

Green Schools Best Practices: School Energy Audits

Simple and Easy Low Cost or No Cost Energy Saving Measures for School Offices & Classrooms

Goal: The goal of an energy audit is to achieve energy and cost savings by identifying areas of energy waste in school classrooms and offices and implementing simple energy efficient measures. By embarking on a basic energy audit project, students can promote the message of energy conservation and turn the classroom into a learning laboratory, while sharpening their observation, communication, and critical thinking skills.

Background: Students at all levels can participate in energy audits, provided they have basic understanding of energy use and energy conservation. With a little time and persistence, students can conduct an 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.

Steps to Conducting an Audit:

1. Obtain permission to conduct your audit. Be sure to get permission from your school principal, secretary, and/or custodian to introduce the project. Students can write a letter summarizing the project goals, steps, and benefits of the project.
2. Schedule the audit. If students plan to audit a school office, be sure schedule a time that works for office occupants. Because much of an office or classroom's energy use depends on the occupants' behaviors, try to schedule an audit when occupants are in the room.
3. Conduct the initial walk through audit. Energy audits can be adapted to students' age and ability level, and can range from basic to technical. To conduct a basic energy audit, students can simply observe the amount of lighting used in a room, check to see if doors are left open when heat or A/C is on, determine if computers are set to sleep mode, and make other simple energy-use observations. For a more advanced energy audit, students can use auditing tools such as a light meter and watt meter to make more detailed observations about the amount of energy being used in a room. These tools are included in the Green Schools Tool Kit; contact your Green Schools local project leader to check one out.
4. Formulate energy efficiency recommendations. Energy efficiency measures can include zero cost behavioral recommendations (e.g. maximizing natural daylight versus overhead lights, closing doors to maintain heating/cooling, activating computer sleep functions); low cost equipment installation (such as Powerstrips, compact fluorescent lamps (CFLs), and timers); to higher cost retrofit options (e.g. ENERGY STAR appliances, LCD (flat screen) instead of old, boxy CRT monitors).
5. Complete a summary of audit findings and present to office and classroom occupants and other members of the school community. By completing a written report, students can ensure that their energy efficient recommendations are captured, allowing office and classroom occupants to easily access these recommendations. Students can also use this report as a reference when conducting follow up audits and office visits.

Follow Up and Reporting:

It's important for students to communicate the results of their audit and their energy-saving recommendations. If students make technical observations, it helps to measure energy savings in terms of kWh, associated greenhouse gas (GHG) emissions reductions, and avoided cost (ask your local project leader for resources to make these simple calculations). This allows students to quantify the benefits of an office energy audit when presenting to the school community. This information can then be put in newsletters, announcements, and newspaper articles.

In addition, students can prepare certificates of completion as a way of thanking class or office participants and recognizing their participation in the audit.

Finally, students can conduct a follow-up audit to see if their energy-saving measures have been adopted.

Project Tools & Resources	<p>Tools: Green Schools energy audit toolkit (watt meter, light meter, flicker checker, tool instruction manuals, etc.) Available through your local project leader.</p> <p>Resources:</p> <ol style="list-style-type: none">1. Alliance to Save Energy – Energy Savings Tips for Schools http://www.ase.org/content/article/detail/6252. Wilson Educational Services – Savings through Energy Management http://www.wilsoned.com/STEM.html3. Environmental Protection Agency Power Profiler http://www.epa.gov/cleanenergy/energy-and-you/how-clean.html4. What's Up in the Environment – Energy Audit Project http://www.thirteen.org/edonline/wue/energy2_procedures.html
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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.

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)? Can footwarmers be used as a replacement?

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.