gloves for sorting trash
- Recycling guide (if available) on what can and can not be recycled in your area. See “Resources” section below for information in the Puget Sound region.

Teacher Directions:

1. Lead a class discussion using the Introduction to this activity or have students read the Introduction themselves.
2. Review local recycling guidelines with students. Possible discussion about why some things are/are not recyclable.
3. Place a recycling bin and regular garbage bin in your class and weigh the contents daily. Record the data either on worksheets or in a central area such as on the white board.
⇒ Note: for best results, first weigh the containers while they are empty, so you can more accurately measure the weight of the actual waste generated. Either do this as preparation or classroom demonstration.
4. Using the recycling guidelines, sort through the contents to find any contamination or recyclables in the garbage. Weigh again with items in the correct bins.
5. At the end of five days, calculate greenhouse gas emissions for the garbage using the worksheet. Also calculate the greenhouse gas emissions saved or prevented by recycling.
6. Discuss the General Questions on Student Worksheet either in class or in small groups.

Teacher Note:

It can be interesting for students to see how their recycling behavior changes over the course of the week once they have started the process and are paying attention to it. As a time-saving alternative to daily weighing, however, students can collect the garbage/recycling for a week and conduct the “garbage/recycling sort” on Friday.

Glossary:

Waste reduction - refers to reducing the amount of trash generated.

Recycling - Minimizing waste generation by recovering and reprocessing usable products that might otherwise become waste (.i.e. recycling of aluminum cans, paper, and bottles, etc.).

Contamination -refers to non-recyclable items put in the recycling. This affects the quality of the recycling batch and requires careful sorting at the recycling center.

Resources:

- Solid waste/recycling agencies in the Puget Sound region:
 - **King County Solid Waste** - Curbside recycling guide:
http://www.metrokc.gov/dnrp/swd/garbage-recycling/documents/Curbside_recycling_guide.pdf
 - **Kitsap County Public Works** - Recycling information
<http://www.kitsapgov.com/sw/recycle.asp>
 - **Pierce County Public Works & Utilities**
<http://www.co.pierce.wa.us/pc/abtus/ourorg/pwu/curbside/recycle.htm#All>
 - **Seattle Public Utilities** - Recycling Do's & Don'ts
www.seattle.gov/util/Services/Recycling/Recyclable_Items/Recycling_Dos_and_Donts_Flyers/index.asp
 - **Snohomish County Public Works Division** - Solid Waste resources:
http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SolidWaste/Garbage/Garbage_Haulers.htm
 - Other recycling information resources for Washington state:
<http://www.ecy.wa.gov/PROGRAMS/SWFA/contact/recyclelinks.html>
- Washington State Department of Ecology - Solid Waste Program
<http://www.ecy.wa.gov/programs/swfa>
- Washington State Recycling Association - Information and education on recycling
<http://www.wsra.net/Education/education.asp>
- National Solid Wastes Management Association - Municipal solid waste background.
<http://wastec.isproductions.net/webmodules/webarticles/anmviewer.asp?a=1123>
- Container Recycling Institute - Information and statistics on recycling
<http://www.container-recycling.org/>
- U.S. Environmental Protection Agency (EPA) - General information on the link between solid waste and greenhouse gas emissions:
<http://www.epa.gov/climatechange/wycd/waste/generalinfo.html>
- U.S. EPA - Municipal Solid Waste, Basic Information
<http://www.epa.gov/msw/facts.htm>
- Earth 911: Information on how, why and what to recycle.
<http://earth911.org/recycling/>
- Center for Ecological Technology - Toolkit for Composting in Schools
<http://www.cetonline.org/Publications/res-schools-online.pdf>
- Washington Green Schools program
<http://www.wagreenschools.org>
- Conversionator: Recycling Calculator: Fun conversion game with facts and good visuals
<http://www.nrc-recycle.org/theconversionator/shell.html>

Cool School Challenge



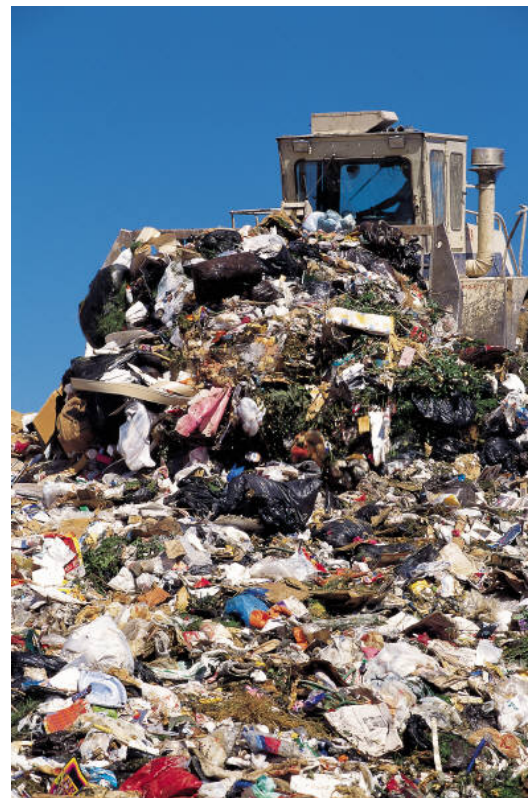
Waste watchers: Audit your classroom's solid waste

INTRODUCTION

Every day, every person in Washington generates an average of 8 pounds¹ of waste. This is all the stuff we throw away, recycle, or compost - like paper, plastic and glass bottles, soda cans, wrappers and other packaging, food scraps, etc. Think about it: 8 lbs a day - that's nearly 3000 lbs a year! Sounds like a good time to start watching our waste and finding ways to cut back how much trash we create.

Out of sight, out of mind?

Once all that stuff is thrown away or recycled, it's easy to not think about it any more. But no matter where it came from, or where it eventually ends up, waste impacts our environment in a number of ways. The garbage truck that picks up our trash and takes it to the dump is most likely fueled by diesel or gasoline, which means it emits carbon dioxide, soot and other pollution as it travels on its way. After being dumped at the landfill, garbage decomposes and releases methane, a greenhouse gas 21 times more potent than carbon dioxide. Incinerating garbage also generates carbon dioxide and nitrous oxide, a greenhouse gas 310 times more potent than carbon dioxide. Also consider what it took to manufacture that item in the first place - from harvesting, extracting, and processing raw materials, packaging and transporting the goods, etc. Making "stuff" can be a very energy-intensive activity.



¹ Washington State Department of Ecology, "Solid Waste in Washington State: 16th Annual Status Report." December 2007. <http://www.ecy.wa.gov/pubs/0707048.pdf>

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Waste not, want not

So what can be done? Clearly not buying or using stuff is the easiest solution –but sometimes that’s not always possible. The next best practice is to *reduce, reuse, and recycle* items or products.

Reduce. Buying and using *less* when you can reduces the amount of stuff you acquire in the first place, which in turn reduces the waste. Ways to *reduce* might include bringing your own shopping bag to the store, so you use one less paper or plastic bag. Printing on both sides of paper reduces how much paper you need to print the same document.

Reuse. Reusing items as often as you can also helps. Borrow books, CDs, or DVDs from the library – or a friend! – rather than buy new ones. Turn ripped jeans into shorts, buttons into jewelry, old newspaper into wrapping paper. Or donate items such as clothes, books, furniture and household items, to local charities, so that *others* can re-use your stuff.

Recycle. A third option is recycling, and buying things that are made from recycled materials. Materials such as paper, plastic, aluminum and glass, for example, can be recycled into new products, which reduces the need to extract new raw materials, as well as the amount of energy needed to create brand new products. Decreased energy use translates into fewer greenhouse gas emissions. Surprisingly, however, a lot of recyclable materials still find their way into the waste stream. Consider paper: paper can be recycled almost everywhere, yet paper accounts for more than 40 percent of what’s dumped in our landfills.

Newspapers alone can take up as much as 13 percent of the space in US landfills. Why is that? Is it because people don’t know what can be recycled, or because for whatever reason they just don’t choose to recycle?

Making an aluminum can from recycled material uses 95% less energy than making one from virgin materials.

What can be done to encourage more people to watch their waste, and reduce their climate impact? In this activity you will search for the answers to these questions by watching your classroom’s waste, so to speak, and exploring:

1. How much garbage / recycling does this class generate? What are the greenhouse gas emissions associated with those habits?
2. How much less garbage could this class create? What could be recycled, reused, or not used in the first place?

Name: _____

Class: _____

Date: _____



Classroom Waste Watchers Student Worksheet

For one week you will collect all of the garbage and recycling generated by your classroom. Each day you will first weigh all of the trash and recycling. Next, you will sort through the containers to find any recyclable materials that ended up in the trash, and any trash that ended up in the recycling bin. You'll then re-sort the materials correctly and re-weigh. You will have the opportunity to analyze what is being thrown away, how much of it is currently being recycled, and how much potentially *could* be recycled.

Instructions

1. First weigh the trash can and recycling container **while empty**. Record the weights below.

Trash bin weighs: _____ lbs

Recycling bin weighs _____ lbs

2. Each day, weigh the contents of both the garbage and recycling containers separately, **deduct the weight of the bin itself**, and then record your results below.
Example: if your trashcan weighs 25 lbs while full, 5 lbs while empty, the total weight of the trash equals 20 lbs (25-5 = 20). Record 20 lbs in the table below.

ROUND ONE: WEIGHT OF CLASSROOM GARBAGE & RECYCLING (in lbs)

| Material | Monday | Tuesday | Wednesday | Thursday | Friday | Total |
|-----------------|--------|---------|-----------|----------|--------|-------|
| Garbage (lbs) | | | | | | |
| Recycling (lbs) | | | | | | |
| Total (lbs) | | | | | | |

3. Wearing gloves, now go through both containers to see whether everything was properly sorted. Separate the items correctly into recycling and garbage. Is there any **contamination** in the recycling? Or **recyclables** in the garbage? Take notes on the specific types of contamination you found and record them in the table below. If you are unsure where some items belong, refer to the recycling guidelines or ask your teacher.
4. Once everything is properly sorted, weigh the contents of both receptacles again, deduct the weight of the bins, and record your results below. Notice how both the weight and the volume of the containers changes as the week progresses.

ROUND TWO: WEIGHT OF CLASSROOM GARBAGE & RECYCLING

| Material | Monday | Tuesday | Wednesday | Thursday | Friday | Total |
|-----------------|--------|---------|-----------|----------|--------|-------|
| Garbage (lbs) | | | | | | |
| Recycling (lbs) | | | | | | |
| Notes | | | | | | |
| Total (lbs) | | | | | | |

5. **How big is your waste footprint?** Every pound of waste sent to the landfill generates approximately 1.75 lbs of CO₂.

a) How much CO₂ did your classroom generate this week?
Show your work.

lbs CO₂

b) If your class recycled NOTHING, but threw all recyclables out with the trash, how many lbs of CO₂ total would it generate? *Show your work.*

lbs CO₂

c) Based on your responses to a & b above, how many lbs of CO₂ does your classroom prevent each week, just by recycling?

lbs CO₂

Waste Watchers, continued...

d) If your classroom practiced correct recycling for an entire school year (36 weeks), how much CO₂ would be prevented?

lbs CO₂

6. Which would reduce your classroom's greenhouse gas emissions **more**: increasing recycling, or decreasing waste? Explain.
7. What did you learn about your classroom's recycling habits through the sorting process? Are most recyclable items being properly recycled? Are there items that could be recycled that are ending up in the trash, and vice versa? What are some ways you could improve classroom recycling?
8. Thinking about the kind of things that are ending up in the trashcan, how might your classroom reduce the amount of waste it generates in the first place?



General Questions for Class Discussion

1. Based on the results of your audit, name three ways your school could improve recycling and reduce greenhouse gas emissions associated with waste.
2. Name three ways your school could reduce its garbage and thereby help reduce greenhouse gas emissions associated with waste.
3. Food scraps and other compostable materials are the single largest contributors to the waste stream and landfills. Identify opportunities your school has to minimize this.
4. Many cities, even countries, require recycling. Explain why you think this might be a good or bad idea.
5. Some states have "Bottle Bills" which allow consumers (you!) to get 5-10 cents for each can or plastic or glass bottle they return for recycling. In your opinion, is this a good incentive? Why or why not?
6. Think of three other incentives that might encourage recycling. For example, in some cities, businesses or households can be fined for **not** recycling. Would this make everyone more conscientious?