Ideas and Inspirations for Green Schools and Green Teams

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Preface

Today's children are our future leaders—sustainable thought and action are essential to their future. Oregon Green School programs teach kids about sustainability concepts, show them how to practice it, engage them in local sustainability projects, and ensure that our schools operate sustainably. This guide is meant to assist you to inspire students to make changes in their schools and become the next generation of stewards and leaders.

Why is it Important to Save Resources aka Be Green or Get Green School Certified?

When working with students on green school initiatives, you are helping to instill environmental values in students and in a sense changing the course of the future. Green schools empower kids to make a difference right in their own school, save money, improve health and raise test scores. You can teach your team that they are making a real difference for their entire school community! The green team will work throughout the year to increase recycling efforts, plan fun projects and programs, save energy and water, educating the community about the "why's and decrease the resources wasted in the school

Getting Started

Building momentum is best started at the beginning of the year. Talk with your administrator and leadership team in pre-service days and get them on board for establishing and maintaining a team of students and staff to work together to make school wide changes. It is important to talk with the whole school community in order to gather support and whole school involvement to make green efforts last. A program that involves everyone, custodian, kitchen staff, and aids, is one that will last.

Gather Students

Get a first meeting on the calendar as soon as you can and begin to recruit students. Decide how often you can meet. Some meeting might need to meet after or before school to tackle larger projects. Send information to teachers about the green team and make announcements. See Appendix 1 for a **Poster** to hang in the school

Recruiting Ideas for Green Team Students

- Personal note to students that might be interested

Dear _____:

I'd like to personally invite you to join the Green Team! This is a really exciting club led by _____. The first meeting is this _____, from _____ in room _____. Feel free to bring your friends, and hope to see you there! Let me know if you have any questions. With your leadership, we can make some great strides in sustainability at _____ this year!

- Email to staff to help recruit

Dear Staff,

We're starting our student Green Team this ___(Date)_____.I'd love your help in recruiting interested students. What do Green Teams do? Students get to investigate school-wide practices with eyes towards making them greener. They'll help our school save resources including waste, energy, water, and money. They lead our school by learning about sustainability and educating other students. In short, they'll learn, explore, and be the change of our school! Thank you so much for your time.

For School Announcements:

Calling all eco-heros to the _____(School_____ Green Team! This is a really exciting club led by _____(Teacher)_____. The first meeting is this _____, from _____ in room _____. Please see _____ for questions or to sign up.

Goals of First Meeting:
Create excitement about the Green Team, Make connections with kids and to the things they value
Get the message across that kids can make a difference and be leaders in their school, Let students know what types of activities they can expect to do as a members of the Green Team, Figure out the best meeting time for most (lunch, before or after school?), Interested kids can sign an **Eco-Hero pledge**. See Appendix 2

The start of school is the best time to get systems set up, specifically waste and recycling programs and signage. It is important with every imitative, there is an education component that your green team can assist in spreading throughout the school community. There is a lot to do when school begins which is why a team of students, additional staff and the assistance of parent volunteers are essential. As the Leader, you are the motivator and task master for the students and other adult helpers you might have on your team

Yearly Goals for Recycling and Waste

- Research systems set up for recycling in school. Is there a recycling coordinator? Is there a group of students currently working on recycling efforts? Have they been successful in the past?

- Inventory school for Recycling bins. Make sure there is one in every classroom next to the garbage can and there is one in the cafeteria

- Get signage throughout the school. Samples of signs can be found in Appendix 3 Each classroom, office and common area will need:

1. *A clearly labeled waste station with signage about what can and cannot be recycled*
2. *Paper=Trees signs on all paper towel dispensers in the school including bathrooms*
3. *Turn of the light signs by all classroom and office light switches*

- Complete a waste investigation. Appendix 4

- Track monthly Garbage and Recycling. Appendix 5

- Complete classroom resource patrols. Appendix 6

- Perform a waste audit of typical classroom and cafeteria. This will get baseline data to use in assessing your success. Classroom audits should be done regularly to check that bins are next to each other with signage.

- Start up the Clean Sweep for every classroom. Appendix 7. HS and MS come up with a way to inspire/award students for personal clean up in classrooms, locker room spaces and commons. *Examples: advisory meeting time classroom clean up, newspaper article about commons clean up*

- Send information out to parents via the newsletter or teacher emails about Waste Free Lunches

- Make sure there is a "No Thank You Table" in the cafeteria to minimize food waste and all students understand what they can place there and where it is

- Participate in the Great desk/Locker clean up at the end of the year to collect large volumes of materials normally thrown out

- Set goals for the year regarding waste

Education for Recycling and Waste

As the school leader you can work with your green team to provide information on what materials can be recycled, where to recycle and the importance of recycling in your community. These three education goals are essential to increasing school wide recycling efforts. Think of the three R's. Can we **reduce** the waste generated in the first place? If not, can we **reuse** it? If we can't reuse it, can we **recycle** it?

Here are some helpful places to find lessons to complete with your green team and then use to educate your school community.

Facts about Waste and Recycling:

Use Less Stuff - http://www.use-less-stuff.com/
Waste Facts:
http://www.cleanair.org/Waste/wasteFacts.html
EPA Commodities Site – Great report for reference:
http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw_2010_rev_factsheet.pdf
Recycling Fact Sheet:
http://www.recycling-revolution.com/recycling-facts.html
EPA- How To Start or Expand a Recycling Collection Program:
http://www.epa.gov/epawaste/conserve/smm/wastewise/pubs/howtopdf.pdf
Waste Quiz:
http://www.inspiregreeninc.com/blog/trash-trivia/

Activities and Resources:
Education World
http://www.educationworld.com/a_lesson/lesson308b.shtml
The Quest for Less- Grades 6-8:
https://www.epa.gov/students/quest-less-activities-and-resources-teaching-k-8
The Environmental Center lessons:
https://envirocenter.org/programs/youth-education/educator-resources/earthsmart-lesson-plans/
Project Green Schools
http://projectgreenschools.org/resources/
Green School Imitative
http://www.greenschools.net/article.php?id=46

Videos and Graphic Resources
Saving Little Pieces
https://www.youtube.com/watch?v=BsIiD1nRE8M&feature=c4-overview-vl&list=PLUO9E3cULi8NcmphSP-y3d3ipjdtI3qwH
in Spanish https://www.youtube.com/watch?v=qa8Ga9-AGBQ&feature=c4-overview-vl&list=PLUO9E3cULi8NcmphSP-y3d3ipjdtI3qwH
PBS Kids Loop Scoops- games and videos on reducing and recycling:
http://pbskids.org/loopscoops/
The Story of Stuff- dark look at consumerism and the life-cycle of goods- appropriate for middle school and up:
http://www.storyofstuff.org/movies-all/story-of-stuff/
The Story of Bottled Water- appropriate for middle school and up:
http://www.storyofstuff.org/movies-all/story-of-bottled-water/
What's in Your Trash Infographic:
http://dailyinfographic.com/wp-content/uploads/2012/02/whats-in-your-trash-infographic.jpg
Project Aware- The Ugly Journey of Our Trash:
http://www.projectaware.org/infographic
Material recycling at a MRF
https://www.youtube.com/watch?v=dUwZIk98wDM

Additional ideas for Green Team Projects beyond the baseline goals for Recycling and Waste

- Start a teracycle collection program for less commonly recycled materials like chip bags, candy wrappers, pens, cell phones, plastic bags, printer cartridges, rechargeable batteries, greeting cards, etc.
- Collect paper that has been used on one side and reuse as a draft drawer in your copy machines and to use as note pads.
- Encourage the use of rechargeable batteries in your school and to students.
- Create a donation station where people can drop off or pick up used clothing, games, sporting equipment, etc. Donate any undesirable items to a thrift store or homeless shelter.
- Teach staff, students and parents how to get off junk-mail lists.
- Purchase reusable gloves & aprons for kitchen staff.
- Set your printers to default to double-sided printing.
- Set up a "No Thank You" table (also known as "Offer Versus Serve") in the cafeteria to minimize food waste.
- Sell reusable water bottles as part of a campaign to reduce plastic water bottles.
- Sell reusable snack bags as part of a campaign to reduce plastic baggies
- Automatically set up documents to have 0.5" margins.
- Eliminate the sale and use of bottled water in your school.
- Donate excess food from kitchen to food banks.
- Replace disposable cups, plates and utensils throughout school with durables.
- Replace milk cartons with milk dispensers.
- Require outside groups that use your school after-hours to recycle.
- Set up a worm composting system.
- Compost vegetative waste at your school like fruit peels, coffee grounds, grass clippings, leaves and kitchen waste.
- Compost cafeteria waste (if food composting is available in your area).

Yearly Goals for Energy

- Have student Green Team or Energy Patrol complete an informal Energy Audit and set goals for the year. *Appendix 8*
- Make sure there is signage for turning off the lights where applicable. *Appendix 9*
- Work with Administrative team and building engineer to designate some unneeded lights to be consistently unused for the remainder of the school year
- Research when outside parking lot lights are turned on and off and work with admin team and district decrease time on. Can the time be altered by an hour on either end? Can they be turned off from 11pm-5am?
- Student video about energy conservation and ways to save at school. For examples please check out : https://www.youtube.com/watch?v=tIOwQnO6Ub4 https://www.youtube.com/watch?v=jwOVI4QC8Zg
- Night time policy created and in place for printers, copiers and fax machines
- Energy Saving tips for the read over announcements. Created and read by Green Team Students.
- Students performed energy/watt patrols looking for lights and unnecessary electronics to be turned off. *Appendix 10*
- Educate teachers about HVAC and have the green team check to make sure vents were not blocked in classrooms

- Use kilowatt meters with Green Team to educate about energy use and try to remove some appliances. *Appendix 11*
- Make sure the school was properly shut down over all holidays, Thanksgiving, Christmas, Spring Break, Memorial day
- Work with staff to sign the KiloWatch Conservation Pledge. *Appendix 12*
- Kill the phantoms with "Phantom Fridays". *Appendix 13*
- Complete the Power Down Challenge throughout the year. *Appendix 14*

Education for Energy Conservation and Efficiency

School buildings are the third biggest energy user of all commercial building types, accounting for 10% of the energy used by non-residential buildings. All that energy translates into big bills: Each year, K-12 schools spend $8 billion and universities spend $6 billion on energy – more than they spend on computers and textbooks combined. When schools become more efficient they provide a better learning environment, reduce greenhouse gas emissions, and help students understand how to be responsible energy consumers. *From Alliance to Save Energy.*

Here are some helpful places to find lessons to complete with your green team and then use to educate your school community.

Facts about Energy Conservation and Efficiency:

Alliance to Save Energy:
https://www.ase.org/resources/energy-saving-tips-schools
Climate Kids:
http://climatekids.nasa.gov/how-to-help/
Kids Korner- Energy Efficiency
http://c03.apogee.net/contentplayer/?coursetype=kids&utilityid=wppic&id=16072
US Energy Information Administration
http://www.eia.gov/kids/
US Department of Energy
http://energy.gov/eere/education/education-homepage
Oregon Department of Energy
http://www.energy.state.or.us/

Activities and Resources:

Lights Out – The Energy Saving Game
http://www.kidsenergyzone.com/activitiesdetailall2.cfm?categoryid=1&activityid=8
NEED Project:
http://www.need.org/
Gulf Power
http://www.learningpower.org/gulf/home.aspx
Elementary: Fun with the Sun — Teacher's Activity Guide for Elementary Grades K-2
http://energy.gov/eere/education/downloads/fun-sun-teachers-activity-guide-elementary-grades-k-2-1
Middle School: Energy for Keeps — Electricity and Renewable Energy Teacher Information
http://energy.gov/eere/education/downloads/energy-keeps-electricity-and-renewable-energy-teacher-information
High School: Watt Does It Cost To Use It?
http://energy.gov/eere/education/downloads/watt-does-it-cost-use-it
Energy Star Program for energy efficiency:
http://www.energystar.gov/

Videos and Graphic Resources

How to use a killawatt device:
https://www.youtube.com/watch?v=KtB4uHxLY2k
Energy Efficient Light Bulb Comparison:
https://www.youtube.com/watch?v=MS4I9O1tQg4
Energy 101: Light Bulbs
https://www.youtube.com/watch?v=Pk60-D61h34
Energy 101: Electrical Generation
https://www.youtube.com/watch?v=20Vb6hlLQSg

Additional ideas for Green Team Projects beyond the baseline goals for Energy Conservation and Efficiency

- Put up prompts like stickers to remind people to turn off lights and computers.
- Set thermostats to maximize energy efficiency.
- If your refrigerators are older than 1993, use the EPA calculator to determine if your refrigerators are in need of updating.
- Check that refrigerator temperatures are between 38-42 degrees Fahrenheit and freezers between 0-5 degrees Fahrenheit.
- If you have vending machines, ask your distributor to delamp the machines or get rid of them all together
- Check all school faucets hot water to ensure that the water temperature is between 120-130 degrees Fahrenheit.
- Check that all refrigerators have adequate seals and have the custodian's annual maintenance list include cleaning the refrigerator coils.
- Establish a policy to require monitors to be turned off after 5 minutes of inactivity and computers after 2 hours of non-use.
- Eliminate mini-fridges unless needed for medications.
- Consolidate staff refrigerators in order to eliminate unnecessary ones.
- Install Vending Misers on all school vending machines.
- Delamp lights that are not needed.
- Install motion sensors in seldomly used rooms
- Have computers, lights and copy machines set to automatically turn off at the end of the day. If you can't do this, make this the responsibility of your custodian or other staff that works after hours.
- Invest in solar panels.

Appendix 1 – Green Team Recruiting Poster

Come join us for a meeting of the Green Team!

Date and Time: **Place:**

You get to explore, learn and understand how your school is using resources and creating waste, then work to make a real difference.

Be a leader, Be the change!

Appendix 2 – Eco Hero Pledge

GREEN TEAM ECO-HERO PLEDGE

I pledge to explore, learn and understand how my school is using resources, creating waste and educating students. I pledge to be a role model in my school community, and a steward of the Earth. I will work to help my school save resources and have a smaller footprint, and I'll have a great time doing it!

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

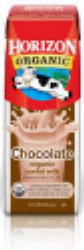
Kids Can Make a Difference!

Appendix 3 – Sample Waste Station Signs

TRASH this

It will go to the landfill.

Clamshells, Coffee Cups & Coated Paper




To Go Containers


Bags and Wrappers


OTHER LANDFILL ITEMS: Anything plastic that's not a bottle, tub or jug; plastic bottle caps and tub lids; plastic tubs smaller than 6oz., candy wrappers, chip bags, frozen food boxes, ALL styrofoam.

COMPOST this

It will turn into soil.

KITCHEN SCRAPS

Raw Fruits & Vegetables, Coffee & Tea

NO Meat, Dairy, Oily or Greasy Foods

GARDEN & YARD DEBRIS

Grass clippings, leaves, yard & garden trimmings , & flowers

Please NO Metal, Plastic, or Compostable Food ware.

Appendix 4 – Waste Investigation

Waste Investigation

WASTE

1. How many dumpsters does your school have?

2. What size are the dumpsters? (There may be a label on the dumpster that indicates the size. Size is often noted in yards—for example, a 10-yard dumpster holds 10 cubic yards of material. Students may want to verify the size of the dumpsters by taking measurements and calculating volume.)

3. How often are these dumpsters emptied?

4. What company collects the schools garbage?

5. How many lunches are there?

6. About how many full bags of trash are thrown out every lunch period from the cafeteria?

7. How many lunches are there?

8. How much does trash removal cost your school?

Monthly _____

Annually _____

9. What is the life expectancy of the landfill? (This information may be posted online by your county government.)

10. Brainstorm, and then record a list of ways that the trash removal practices at the school could be improved.

RECYCLING

1. How many big recycling roll carts does our school have?

2. How many days per week do the recycling roll carts get dumped?

3. Which of the following items are recycled at your school? (Check all that apply.)

__Paper __ Aluminum containers

__Plastic bottles __ Printer cartridges

__Batteries __ Copier cartridges

__ Steel food cans __Glass bottles and jars

__ Other _____

4. Who takes care of the recycling?

5. Are there clearly marked recycling bins in all classrooms?

6. Are there recycling bins in all the commons and offices?

7. Is there a way we can improve our recycling program?

COMPOSTING

1. Is there a compost program at your school?

__ Yes

__No *If no, skip to next section.*

2. If yes, what does your school compost? (Check all that apply.)

___Grass clippings ___Yard waste

___Leaves ___Fruit and vegetable waste from food preparation and lunches

___Other _____

3. Who collects the materials to be composted? (Check all that apply.)

___Students ___Teachers

___Custodians ___Cafeteria staff members

___ Other (describe): _____

4. Where are the indoor food waste-collection bins located?

5. Where is the outdoor compost bin located?

6. What happens to the compost material after it's created? (For example, is it used to enrich gardens at the school?)

7. Does your school have a vermicomposting program? (Vermicomposting is the process of using worms to compost material.)

___Yes

___No

8. If no, explain how your school could start a compost program and what could be composted.

9. Brainstorm, and record a list of ways that composting efforts at the school could be improved.

WASTE REDUCTION, REUSE, AND PURCHASING

You may want to interview the school's personnel in charge of environmental policies and supply purchasing to help find the answers to the following questions.

1.Does your school or school district have policies regarding purchasing of supplies, waste reduction, and reuse?

___Yes

___No

2. Does your school purchase recycled office paper?

___Yes

___No

If yes, what are the specifications of the paper? (For example, what percent is postconsumer recycled content?)

3. Is the paper certified to ensure that it comes from sustainably managed forests?

___Yes

___No

4. Are any of the following strategies done to reduce paper use at your school?

Storing records electronically?

___ Yes

___ No

Communicating with staff by email?

___Yes

___ No

Communicating with parents by email?

___ Yes

___ No

Using online tests?

___Yes

___ No

Using online textbooks?

___Yes

___No

Using double-sided printing and copying?

___Yes

___No

Reusing scrap paper for art, notes, and so forth?

___Yes

___ No

5. Are any of the following done at your school to save resources, reuse items, and reduce waste.

Food in the cafeteria is served on reusable plates rather than disposable.

___ Yes

___ No

Reusable cafeteria trays are used rather than disposable.

___Yes

___No

Metal utensils are used rather than disposable.

___Yes

___No

Reusable materials for classroom parties.

___Yes

___No

Unclaimed "lost" items are donated to a charity for reuse.

___ Yes

___ No

Gently used clothing, toys, and books are collected and donated to charities for reuse.

___Yes

___ No

School holds swap days or an online swap site for exchanging books, clothing, bicycles, costumes, and so forth.

___Yes

___No

Items are collected for reuse when desks and lockers are cleaned out at the end of the school year.

___ Yes

___ No

6. Does your school or school district purchase items other than paper that are made from recycled content?

(For example, tissues or napkins?)

___Yes If yes, briefly explain:_____

___No

7. When classes go on field trips, do they

Recycle cans, bottles, paper and cardboard they brought with them?

___Yes

___ No

Minimize the amount of trash they generate by using lunch boxes or cloth bags and reusable containers?

___ Yes

___No

8. Brainstorm, and record a list of ways that purchasing practices, reuse of items, and reduction of waste at your school could be improved.

Appendix 5 – Waste Audit materials

Classroom Waste Audit Date ____________________

Green Team Members ____

Classroom number	Is there a recycle bin in the classroom?	Is the recycle bin labeled?	Are the garbage can and recycle bin next to each other?	List the trash items you found in the room's recycle bin:	List the recycle-able items you found in the classroom's garbage can:

Lunch Waste Audit Form

School:_____Date:_____

People involved in audit:_____

Waste is from: _____the cafeteria _____classrooms. Total number of bags:_____

Recyclables	**Volume in _____ bags (Gallons)**	**Total Volume (Gallons)**
Mixed Paper		
Aluminum and Tin (cans, foil)		
Glass Bottles		
Plastic Bottles and Tubs (yogurt containers, etc.)		
Compostable Food Waste		
Other (please list)		
Non-Recyclables (Trash)		
Milk Cartons, Waxed Paper		
Juice Pouches		
Plastic (baggies, wrappers, straws, spoons, clamshells, etc.)		
Dirty Paper (napkins, etc.)		
Other (please list)		

Interesting findings:_____

_____

Recommendations:_____

_____

_____

Resource Patrols

Your student green teams can complete monthly or even weekly patrols of classrooms and offices. Teach your students to provide analysis of classroom resource conservation behavior and keep track of each class throughout the year. Perhaps award classrooms with the highest score at the end of each month, semester or year. This is a great way to engage students and classrooms to improve on simple recycling and energy conservation behaviors.

RECYCLING AND TRASH	
Score	
5	**No contamination** (no trash in the recycling; no recycling in the trash)
4	**Little contamination** (a little trash in the recycling or a little recycling in the trash)
3	**Some contamination** (some trash in the recycling or a some recycling in the trash)
2	**Lots of contamination** (lots of trash in the recycling or lots of recycling in the trash)
1	**Talk to the Green Patrol for Help!**

ENERGY	
Score	
4	**No** unnecessary lights/computers/printers/stereos/screen saver or monitor/other electronic devices left on
3	**Some** unnecessary lights/computers/printers/stereos/screen saver or monitor/other electronic devices left on
2	**One item** such as projector station/SMART board/ powerstrip left on
1	**Talk to the Green Patrol for Help!**

Created by: Recycle At School, Community Environmental Services, Portland State University

Resource Patrol Tracking Sheet

Room: __________	Date:	Recycling and Trash Score	Energy Score
	TOTALS:		

Room: __________	Date:	Recycling and Trash Score	Energy Score
	TOTALS:		

Room: __________	Date:	Recycling and Trash Score	Energy Score
	TOTALS:		

Room: __________	Date:	Recycling and Trash Score	Energy Score
	TOTALS:		

Room: __________	Date:	Recycling and Trash Score	Energy Score
	TOTALS:		

Room: __________	Date:	Recycling and Trash Score	Energy Score
	TOTALS:		

Created by: Recycle At School, Community Environmental Services, Portland State University

Appendix 7 – The Clean Sweep

The Clean Sweep

Rationale

- In the rush to get finished with the day and leave schools, student often leave behind a personal tornado of debris. Many of the items left behind are useful and come from many earth resources or can be recycled.
- Custodians are allocated about 10 minutes to disinfect, sweep or vacuum up each classroom, stuff left behind goes to one place, the garbage.
- We can teach students the value of picking up after themselves in school and give them skills to last a lifetime.
- The responsibility for straightening and tidying up the classroom should fall on your students. Contributing to the common good helps them build a sense of pride in their classroom—while at the same time encouraging individual humility.
- It also sends the message that yours is a classroom of doers, that the world wasn't created to wait on them. It only takes a minute or two for your students to pick up the floor around them, align desks, and make sure books and materials are stored neatly.

Ideas

- **Find a song the students like to sing to.** Play the song last 3 minutes of the day to help them get motivated to clean up around their desks and classroom areas. "Yakety Yak," "The Final Countdown" or the theme from "Mission Impossible" or "Na Na Na Na Hey Hey Goodbye", "Rockin Robin"
- **Occasionally have a "Lucky Piece of Garbage Day."** On the days you play this, be sure all children are informed! At clean-up time, secretly pick a random piece of trash or toy on the floor or tables. When someone picks it up, they win a small prize or privilege. Within minutes, the entire area will be clean! Do this often enough so many kids get a chance to win!
- **Create a classroom Found Box!** When students find something on the floor and they do not know where it goes or who it belongs to they can place it in the found box. You can occasionally look through the box with students to see objects might have been thrown away.
- **Show students the Pencil Commons Video.** https://www.youtube.com/watch?v=kengokKE3Qw
- **Check out the Clean up idea by Rick Morris**
- **Start a routine.** Perhaps start with a moment of calm, a poem or short story to calm the students before they clean up around desks, stack or put up chairs and gather materials to go home. If students have locker in the halls, make sure they are also free of debris before the students leave.
- **Teach students about Earth Materials and where things come from.** Download lesson from the Environmental Center about Natural Resources to helps students understand the value of every day objects.
- **Have a painted broom or golden dust pan to award a class every week/month**

Appendix 8 – Energy Audit

Green Schools Best Practices: School Energy Audits
Resource Guide: What to Look for during an Energy Audit

With a little preparation, students at all levels can conduct an energy audit, identify where energy is being wasted, and make simple energy efficiency recommendations to achieve savings for your school. As part of the audit process, student audit teams recruit offices or classrooms, conduct walk-through observations, identify areas of energy waste, and make simple energy efficiency recommendations based on their findings. Each of the categories below provides a list of questions and information that students can use when conducting an energy audit.

General

Ask about occupancy

How many days out of the year is the office occupied? Do different staff members have different hours? What are the general hours of occupation for the office? These questions will help inform students of the overall energy use of a room, and ways in which energy can be saved.

Is there a mini-fridge in the room? Is there a larger fridge near by? Is this device needed?

Lighting

Note overhead lighting

Many classrooms are built with more lighting than is necessary. Based on room lighting, students can recommend that occupants use half the number of lights, and can even suggest that custodians remove a row of lamps from the light fixture altogether (a process called delamping). If students are using a light meter, they can measure the amount of light typically in a room to determine if it is overlit.

Note all other lights

Students should also look for desk lamps, floor lamps, and other lights used in the room. Students can recommend that occupants install CFLs, and/or that occupants use these lights in place of overhead lights when full overhead lights aren't needed (tasklighting). If halogen torchieres are present, recommend that they be removed or replaced with CFL equivalent fixtures – these are very inefficient and dangerous since the halogen bulbs get incredibly hot.

Note windows

If blinds are shut during the day, students can recommend that natural daylighting be used in place of artificial light.
Questions for occupants

Students should ask questions about how long lights are left on, and if lights are switched off when the office is unoccupied during the day and at night.

Computers

Note monitor type

Students should check for CRTs (the big, boxy kind) and LCDs (flat screens). If CRTs are being used, students can recommend replacing them with energy-saving flat screens. In addition, students can check the power settings to see if the computer uses a screensaver. Screensavers
don't actually save energy and can actually waste more than a monitor with out one, so students can recommend that they be switched off or replaced with other power saving settings.
Check power saving settings

Students can determine the amount of time until the monitor sleeps, the hard drive sleeps, and the computer sleeps and make recommendations to change the settings for more optimal use.
Measure Energy usage at different settings

If students want to conduct a more advanced energy audit, they can use the watt meter to record computer energy use at different power settings in order to quantify the potential savings of their recommendations.
Questions for occupants

Students should ask general questions about computer use, such as how many hours are the computers on; do people turn them off when they leave the office (lunch or meetings); how long are they left on without being used, etc…

Plug Loads

To understand how much energy an appliance use, students can plug devices into a watt meter in order to measure plug load. Many appliances draw a "phantom load", which means they continue to use energy even when they are not in use. Students should look for these appliances and see if they can be plugged into a powerstrip or unplugged when not in use. Typical appliances that can use a lot of energy in offices are copy machines, mini-refrigerators, printers, coffee machines, and vending machines.
Heating, Ventilation & Air Conditioning (HVAC)
Look for space heaters, Thermostats, or air ducts/grills

Students can also check to see if any adjustments can be made to heating and cooling levels. HVAC systems may be working inefficiently if heat registers are blocked, air ducts are closed, or when doors and/or windows are left open when the heating and A/C are on. If occupants use space heaters or portable fans and air conditioners, it may suggest that the HVAC is malfunctioning or improperly set and building temperature levels may need to be adjusted.
Questions for occupants

Students can ask a number of questions that will help them make energy-saving recommendations. Do occupants have control over the heating in the office? If so, is the thermostat programmable, and has it been programmed to save energy? Is it frequently too warm or cold in the office? Do occupants use space heaters; if so, are they aware of their dangers (fire hazard)?

Many office and classroom occupants will thank you once they see that you are trying to save energy while also improving their workspace lighting conditions and personal comfort! This is why you should always include the occupants of the space in an audit.

Energy Investigation

Building Information, Energy Costs, and Energy Sources
(This section may require input from your head custodian, office manager, or sustainability coordinator.)

1. What year was your school built?
__Before 1950
__ Between 1950 and 1975
__ Between 1975 and 1990
__ After 1990

2. Has the school building been renovated?
__ Yes If yes, what years(s)? _____
__ No

3. Approximately how old is the school's heating, ventilation, and air conditioning (HVAC) equipment?

4. How is the temperature setting for your school controlled?
__Offsite remote control
__One central control in the school building
__ Separate thermostats for each room or each group of rooms

5. Does your school follow a routine schedule for servicing HVAC equipment?
__ Yes
__ No

6. Are furnace and ventilation filters cleaned or replaced on a routine maintenance schedule?
__Yes
__No

7. If your school has central air conditioning, is the outside unit in the shade to increase efficiency?
__ Yes
__No

8. Are there trees on the south side of the school building to provide shade during the hotter months?
__ Yes
__ No

9. Are there trees on the north and west sides of the school building to provide a windbreak in the colder months?
__ Yes
__ No

10. Obtain a copy of your school's energy bills. Use the bills to answer the following questions. What is the average cost of energy for one month? What is the cost for one year?

Per Month	**Per Year**
Electricity _____	_____
Natural Gas/Oil/Propane _____	_____

Other: _____

Using the answers above, calculate how much money is spent on energy-related utilities per student. (Total cost of energy per month or per year divided by the number of students.)
_____

How much does your school pay per KWh?_____

11. Does your school have any onsite renewable energy systems?
___Solar Photovoltaic ___Wind Power
___Geothermal ___ Solar
___Other: _____

13. Brainstorm, and record a list of ways to improve energy efficiency at your school based on the information gathered on the building, energy costs, and energy sources.

Classroom Audit
The Energy Audit will help you find out how efficiently your school is using energy and help you measure the impacts of your actions on saving energy.

1. What Classroom?_____

2. When you came to the room were the lights on or off?____ ON ____ OFF

3. Is there a sign that reminds you to turn off the lights? ___ YES ____ NO

4. Were there people in the room? ____ YES ____ NO

5. Are there windows in the room that bring in natural daylight? ___ YES ____ NO

6. Are there lights that can be turned off and still provide enough lighting? ___ YES ____ NO

7. Is the projector or Smart Board and computer turned off? ____YES ____NO

8. Is there a power strip for electronics? _____YES ____NO

9. Is there a printer in the room or one in the common area that is used by the room? ____YES ____NO

10. Is it turned off at the end of the day? ___YES____NO

11. Look for the heating vents in the room. Are they being blocked by anything? __ YES __ NO

12.Is there a mini fridge in the room?___YES ___NO If Yes, Does it "need" to be there? Is there another fridge close by that could be used?

Please share some ideas of how your team thinks that energy can be conserved in this room

_____

_____

_____

_____

Staff Lounge/ Work area/Office

1. What Room?_____

2. When you came to the room were the lights on or off?____ ON ____ OFF

3. Is there a sign that reminds you to turn off the lights? ___ YES ____ NO

4. Were there people in the room? ____ YES ____ NO

5. Are there windows in the room that bring in natural daylight? ___ YES ____ NO

6. Are there lights that can be turned off and still provide enough lighting? ___ YES ____ NO

7. Are there appliances that can be unplugged at the end of the day? ____YES ____NO

8. Can the appliances be plugged into a powerstip to be turned off at the end of the day?___YES ___NO

Please share some ideas of how your team thinks that energy can be conserved in this room

_____

_____

_____

Common areas/ Library/ Gym

1. What Room?_____

2. When you came to the room were the lights on or off?____ ON ____ OFF

3. Is there a sign that reminds you to turn off the lights? ___ YES ____ NO

4. Were there people in the room? ____ YES ____ NO

5. Are there windows in the room that bring in natural daylight? ___ YES ____ NO

6. Are there lights that can be turned off and still provide enough lighting? ___ YES ____ NO

7. Is there a printer/other appliance in the room that can be turned off/unplugged at the end of the day?__YES_NO

Please share some ideas of how your team thinks that energy can be conserved in this room

_____

_____

_____

HVAC Investigation

Take several readings at each location described in the Temperature Readings chart. Then, calculate an average temperature. Record data on the chart. Indicate Fahrenheit or Celsius units.

Temperature Readings Chart

Location	Reading 1	Reading 2	Reading 3	Average
On an outside wall near windows				
In the middle of the room				
Far away from the windows				
At or near an air-output vent				
In the hallway right outside the room				
Weather (sunny, partly cloudy, cloudy):_____				
Outside temperature range during the day: _____				

1. Do temperatures vary significantly around the room?
___Yes
___No

2. Do you see any blocked air vents or ducts?
___ Yes
___No

3. Does this room have a thermostat?
___ Yes
___No

4. If the room has a thermostat, is it digital?
___ Yes
___ No

5. If the room has a thermostat, is it programmable?
___ Yes
___ No

Temperature Readings Schoolwide

Room type	Temperature near outside wall		Temperature in middle of room		Temperature far away from windows		Temperature at air output vent		Mandated temperature range
	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	
Classrooms									
Offices									
Faculty rooms									
Restrooms									
Cafeteria									
Auditorium									
Gym									
Locker rooms									
Hallways									
Library									

1. Which room type has the most difference between the lowest and highest temperature readings? _____

2. Which room type has the least difference between the lowest and highest temperature readings? _____

3. Which room type has the most variability among the temperature readings taken at the different locations in the room? (i.e., near the outside wall, in the middle of the room, away from windows, and at air-output vents)

_____

4. If the temperature readings vary a lot, what might explain this variability?

5. Are there any cases in which the recorded temperature was outside the mandated temperature range? _____
If so, in what room type(s) did this variance occur? _____

6. What other observations and conclusions can you make on the basis of these data?

Share any interesting results with the building engineer.

Explore Appliance Use with a Killawatt Meter

1. Divide students into groups and provide each group with a Kill-a-Watt meter, a calculation sheet, and a copy of appliance sheet Handout.
2. Direct students to plug the Kill-A-Watt meter into the wall.
3. Direct students to plug an appliance into the meter and push the "watt" button.
4. Direct students to read the meter to see the number of watts used by appliance and record the number in column A of Handout.
5. Repeat with multiple appliances.
6. Provide students with calculators to complete these calculations(you may also use the online calculator (http://www.sustainabilitybythesea.org/calculators/kill-a-watt-calculator/)
* Kilowatts = watts/1000. Record in column B of Handout 4-b.
* Estimate the average number of hours you use the appliance in a day. Record in column C
* Convert to hours/month that the appliance is used. Hours/month = (hours/day) x 30.4. Record in column D
*Convert to kilowatt-hours used by the appliance each month. kWh/month = kilowatts x (hours/month). Record in column E * Calculate cost per month of appliance. Cost = (kWh/month) x $0.1415/kWh. Record in Column F
* Calculate the pounds of CO2 used per month. CO2 = (kWh/month) x 0.03 lbs CO2/kWh in Vermont. (0.03 is the average CO2 released per kWh in VT). Record in Column G.
7. Ask groups to circle the three appliances that use the most energy and produce the most CO2.
8. Ask groups draw a star by the three appliances use and produce the least.

KILLAWATT METER HANDOUT

Group Members_____

	A	**B**	**C**	**D**	**E**	**F**	**G**
Appliance	Watts	Killawatts A/1000	Hrs/ Day	Hrs/Month C x 30	KWh/Month B x D	Cost/Month E x $.07	Pounds of CO2/month E x .05

Explore light using a Light meter

A light meter or lumen meter is a device used to measure the amount of light in a certain area. Lumen meters have many uses such as photography and cinematography, however for our purpose we want to help reduce the amount of wasted light which equals wasted electricity. If conducting an outdoor lighting audit the purpose of a lumen meter would be to reduce the amount of light pollution. Light output is typically measured in luxes or lumens.

Standard Maintained Illuminance (lux)	Foot-candles	Characteristics of Activity	Characteristics of Activity
100-200	10-20	Interiors with low demand for visual acuity	Hallways and entrances, dining rooms, warehouses, restrooms
300-400	30-40	Interior with some demand for visual acuity	Libraries, sports and assembly halls, teaching spaces, lecture theaters
400-500	40-50	Interior with moderate demand for visual acuity	Computer work, reading & writing, general offices, retail shops, kitchens

- See more at: http://sustainabilityworkshop.autodesk.com/buildings/measuring-light-levels#sthash.DJP1NSaS.dpuf

Light Audit Report

Take measurements and rooms or hallways under the conditions in the chart and compare to the recommended levels above. All measurements should be on a desk or where the work is done.

Room, hallway or classroom_____

	All lights turned on	Half lights turned on	All lights turned off
Measurement by window			
Measurement in the middle of the room			
Measurement away from the window			

What is the weather outside? *Circle one* Sunny Mostly Sunny Cloudy Overcast Raining Snowing

Room, hallway or classroom_____

	All lights turned on	Half lights turned on	All lights turned off
Measurement by window			
Measurement in the middle of the room			
Measurement away from the window			

What is the weather outside? *Circle one* Sunny Mostly Sunny Cloudy Overcast Raining Snowing

1. Are there areas in your school lit above the recommended lighting levels?

2. Is there enough natural light to tune off any lights during the day?

3. Based on you data ad observation, what is one specific recommendation you have to reduce the amount of energy in regards to lighting?

Appendix 10 – Using a KillaWatt Meter

KILL-A-WATT AND PHANTOM LOADS

Students will use Kill-A-Watt meters to monitor obvious and phantom electrical energy consumption in a variety of typical home appliances.

OBJECTIVES

The student will be able to

- Determine the number of watts an electrical device uses.
- Give an example of a phantom load.
- Explain the problems of phantom loads.
- Suggest strategies to eliminate or minimize phantom loads.

VOCABULARY

- **Phantom load:** Electricity used by a device even when the appliance appears to be turned "off."
- **Watts:** The amount of energy a device uses in performing its function; the SI derived unit used to measure power, equal to one joule per second. In electricity, a watt is equal to current (in amperes) multiplied by voltage (in volts).

MATERIALS/EQUIPMENT

- Variety of household electric devices including devices that have a "stand by" power feature and others that have on/off switches. Use electrical devices such as computers, printers, speakers, pencil sharpeners, TVs, VCR/DVD players, digital clocks, desk lamps, irons, vacuum cleaners, toasters, fans, coffee maker with digital clock, radio, dock for iPod, cell phone charger, phone answering machine
- Power strip
- Kill-A-Watt meters (* two versions now available: regular and EZ)
- Optional: electric bill

TIME NEEDED: 30 minutes

DEGREE OF PHYSICAL ACTIVITY: low

SET-UP

Prior to the start of class, have several appliances (including at least one that will draw a phantom load) and a power strip in the front of the room. Have the other appliances positioned around the room for the testing.

RUNNING THE ACTIVITY

Point out the three appliances. Ask students to predict which one of these devices they think needs the most power and why. Introduce students to the unit used to measure electrical energy: the watt.

Show students the Kill-A-Watt meter and explain that the meter measures and displays the number of watts being used to power an electronic device. Demonstrate how the meter works by plugging in one of the appliances. Explain to the students that they will be testing a variety of devices to find out how many watts they use. Create a chart on the board, listing each of the appliances and providing places for the students to write the values they discover. Show the students where to find the various appliances that they can test. Give the students a brief reminder about safety when dealing with electricity. Split the class into small groups and give each group a Kill-A-Watt meter. Remind the students to let the appliance run for one minute and then record the number of watts drawn by it. Challenge students to find the device that uses the most watts and the device using the least amount of watts.

Once everyone has finished testing devices, come back together and discuss what students found. Which appliances had the highest and lowest wattages?

Ask students what happens, energy-wise, when an appliance is turned off. What value would they expect to see on the Kill-A-Watt meter? Plug the Kill-A-Watt meter into the wall, and plug in an appliance that has a clock or some energy-draining feature to it. Turn the device on and, after one minute, have a student read how many watts were needed to run it. Next, turn

off the device but leave it plugged in. Ask a student to read the display. How much energy is the device still using? Introduce the idea of phantom loads. Explain to students that many devices have a "phantom load" which refers to electricity used by a device when it is turned "off." Devices that have phantom loads often have built-in clocks, glowing lights, or remote controls associated with them. Unless these devices are completely disconnected from their power supplies, they continue to "draw" or use electricity.

Explain that sometimes it is hard to reach the outlets where devices are plugged in so unplugging them to stop the flow of electricity is difficult. Ask students what could be used. Show student power strip. Plug it into the Kill-A-Watt meter in the outlet and then plug several of the other appliances, like the coffee maker, TV, and/or radio into the power strip. Turn the various devices on one at a time and ask students to notice what happens to the number of watts. Students should notice that the number of watts increased as the devices are turned on. Then turn off the devices, one at a time. Students should notice the number of watts drops, but doesn't reach zero. Click off the power strip. Students should notice that the Kill-A-Watt meter now registers zero watts. Explain to students that this is because the power strip has a switch that completely shuts off the flow of electricity to all of the devices.

Discuss with students the impact of phantom loads. Students should begin to recognize the cumulative impact of phantom loads used by multiple devices over the course of a year – paying for electricity that isn't being actively used. Depending on the age and ability of the group, share the electric bill. Discuss how the costs are calculated based on kilowatts of power used per hour. If time permits, choose one of the appliances that have a phantom load and calculate the difference in the amount of electricity that is used when plugged in and pulls a phantom load to when the device is completely turned off. Convert the wattage to kilowatts and multiply by the cost of electricity listed on the bill to figure out how much would be paid for that wasted electricity in one month. Multiply by 12 to calculate the cost over a year. While it may not seem like a lot, remind students that this is just one device. Have them think about all the devices throughout their homes and at school that are drawing phantom power and how it is a waste of energy.

Wrap-Up
Ask students to suggest how they can cause this information and change their actions to save electricity when they go home. Write their suggestions on a piece of chart paper that they can take them back to school.

WAYS TO USE/INTEGRATE THIS ACTIVITY
Combine with *Energy Efficiency of Lightbulbs*
Use to train staff.
Use in adult workshops.
Use as an evening program.

STEM CONNECTIONS
Science: Students will need to test, and explain.
Technology: Students will use Kill-A-Watt meters.
Math: Students will need to measure and record.

SOURCE(S)
Adapted from Energy for Maine Lesson 7: Watt's in a Name(plate)?
www.powersleuth.org/docs/EFM%20Lessons%203-10-10/EME15430_Lesson7.pdf

Appendix 11 - Conservation Pledge

Conservation Pledge

I UNDERSTAND THAT THE CONSUMPTION OF ENERGY AND NATURAL RESOURCES AFFECTS OURNATURAL ENVIRONMENT AND HUMAN HEALTH AND WELLLBEING AND IS COSTLY TO OUR SCHOOL.

I PLEDGE TO MAKE EVERGY EFFORT TO SUPPORT OUR SCHOOL'S COMMITMENT TO ENERGY CONSERVATION, RECYCLING AND WASTE REDUCTION AND TO SET A GOOD EXAMPLE FOR MY SCHOOL COMMUNITY

As a teacher or other staff member I commit to:

- Using Natural daylighting when possible
- Turning off electronic devices at the end of the day
- Keeping doors closed when HVAC is heating to ensure proper use
- Closing blinds of curtains at the end of the day
- Acting as a role model and demonstrating energy conservation and recycling in school

As a building engineer I commit to:

- Helping to make sure that unnecessary equipment is shut down over breaks and long weekends
- Ensuring that cleaning staff shut off lights when finished cleaning and area
- Checking on HVAC to make sure it is working effectively in the school

Appendix 13 – Phantom Fridays and Power Down Challenge

Phantom Fridays

Unplug the Energy Phantoms!

On Fridays in all classrooms and offices, our school will be finding and unplugging energy phantoms. Please join us in our efforts to reduce our carbon footprint!

Morning Announcement idea

Today is Phantom Friday. You know it is kind of spooky. Lots of electronic devices consume electricity when plugged in but not even being used. We call them Energy Phantoms. At the end of the day today, please help reduce our energy use and carbon footprint by turning off and unplugging devices such as computers, smart boards and unneeded appliances.

Staff email idea

On all Fridays starting April 15, we are going to work to decrease energy waste by electronics plugged in but not in use. We can reduce energy costs by as much as 10% simply by unplugging Appliances or switching them off at the power strip when not in use. Ideas include printers, coffee pots, microwaves, some phone chargers, document stations, speakers and more.

Please join us in our efforts to support the green team, reduce our carbon footprint, lower our electric bills and win the BLPSD Energy Conservation Challenge!

Power Down Challenge

What can you live without for a day!

Pick a day or several to challenge classrooms to shut of lights and think about energy use. Have the teachers email you what they did on that day.

Morning Announcement idea

Today we are asking everyone to take the Power Down Challenge. We're challenging everyone to shut down any equipment and lighting that is not necessary. What can you live without today?

Staff email idea

On (date), we are asking offices and classrooms to take the Power Down Challenge. On this day we will be challenging everyone to shut down any equipment that is unnecessary for a safe and healthy learning environment. Here are a few ideas:

· Use daylighting and shut down some of your lights

· Shut down computers and document cameras that are not in use

· Unplug electronics

· Refrain from using classroom comfort items such as coffee pots microwaves. Use the ones in the staff room.