Connecticut School Indoor Environment Resource Team

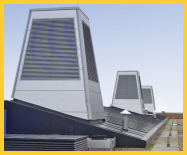
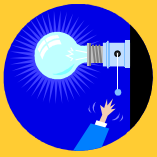
Maintaining Good IAQ While Conserving Energy

January 2009

With ongoing energy concerns, schools may face rising energy costs. There is concern about the impact this may have on school budgets and their ability to address indoor environment quality (IEQ) issues. Of particular concern are cost-saving measures that may include cutting back on fresh air to save fuel costs. Properly operated and maintained HVAC (Heating, Ventilation and Air Conditioning) systems that provide good ventilation rates [a minimum rate of 15 cubic feet per minute (cfm) per occupant] not only protect student and staff health, but also increase comfort and productivity. There is growing evidence that appropriate ventilation rates lead to higher reading and math scores and lower absentee rates.

Some Suggestions On Maintaining Good Indoor Air Quality While Saving Energy:

- **Make sure all parts of the HVAC system are working well:** Are air filters and belts maintained? Motors running with loose belts provide poor heating air distribution. When possible, replace old inefficient electric motors with newer more energy-efficient models. Make sure systems controls are calibrated correctly, including clocks, timers and switches. Check outside dampers to make sure they are not leaking and are operating properly.
- **Avoid running building systems 24 hours a day:** Running systems in the occupied mode for 24 hours a day usually wastes lots of heating and electrical energy. Install programmable thermostats in areas like the cafeteria, gym, and auditorium to minimize operating hours of the heating and cooling systems during low occupancy periods. However, make sure adequate ventilation is provided for students and staff at all times.
- **Make sure airflow around vents is not blocked.** Keep bookcases and other bulky items away from the heating and cooling units so they don't block air that should be coming into the room. Make sure outside unit ventilator intake vents are not blocked.
- **Increase fresh air levels**: Schools that rely on natural ventilation (windows) can increase fresh air levels with limited energy loss by periodically (2-3 times a day) opening windows for a brief time (5 minutes or so), then closing them.
- **Use heat recovery ventilators and energy recovery ventilators** (HRV/ERVs). These systems precondition incoming air from outdoors by transferring energy between supply air coming in and exhaust air flowing out of the building. In some cases, ERV systems can also help with moisture control. (For more information, go to: **http://www.epa.gov/iaq/schooldesign/hvac.html#Energy%20Recovery%20Ventilation)**
- **Temperature Setting:** Consider setting thermostats at 68-70 degrees during the heating season, and 78 degrees in the warmer months if the building has air conditioning, as suggested by the Alliance to Save Energy. For every temperature degree, energy costs go up or down 2-3%. For instance, if a school can keep the temperature at 68^0 rather than 72^0, that 4 degree difference means a 12% energy savings. Schools should install night setback programming that includes vacation weeks and holidays. The savings can be used for IEQ and energy conservation improvements.


Some General Recommendations For Saving Energy:

- Turn off lights when not in use - lighting accounts for nearly 50% of the electric bill in most schools. Consider installing sensors that shut off lighting when rooms are unoccupied.
- Remove unneeded light fixtures near windows, especially in unused corners or along banks of windows. Halls are often over-lit and should be evaluated.
- Set computers so they will go into "sleep" mode when not in active use (Screen savers don't save energy - only the sleep mode does).
- Save 50% on energy costs by using Energy Star computers, monitors, printers, fax machines, copiers and other equipment. (Visit **http://www.energystar.gov** for more information.)
- Publicize energy costs and savings. When people know how much it costs to power their school, they can see why it's worth some extra effort to avoid waste.
- Install programmable thermostats in areas like the cafeteria, gym, and auditorium to minimize operating hours of the heating and cooling systems during low occupancy periods.

Get TfS Building Teams Involved In Energy Saving:

Saving energy is in the interest of all school building occupants – including those concerned about good indoor air quality. Tools for Schools building teams should consider facilitating measures to save energy such as:

- Encouraging all staff to keep the building temperature at 68° during the heating season.
- Investigating and correcting problems. Where classrooms or other areas are uncomfortably cold or drafty, find out why and fix the problem. Custodians, teachers, and students should work together to increase building comfort.
- Turning down heat in the hallways. Keep classroom doors closed. Otherwise, the heat runs down the hall and outside—where it is wasted to the outdoors.
- Involving the whole school. Energy savings add up when the entire school joins together in conservation efforts. Schools with effective conservation programs have reported reductions of as much as 25% in utility bills.
- Using the energy conservation checklist that follows to regularly monitor and maintain energy conservation measures.

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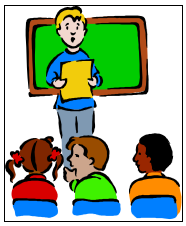
Get Students Involved:

⇒ Form a student energy patrol to:
- Ensure lights are out when rooms are empty (check classrooms, the cafeteria, the auditorium, etc.).
- Make sure monitors are off when computers are not in use and turn computers off at the end of the day.
- Ensure that windows are closed during heating/cooling seasons, and that all problems are being reported and followed up

⇒ Have students make signs and stickers to remind people to turn off the lights when they leave a room.

⇒ Have students conduct an experiment in classrooms by turning off selected banks of lights and surveying occupancy comfort at different lighting levels (often, occupants prefer working under natural light).



⇒ Have students calculate the energy savings achieved by:
- Replacing incandescent light bulbs with CFLs
- Changing incandescent lights in Exit Signs to light-emitting diode (LED) bulbs

⇒ Have students calculate potential savings from the use of Energy Star equipment and present the results to school administrators. If your school purchases the equipment, make sure the Energy Star features are enabled.

⇒ Have students use a meter to measure how much electricity a device uses. This is useful in determining which appliances are less efficient.

⇒ Have students conduct a survey of the number of appliances in each classroom and encourage teachers to take away unneeded appliances.

⇒ Have students determine areas of energy loss by using "draft meters" made from plastic wrap and pencils to study where sources of drafts.

Useful Web Links

EPA: Heating, Ventilation and Air-Conditioning (HVAC) Systems:
http://www.epa.gov/iaq/schooldesign/hvac.html#Energy%20Recovery%20Ventilation

EPA: Energy Efficiency and IAQ in Schools: fact sheet:
http://www.energystar.gov/ia/business/k12_schools/Ee&iaq.pdf

EPA: Energy Star Site for K-12 Schools:
http://www.energystar.gov/index.cfm?c=k12_schools.bus_schoolsk12

ECSU Institute for Sustainable Energy:
http://www.easternct.edu/depts/sustainenergy/index.htm

Alliance to Save Energy School Energy Efficiency Links:
http://www.ase.org/content/article/detail/646
http://www.ase.org/uploaded_files/greenschools/School%20Energy%20Guidebook_9-04.pdf

ACHR: *School IAQ Solutions Can Save Energy* Newsletter Article:
http://www.xpedio.carrier.com/idc/groups/public/documents/marketing/thenews_07-06.pdf

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Daily Energy Conservation Checklist for Energy Conservation Team

Lighting & Computer Use	OK	Notes
Turn off lights in classrooms when unoccupied.		
Turn off lights when leaving an unoccupied room.		
Use minimum amount of lighting (i.e. Gym, Cafeteria, Halls).		
Keep lights off in storage rooms except when being used.		
Make sure all exterior lighting is off during daylight hours.		
Replace burned out lamps with lower wattage when possible.		
Install lower wattage replacement lamps.		
Make sure computers are set so they will go into the "sleep" mode when not in active use. (Screen savers don't save energy)		
All computer equipment should be turned off at end of the day & on weekends, unless your network technicians instruct otherwise.		
Building Envelope		
Make sure all windows & doors are closed during heating & cooling seasons.		
Notify maintenance immediately of poor fitting windows and doors.		
Utilize natural ventilation during mild weather.		
Open blinds to take advantage of natural lighting when possible		
Utilize direct sunlight during winter for heat gain.		
Close blinds when direct sunlight enters rooms during the summer.		
Make sure all exhaust gravity dampers are closing properly.		
Heating, Cooling, Ventilation		
Make sure heating and cooling is not running in unoccupied areas, i.e. Gym, Cafeteria, Band Room, Auditorium.		
Maintain 68° during the heating season. Are there temperature setbacks?		
Maintain 76° during the cooling season.		
Confirm all heating and cooling equipment is operating when building is occupied. Setback modes may be used when building is not being used.		
Notify maintenance immediately of overheating or overcooling problems.		
Water Conservation		
Make sure all faucets and toilets are not leaking. Notify maintenance immediately.		
Make sure all pumps are not leaking. Notify maintenance immediately.		
Use only amount of water necessary for task.		
Use cold water when possible except when hot water is required by state codes.		

(from Facilities Division, Energy Conservation Action Plan, Facilities Division, Alamance-Burlington School System, NC)