

LESSON PLAN: Saving Energy at School

Michigan Curriculum Framework

Middle School

- **Benchmark SCI.II.1.MS.3** – Show how common themes of science, mathematics and technology apply in real-world contexts.
- **Benchmark SCI.II.1.MS.4** – Describe the advantages and risks of new technologies.
- **Benchmark SCI.II.1.MS.1** – Evaluate the strengths and weaknesses of claims, arguments or data.
- **Benchmark ELA.3.MS.1** – Integrate listening, viewing, speaking, reading and writing skills for multiple purposes and in varied contexts. An example is using all the language arts to prepare and present a unit project on career exploration.

High School

- **Benchmark SCI.II.1.HS.3** – Show how common themes of science, mathematics and technology apply in real-world contexts.
- **Benchmark SCI.IV.1.HS.1** – Analyze properties of common household and agricultural materials in terms of risk/benefit balance.
- **Benchmark SCI.II.1.HS.1** – Justify plans or explanations on a theoretical or empirical basis.
- **Benchmark ELA.3.HS.1** – Integrate listening, viewing, speaking, reading and writing skills for multiple purposes and in varied contexts. An example is using all the language arts to complete and present a multimedia project on a national or international issue.

Lesson Outcome

The student will analyze the school's energy use and propose energy efficient practices throughout the school.

Rationale/Purpose for Lesson

According to the Alliance to Save Energy, schools spend more money on energy than on computers and textbooks combined. Schools could save money by reducing energy use and becoming more energy efficient. By surveying the school's energy spending, students will familiarize themselves with energy costs in a real-world setting and make recommendations for energy efficient practices based on their findings. Through their recommendations and proposals, students will be able to see how their actions can impact the school.

Resources/Materials Required

- Copies of "Survey the School" handout
- "Let's Save Energy at School" sheet

- Ability for students to speak with administrators or building/grounds keepers to answer questions from the “Survey the School” handout
- Materials for presentations, such as computer used for slideshow presentations, poster board, markers or paper for brochures and posters.

Introduction

The “Costs of Electricity” activity would be a good introduction to this lesson to give students background knowledge on energy costs and energy efficiency. However, this lesson also can be done independently.

- In a class discussion, have students list all the ways the school uses energy. Encourage students to think of energy uses both in and out of the classroom.
- Ask students what type of things impact energy use. Give students an example, such as drafty doors or windows that ultimately require the school to either use more heat or set the heating system at a higher temperature.

Procedures

- Break students into five even groups. Assign each group one of the areas on the “Survey the School” handout. Have student groups complete the questions for their assigned section.
- Have the groups compile and report their findings to the whole class. If time allows, have students put together a presentation with pictures or other examples of their findings.
- Using the gathered information, have students determine if the school is using energy wisely or if there are areas that could be improved.
- After students consider all the ways the school uses energy and possible areas of improvement, have each group select an area of the school to promote energy efficiency. (Areas could include lighting, windows, doors, food service or appliances such as computers, and heating and cooling.) For their selected area, each group should:
 - Define the problem.
 - Research energy efficient options. (www.energystar.gov, www.eia.doe.gov)
 - List viable options for improvement, including associated costs.
 - Choose one option and create a method for sharing recommendations with the whole class.
- Implement the recommendations of each group. See “Let’s Save Energy at School” handout for ideas on implementing the energy-saving techniques.

Closure

After recommended strategies have been implemented, track monthly energy savings.

Extensions

Have students discuss ways to save energy at home.

Survey the School

You know that the school uses a lot of energy to operate, but how does the school's design and energy-using systems impact the school's energy use? Investigate and answer the following questions to become more familiar with your school.

School Overview

1. When was the school built?
2. How many hours per week is the school in use?
3. In addition to the school itself, what else on the school property uses energy? (Such as athletic areas, storage or facilities areas, outdoor lighting, transportation, etc.)
4. What type of energy is used to power lighting, heating, cooling and water heating?
5. Who is responsible for controlling the school's energy use? Is there a developed system for monitoring the school's energy use?
6. Is there a developed system for maintaining energy-powered equipment?

Building Exterior

1. What material is the building made of? The roof? What is the general condition of the building exterior?
2. How many exterior windows does the school have? What is the general condition of the windows? (Note any broken windows.)
3. Are there any exterior windows or doors that let air in or out when closed?
4. Examine and record the school's ability to receive sunlight. Which direction does the school face? Are there shade-providing trees near the school? Are there awnings on the windows?

Lighting

1. What type of lighting is used in the school?
2. How are the lights controlled? Can they be turned on and off? In which areas of the school? Can the lights be dimmed? If so, where?
3. Examine and record the natural lighting of the school?
4. What type of lighting is used when school is not in session?

Heating

1. What type of heating and cooling system does the school use?
2. How is the temperature for both heating and cooling controlled?
3. Investigate and record the maintenance of the heating and cooling systems.
4. How is the school's water heated?
5. How is the water's temperature set and controlled?
6. Does the water heating system have any leaks? Are the pipes insulated?

Appliances

1. What type of appliances does the school use, in the office, computer labs, and kitchen?
2. What year were the appliances purchased? Are they Energy Star products?
3. Is there a system developed for maintaining the appliances?
4. What are the procedures for using the appliances?

**Building Survey questions adapted from The National Energy Education Development Project. (www.need.org)

Let's Save Energy at School!

Here's how:

- Present your survey findings and recommendations to other classes, the school board and administrators, and parent-teacher organizations.
 - o Create a pamphlet or brochure.
 - o Create a school display or art project to communicate your findings on energy, efficiency and the environment.
- Involve the entire school – students, teachers, administrators, food service, main office and counselors.
- Get help from outside sources, such as local businesses or nonprofit organizations. These outside sources could provide information or presentations on energy efficiency, or they could donate time, money or materials to help your school become more energy efficient.
- Establish “energy patrol” teams to ensure new practices are being followed.