



# Kentucky Green and Healthy Schools



## Teacher Guide Energy

If your students have chosen to do an Improvement Project in the Energy category, the resources below can help them as they complete the Project Form.

### **Remember to let your students lead!**

As much as possible, let the students decide the direction of their investigation and come up with Improvement Project ideas.

### **Overview**

Humans harness energy for use beyond basic survival. We use energy for many purposes, including to heat and cool buildings; grow, harvest, package, and transport food; commute from place to place; and communicate with one another across the globe.

Modern society depends on accessible and affordable energy. In school buildings, energy is the second largest expense, second only to employee salaries. Reducing energy consumption can save money for schools so funds can be invested in other programming; it can also reduce the consumption of fossil fuels, reduce pollution, and help the community become more sustainable.

For the KGHS Energy category, students may survey a variety of areas around the school, like examining windows and doors, inspecting lighting, reviewing procedures for heating/cooling systems, or researching school energy providers. Students may speak with the school's administrative staff about energy costs, the facilities staff about standard operating procedures, or teachers about how they use energy in their classrooms.

### **Places to Investigate**

- Lights
- HVAC
- Appliances
- Computers
- Doors
- Windows

### **People to Interview**

- The Energy Manager (if there is one)
- Maintenance/custodial staff
- Administrative staff
- Teachers
- Kitchen staff



## Questions

These questions can be utilized as prompts should you need them. Ideally, we would like students to engage in their own questioning to provide an authentic learning experience.

- Energy Management
  - Does your school and/or school district have a written energy policy?
  - Does your school and/or school district have an energy manager?
  - Are energy conservation measures in place for after school hours, evening activities, and vacations? (i.e., Is there a building schedule for use after hours? Is there a schedule for setback thermostat temperatures after school hours?)
  - Does the administration encourage the purchase of ENERGY STAR equipment?
  - Has your school received outside funding to assist with energy saving efforts such as rebates from local utility or federal or state grants?
  - Does your school have a student energy team that monitors and promotes energy conservation at school?
  - What appliances/machines are found in your school's building(s)?
  - Did you find any appliances/machines located less than 5 feet from a thermostat?
  - Are computer monitor screen savers in use?
  - Are computers set to go to stand-by mode?
  - Did you find any rooms where machines were left on when no one was in the room?
- Building Profile
  - How many buildings are on the school campus?
  - For the main school building, what direction do the majority of the windows face? How can the building orientation impact energy use in the building?
  - Did you observe any cracked or broken windows in any buildings?
  - Did you observe any window air leaks?
  - Are there blinds or shades on the windows?
  - Observe the condition of weather stripping around exterior doors. Is any of the weather stripping cracked, broken or missing?
  - Did you observe any air leaks around exterior doors?
  - Did you find any interior doors opened?
  - Did you find any exterior doors propped open?
- Lighting
  - What different types of lighting are being used in your school (fluorescent, compact fluorescent lights (CFLs), incandescent, LEDs, skylights or daylighting window) and how are they being used?
  - Can the overhead lights be turned off and on manually?
  - Are there lights on switches where banks (rows) of lights can be switched off?
  - Can the lights be controlled by dimmer switches?
  - Are there occupancy sensors that turn the lights on/off?
  - What type of lighting is used in the Exit Signs?
  - Did you find any rooms where lights were left on when no one was in the room?





- If lights were left on with no occupants, how many rooms had lights on?
- HVAC
  - How is heat supplied?
  - How is cooling supplied?
  - Are filters changed per manufacturer's recommendations?
  - How frequently does the manufacturer recommend filter changes?
  - Is heating/cooling controlled by:
    - Central Controls?
    - Programmable Thermostat?
    - Adjustable Room Thermostat?
    - Energy Management System Sensor?
  - Were any vents obstructed?
- What are your school's guidelines for thermostat temperature settings during the heating season and the cooling season?
- Are any of the following energy saving measures are used by the school?
  - Stoves preheated no more than 15 minutes prior to use?
  - Exhaust hoods in kitchen turned on after cooking begins, rather than by the first person arriving to work?
  - Lamps in vending machines turned off when school is not in use?
  - Appliances cleaned and checked regularly (e.g., refrigerator coils vacuumed)?
  - Insulation with appropriate R-values used (In Kentucky, R38 to R60)?
  - Windows and doors caulked to prevent air infiltration?
  - Replacement of older equipment with new equipment, such as on-demand hot water heaters?
  - Unoccupied areas of the building have different temperature settings?
  - Outside air conditioning unit in shade?
- Who supplies each type of energy to your school?
- What was the cost of energy-related utilities for your school or district in the previous school year?
- What percentage of this year's school budget that is dedicated to energy-related utilities?
- How much money did your school spend on energy-related utilities per student last year.
- What do you predict the cost of energy-related utilities for your school will be?
- Are any energy sources used by your school renewable?
- Is the landscaping on the school grounds used in a way to enhance energy efficiency (e.g., evergreen trees on north and west sides of building to provide a windbreak, deciduous trees on south and east sides to provide shade during the hotter seasons and allow sun to warm building during colder seasons)?





## Resources

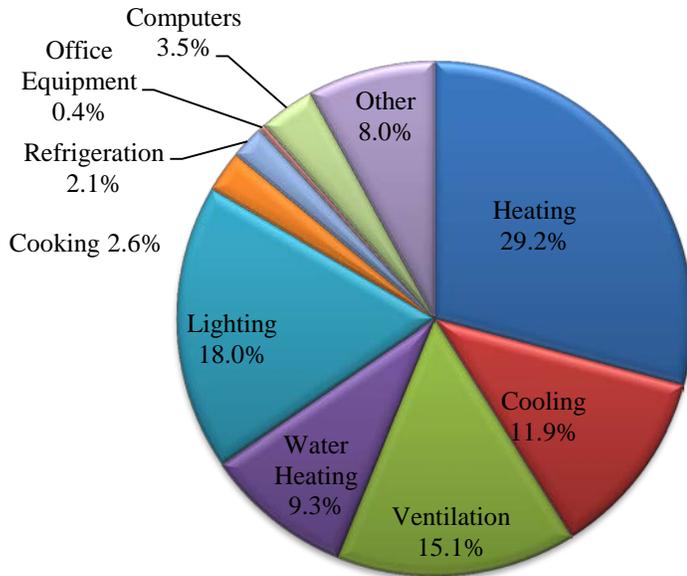
- **U.S. Department of Energy (DOE):** [Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education](#). A publication all about energy that is produced by the U.S. DOE that presents energy concepts that, if understood and applied, will help individuals and communities make informed energy decisions.
- **U.S. Energy Information Administration (EIA):**
  - [Energy Kids](#). This site includes a great introduction to energy, as well as a special guide for teachers.
  - [Energy Calculators](#). Check out the energy calculators on this page to help determine how many resources your school is using.
- **U.S. Environmental Protection Agency (EPA):** [ENERGY STAR](#) is a U.S. EPA voluntary program that helps businesses and individuals save money and protect our climate through superior energy efficiency.
- **Kentucky School Energy Managers Project (SEMP):** Energy Managers in Kentucky help schools save energy and money. They publish a very informative monthly newsletter. Visit the [SEMP website](#) to learn more. Contact Martha Casher at [Martha.Casher@ksba.org](mailto:Martha.Casher@ksba.org) to find out if you have an Energy Manager in your district.
- **KY National Energy Education Development Project (NEED):** [KY NEED](#) is an excellent resource for teachers and students completing energy projects or inventories. KGHS works closely with KY NEED, and projects can be counted toward awards and recognition in both programs.
  - NEED [Energy Infobooks](#)
  - KY NEED [Energy Efficiency and Conservation Curriculum Guides](#). Suggestions by grade level:
    - Elementary: Building Buddies. [Teacher Guide](#). [Student Guide](#).
    - Intermediate: Monitoring and Mentoring. [Teacher Guide](#). [Student Guide](#).
    - Intermediate and Secondary: [Building Science](#).
    - Secondary: Learning and Conserving. [Teacher Guide](#). [Student Guide](#).
    - Secondary: School Energy Survey. [Teacher Guide](#). [Student Guide](#).
      - [Plug Loads](#)
      - [Blueprint for School Energy Teams](#)
- **California Energy Commission** [Energy Quest](#). This award-winning energy education website has interactive visuals and a thorough listing of Energy Education Resources for teachers and parents, including lesson plans, books, and web links.
- The average percentages of energy costs for schools in Kentucky's climate zone are: 26% for heating, 14% for cooling, 25% for lighting, 2% for cafeteria, 5% for computers, and 12% other equipment.



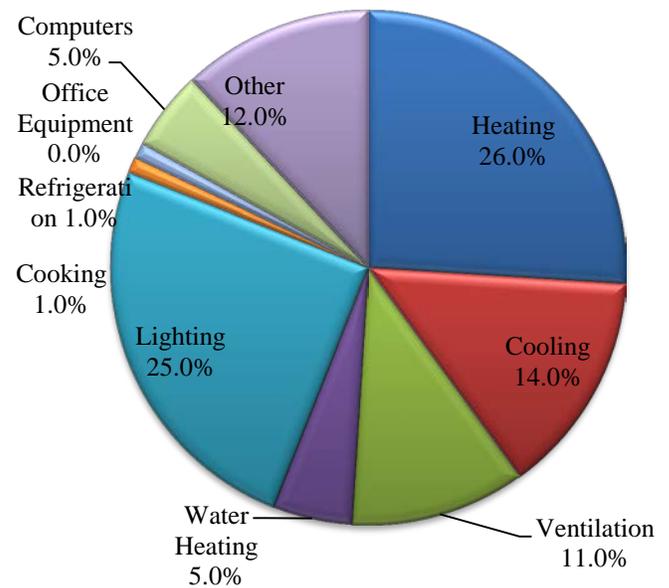
## Resources (continued)

- The actual breakdowns of categories of energy consumption for Elementary, Middle, and High Schools in Kentucky are:

**Figure 1A: CBECS Elementary & Middle School Energy Use Profile (2003)**



**Figure 1B: CBECS High School Energy Use Profile (2003)**



## Improvement Project Ideas

Your students should come up with their own ideas for an Improvement Project, but below are some examples of previous Improvement Projects for Energy:

- Installing [Vending Misers](#) on school vending machines
- Holding a "Lights Out" day once a week to turn off the lights in classrooms
- Working with IT staff to ensure that all teacher and student computers go into hibernate mode when idle for more than 1 hour
- Producing a public service announcement (PSA) about energy consumption at school to highlight wasted energy and how to stop the waste
- Installing motion sensor lighting to ensure that lights go off when the rooms are empty
- Working with facilities staff to plan and implement an efficient air temperature control program



## Extensions

After coming up with an idea for an Improvement Project, consider the following optional extensions.

- A) Once it is completed, submit your Improvement Project in NEED's Youth Awards for Energy Achievement. A portfolio documenting your project is due in the Kentucky NEED office by April 15. Details can be found on pages 33-41 of NEED's Blueprint for Success at [www.need.org/files/curriculum/guides/Blueprint%20for%20Success.pdf](http://www.need.org/files/curriculum/guides/Blueprint%20for%20Success.pdf). For more information on the NEED Program, contact the Kentucky NEED office at [kreagor@need.org](mailto:kreagor@need.org).
  
- B) Submit your investigation documentation to the Project Learning Tree (PLT) GreenSchools! program for their Energy category. Once you submit investigation documentation, your school becomes eligible for thousands of dollars in grant money from the GreenSchools! program. You can also submit your completed Improvement Project to their site. Learn more at [www.plt.org/greenschools](http://www.plt.org/greenschools).

