

Baltimore County Public Schools

Outdoor Science

Maryland Green Schools

Best Management Practice – Energy Conservation

Grade Level – 2

BCPS Unit – This unit is to be written in the near future.

Voluntary State Curriculum

Standard

5.0 Physics – Students will use scientific skills and processes to explain the interactions of matter and energy and the energy transformations that occur.

Topic

B. Thermodynamics

Indicator

1. Identify and describe ways in which heat can be produced.

Objectives

- a. Recognize that things that give off light also give off heat.
- b. Identify fuels that are used to produce light and heat in homes and schools.

Topic

C. Electricity and Magnetism

Indicator

1. Identify and describe the sources and uses of electricity in daily life.

Objectives

- a. Identify sources of electricity.
 - a. Electrical outlets
 - b. Batteries
- b. Identify the devices that use electricity to produce light, heat, and sound. (Students should be cautioned not to experiment with sources of electricity without adult supervision.)

Introduction

There are seven BMP's offered as choices for the Green School application. As a school, you are required to select four different BMP's to obtain Maryland Green School status. This document provides three possible projects for the Energy Conservation BMP. The projects are given for a specific grade level and are based on the BCPS curriculum and the VSC indicators. They execute the *Extension* piece of the 5E format for science curriculum fulfilling the Green School criteria for Best Management Practices through instruction as they broaden the existing science units.

Time will need to be allotted for implementation of these projects. The amount of time will vary with the complexity of the project. Your project might be defined as on-going activities (e.g., curbside recycling) or an annual event (e.g., Earth Day Celebration or a unit specific project). Teacher discretion will determine how to facilitate the project.

Factors including student needs, time management, and available resources will need to be taken into consideration.

The three projects described below are only a few of the many possible projects that could be used to fulfill your school's BMP requirement. Please do not feel that you are limited by these suggestions.

BMP – Energy Conservation

Energy conservation is the practice of using energy efficiently in order to reduce or eliminate unnecessary energy use. It is important to conserve energy because we have a limited amount of energy sources on Earth. Most of the energy we receive from power plants comes from non-renewable resources such as coal and oil. We should limit our energy use in order to conserve these nonrenewable resources and to reduce pollution resulting from use of these fuels. All of us need to become aware of simple ways to conserve energy.

BMP Project 1 – Energy Conservation Light Switch Signs

Background

Energy conservation signs are a visual means of reminding people to save energy. The signage may simply be student-designed signs placed on light switches prompting people to turn off the lights when they leave the room or may be when there is enough natural lighting. Students could also download or order signs from the internet to attach to the switch plates.

When people see visible reminders about saving energy, they are more likely to do so. By placing energy conservation signs in certain locations, students and school staff members are constantly reminded of simple things they can do to save energy. If these energy saving suggestions are followed, the result is an overall reduction in energy use.

Resources

- Awareness Ideas, A Division of FLEXI Display Marketing: *Home > Energy Conservation > Energy Decals*
<http://www.awarenessideas.com/Energy-Conservation-Decals-s/10.htm>
- Energy Hog: *Flip Off the Hog Light-Switch Plate Cover*
http://www.energyhog.org/adult/pdf/switch_cover.pdf
- Paperworks: *Self Adhesive Sticky Back Label Paper*
www.paperworks.com

Cross Curriculum Connections

- Math: Students could tally the number of light switches in different areas of the building in order to determine how many switch plate signs need to be constructed.
- Technology: Students could use *Microsoft Clipart* or clipart from the *Kidspiration* template to inspire ideas for their switch plate design.

- Language Arts: Students could design a brochure to explain how turning lights out saves energy.
- Art: Students could hold a competition to choose the best student design for a switch plate sticker.

Tips for Implementation

- If students will be using blank self-adhesive sticky back paper to create their switch plate label, have volunteers can measure and precut the stickers, including the hole for the light switch.
- Encourage students to use mixed media (e.g., paint, crayons, colored pencils, markers, stamps, etc.) if they are creating their own stickers.

BMP Project 2 – School Energy Audit

Background

As with all school systems, Baltimore County Public Schools has a finite budget, 82% of which covers salary and benefits. While only 2.8% of our system's total operating budget is allocated for energy (fuel oil for heating, gas and electric, and propane), the 2006-2007 cost for this was \$29,738,926. By reducing energy use at each school, money would become available for other resources within the school system. Making faculty and students aware of the energy they are using and places where energy could be saved would help contribute to a reduction of energy costs. This could be done by completing a simple walk-through energy audit around the school. Based on the audit, students can identify unnecessary energy use (leaving lights/radios/computers on when not in a room), ways to minimize energy use (using energy star appliances, CFL light bulbs), and ways to keep school thermostats at the most efficient temperature setting (for both heat and air conditioning). Students can then begin an Energy Awareness Campaign to inform people about ways in which energy use can be decreased. This can be accomplished through the creation of literature and art as well as by writing to school administrators seeking support for lower cost energy changes.

Resources

- Baltimore County Public Schools
Physical Facilities – Operations
410-887-0430
- Energy Star: *Guidelines for Energy Management Overview*
http://www.energystar.gov/index.cfm?c=guidelines.guidelines_index
- Greening Schools: *Energy – Audits Resources*
http://www.greeningschools.org/resources/view_cat_teacher.cfm?id=192&g=2&t=0&s=0
- EcoKids: *School Energy Audit*
http://www.ecokids.ca/pub/fun_n_games/printables/activities/assets/energy/school_energy_audit.pdf

- National Service Resources: *School Building Survey* (inappropriate level for second graders, but a good starting point to create your own)
http://nationalserviceresources.org/filemanager/download/environment/School_Energy_Survey.pdf
- Sierra Club Canada: *Green Star: Enviro-Activity Newsletter for Kids!* (check out the school electricity section of the paper to help with simple school audit ideas)
http://www.sierraclub.ca/bc/programs/education/students/elementary/greenstar_newsletter/Greenstar_newsletter_jan-feb2006.pdf

Cross Curriculum Connections

- Math: Graph the number of appliances/equipment in each room (library, classroom, office, cafeteria, maintenance office, etc.) that use energy.
- Math: Graph a pre energy awareness campaign walk-through audit and a post energy awareness campaign walk through audit.
- Language Arts: Write letters to the administration asking for the installation of light sensors in all rooms in the building. Light sensors trigger room lights on or off depending on the amount of natural light available.
- Language Arts: Create an energy awareness survey and administer to both adults and students in the school to make them more aware of ways that they can save energy.
- Language Arts: Create a flyer to remind teachers and students to use natural light instead of artificial light whenever possible.
- Art: Create signs to be placed near computers, lights, radios, etc. reminding people to turn them off when not in use.
- Art: Create signs to be placed near wall unit air conditioners reminding people to turn them up to a cool, not cold setting.

Tips for Implementation

- Complete a walk-through energy audit of the school (maybe even at a few different times of day and/or week) prior to the start of the Energy Awareness Campaign. Then after an Energy Awareness Campaign has been conducted, have students complete another walk-through energy audit of the school. If the students did audit the school at different times of the day and/or week, have the post walk-throughs occur at the same times.
- Have students make morning announcements with results and updates of the school energy audit. Additionally, one energy saving tip could be announced by students each morning.

BMP Project 3 – Home Energy Use

Background

Taking a closer look at home energy usage provides students with the opportunity to see how subtle changes, such as changing the thermostat temperatures, covering windows with plastic in colder months, and adjusting the water heater to a lower temperature, can save a lot of energy and money. This project provides students with a visual means to compare the amount of energy used based on daily routines at home and incorporated energy saving practices. It is expected that this new knowledge could help bring awareness to students, ultimately impacting their behaviors regarding energy use.

Resources

- Baltimore Gas and Electric: *Energy Calculator*
<http://bge.apogee.net/homesuite/calcs/rescalc/>
- Baltimore Gas and Electric: *Interactive House*
<http://www.bge.com/portal/site/bge/menuitem.bf68d6eddddefe65509c031e0da6176a0/>
- U.S. Department of Energy: *Your Home*
http://www.eere.energy.gov/consumer/your_home/appliances/index.cfm/mytopic=10040
- Greening Schools: *Energy Hog*
<http://www.energyhog.org/>
- U.S. Department of Energy: *Fun with the Sun*
http://www1.eere.energy.gov/education/science_projects.html#k12

Cross Curriculum Connections

- Math: After completing the base and first scenario on the BGE calculator website, have students find the differences in energy usage and costs between the two.
- Technology/Art: Students could design a “blueprint” of a house with energy saving tips in each “room”.
- Language Arts: Students could create a cartoon to show second graders ways that they could personally conserve home energy use.

Tips for Implementation

- Introduce the idea of home energy use by brainstorming a class list of things in a house that might need energy to function. Be cognizant of the fact that some students might not live in a traditional house (e.g., trailers, shelters).
- Select criteria for completing the calculator form on the BGE website: age of house, type of heat, temperature settings, etc. Calculate the amount and cost of the energy

used. Complete the form a second time, changing the factors, and set up the forms for a bar graph comparison.

- Use the BGE website to order free literature for the classroom. The books are written for elementary level students about specific energy topics.

Additional Project Ideas for the Energy Conservation BMP

- Students could read about alternative ways to conserve energy and brainstorm the value of the conservation measures.
- Students could design a flyer to explain why saving energy is so important and list numerous suggestions for energy conservation.
- Students could investigate Energy Star appliances and write a letter to their parents and/or administrators to ask them to consider buying an Energy Star appliance the next time an appliance needs to be replaced.