Healthy Sustainable Schools

# Guide for change







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**This Guide for Change is also available online at www.healthyschools.state.mn.us.**

# Introduction

**Almost one million Minnesota children and thousands of adults spend a significant portion of their days in K-12 school buildings.** Many of these buildings are old and in poor condition, and may contain environmental conditions that inhibit learning and pose increased risks to the health of children and staff.

School officials and appropriate public agencies have mandates and rules to ensure environmentally safe and healthy school facilities. Working together, federal, state, local, and private sector entities can ensure that resources are used effectively and efficiently to address environmental health and safety conditions. By helping schools incorporate sustainable practices, we can reduce operating costs and environmental impacts, while promoting a healthy environment for students and staff.

**A healthy sustainable school** is an environmentally safe and healthy learning environment that is clean, free of environmental hazards, and in good repair.

## Benefits of a healthy sustainable school

- ➤ Enhanced student health and performance
- ➤ Higher performing school buildings
- ➤ Reduced environmental impacts
- ➤ Increased attendance
- ➤ Reduced operating and maintenance costs
- ➤ Increased staff satisfaction

## About this guide

This guide is designed to provide parents and school officials with resources to help them create healthy sustainable schools. In addition to protecting the health and improving the performance of building occupants, the actions outlined in this guide can also save schools money in the long run.

This guide is by no means a comprehensive resource, but offers information to help and motivate anyone interested in improving school environments and building performance. The guide's companion assessment tool will help you begin implementing healthier practices and tracking your school's progress.

Schools across the country are making the transition to become healthy and sustainable. Thank you for starting (or continuing!) the journey to improve yours.

Source: Adapted from Healthy Schools Network, www.HealthySchools.org

# Steps to a creating a healthy sustainable school

Source: Adapted from Eco-Schools International, www.eco-schools.org

1. **Establish a healthy sustainable committee (green team).**
   The committee is the core of the green schools process, both organizing and directing school greening activities. It should consist of the stakeholders of the school environment—students, teachers, cleaners, caretakers, parents, and administrators. One person should coordinate the team and ensure ideas are implemented and goals are met.

2. **Build awareness.**
   The whole school should be involved in practical initiatives such as saving water, recycling materials, and eliminating toxics. Incorporate study of themes such as energy, water, toxics, food, and waste into curriculum where possible. A publicity program can keep the school and the community informed of progress through classroom displays, school assemblies, and press coverage.

3. **Conduct an environmental review (see checklist in Assessment Tool).**
   Work begins with a review of the environmental impact of the school and identification of issues for action. Students can be involved in this work, from assessing the level of litter on school grounds to checking the building for inefficiencies such as leaky taps or electric equipment left on overnight. Having students involved in the audit or assessment creates opportunities for kids to apply their own critical thinking, problem-solving, and leadership skills, and provides opportunities to learn about different substantive environmental issues involved in the review.

4. **Develop a plan of action.**
   Use the information from the review to identify priorities and create an action plan that sets realistic targets to improve environmental performance. The plan could involve and promote, for example, a paper recycling policy, less-toxic cleaning materials, carpooling, turning off lights, fitting push water taps, creating a garden, purchasing environmentally preferable products, creating a litter pick-up strategy, or more!

5. **Involve others.**
   Connect with other organizations in order to benefit from their experience and expertise. In some schools, environmental consultants have offered to take part in the environmental review process. Others have offered advice on school grounds and energy management. Consider the wider community when preparing action plans. For example, the Minnesota Pollution Control Agency has experts on mercury removal, green cleaning, recycling, and waste reduction.

6. **Create an environmental vision statement.**
   Create a pledge or green code that sets out what the school is striving to achieve. Post it around the building. To view inspiring and beautiful posters made by kids from all over the world, visit www.eco-schools.org/projects/ecocode/ec2004c.htm.

7. **Implement the action plan.**
   Start small with one goal, select three areas to make more healthy and sustainable, or develop an overall comprehensive plan. Regardless, each small victory builds confidence that the team can do more. As cost savings and measurable environmental improvements are demonstrated, the school also gains public support and more momentum. (See case studies at www.healthyschools.state.mn.us.)

8. **Monitor and evaluate.**
   Monitoring ensures that progress toward targets and any necessary changes to the action plan are made and that achievement is recognized. It also ensures that environmental education is an ongoing process in the school.

# Resources

**Healthy School Environments**, U.S. Environmental Protection Agency. This is the federal site for environmentally healthy and sustainable school information. You'll find an extensive list of resources, as well as the Healthy School Environmental Assessment Tool (HealthySEAT). This new software tool helps school districts establish and manage comprehensive school facility self-assessment programs. HealthySEAT contains a fully integrated environmental health and safety checklist and is designed to be easily customized to reflect state and local requirements and policies.
www.epa.gov/schools

**Sample School Board Resolution: Blueprint for Healthy, Environmentally Sound Schools**
www.greenschools.net/sampleresolution.html

**Creating Safe Learning Zones: The ABCs of Healthy Schools** (pdf, 62pp), the Center for Health Environment and Justice, March 2002. Comprehensive primer on healthy schools, including information about the special vulnerabilities of children, common toxins found in schools, healthier building material choices, indoor environment, designing healthy schools, and getting your community involved.
www.childproofing.org/ABC.pdf

**Greening Schools**. A joint effort of the Illinois Environmental Protection Agency and the Illinois Waste Management and Research Center to help schools provide a safe and healthy environment that can save money, improve learning conditions, and increase efficiency. Provides teachers with standards-based tools to introduce the concepts of waste reduction and pollution prevention to students. They offer a plethora of online resources for finding funding sources and greening your curriculum and your buildings or grounds.
www.greeningschools.org

**The Green Schools Initiative**. Check out *The Little Green Schoolhouse: Thinking Big About Ecological Sustainability, Children's Environmental Health, and K-12 Education in the USA*, a report expressing a positive vision for healthy, sustainable schools. Learn how to make our schools greener and healthier places for our kids.
www.greenschools.net/

**Green Flag Program**, The Center for Health, Environment and Justice. The Green Flag Program is an innovative, three-step program to address four environmental issues at your school: integrated pest management, nontoxic cleaning, recycling, and indoor air quality.
www.greenflagschools.org

**Healthy Schools Network** is a national environmental health not-for-profit organization, centered on children, and dedicated to assuring every child and school employee an environmentally safe and healthy school through research, information and referral, advocacy, and coalition-building. The website includes a clearinghouse of publications.
www.healthyschools.org

**National Clearinghouse for Educational Facilities**. Sponsored by the U.S. Department of Education, this website provides extensive resource lists that cover planning, design, financing, construction, and the operation and maintenance of school facilities. The lists are annotated bibliographies and include links to full text publications and related websites, descriptions of books, studies, reports, and journal articles. Specific topics pertaining to green building include daylighting, high-performance school buildings, energy savings, indoor air quality, and much more.
www.edfacilities.org
Look specifically for their Healthy Schools Resource List
www.edfacilities.org/rl/healthy_schools.cfm

## Research and publications

**Do School Facilities Affect Academic Outcome?** National Clearinghouse for Educational Facilities, (pdf, 24pp)
www.edfacilities.org/pubs/outcomes.pdf

**Linking School Facility Conditions to Teacher Satisfaction and Success**, National Clearinghouse for Educational Facilities, (pdf, 4pp)
www.edfacilities.org/pubs/teachersurvey.pdf

**Renaissance of the American School Building**, (pdf, 72pp), Environmental Resource Council. A history of the American school building, where we are today, and where we need to go.
www.edfacilities.org/pubs/Renaissance.pdf

**A Summary of Scientific Findings on Adverse Effects of Indoor Environments on Students' Health, Academic Performance, and Attendance**, U.S. Department of Education, Office of the Under Secretary, Washington, DC, 2004 (pdf, 36pp)
www.iehinc.com/pdf/Effects%20on%20Students.pdf

## Educational resources

**Ecological Footprint Quiz,** Redefining Progress
www.myfootprint.org
www.kidsfootprint.org

**Green Squad**, Natural Resources Defense Council, teaches kids about the relationship between their schools and environmental and health issues. The site is designed primarily for students in fifth through eighth grade, but also offers information for younger and older students as well as parents and teachers.
www.nrdc.org/greensquad

**SEEK website** offers information on curricula for the state of Minnesota, incorporating environmental education with graduation standards. These curricula employ natural and built environments as the context for learning.
www.seek.state.mn.us

**For teachers: Curriculum and activities from U.S. EPA website**. Resources include project ideas, tools, games, and activities for students of all ages. Topics include:
- Air: acid rain, indoor air pollution, ozone
- Conservation: energy, environmental stewardship, natural resources, pollution prevention
- Ecosystems: ecology, endangered species, global warming, habitats, watersheds
- Human health: drinking water, fish advisories, indoor air, lead, pesticides, radon, smog
- In your neighborhood: databases, local issues, maps
- Waste and recycling: garbage, hazardous and solid waste, landfills, superfund cleanups, trash
- Water

www.epa.gov/epaoswer/education/teach_curric.htm
www.epa.gov/teachers/teachresources.htm

**Vermont Guide to Education for Sustainability**, Vermont Education for Sustainability
www.vtefs.org/resources/EFS%20GuideComplete-web.pdf

**Canadian Center for Pollution Prevention: Tools for educators.** This website offers curricula on product life-cycle analysis, links to the U.S. EPA website, and links to lesson plans in environmental education.
www.c2p2online.com/main.php3?section=41&doc_id=661&session=

**Hamline University's Center for Global Environmental Education** links to educational resources for teachers on water quality, clean-ups, storm drain stenciling, soil testing, water quality monitoring.
www.cgee.hamline.edu/watershed/action/

**"Hogbusters"** interactive web-based game for K-5 dealing with energy-efficiency practices.
www.energyhog.org/childrens.htm

**PBS, Newton's Apple.** Teacher guides on environmental issues as well as other science-related topics.
www.newtonsapple.tv/TeacherGuides_alphabet.php

**Powerpoint presentation** created by Minnesota Office of Environmental Assistance on strategies for students to reduce waste.
www.reduce.org

**North American Association for Environmental Education website** with classroom resources and curricula for teachers of grades pre-K through 12 in all areas of environmental education.
http://eelink.net/pages/Classroom+Resources-Directories

## Funding opportunities

**Funding Opportunities List**
www.greeningschools.org/resources/funding_opportunities.cfm



# Green building

## Building or renovating to green or B3 (Buildings, Benchmarks & Beyond) standards

**Good teachers and motivated students can overcome inadequate facilities and perform at a high level almost anywhere, but a well-designed facility can truly enhance performance and make education a more enjoyable and rewarding experience.** Sustainable design or high-performance building provides economic, human, and community benefits, as well as reduced environmental impacts. A new Minnesota study quantifies the benefits of 41 high-performance buildings in the state. Of the buildings with available information, the payback of green design features averages less than three years.

According to a recent national report, the average conventional school using green building practices would save enough money to pay for an additional full-time teacher.

## What is a green school?

The following features define a high-performance school (also known as a green school).

➤ **Healthy**

High indoor environmental quality is essential. The significant amount of time that students and teachers spend inside schools during the course of their educational career, combined with children's increased susceptibility to indoor pollutants, underlines the importance of healthy schools.

➤ **Comfortable**

Teachers, students, and administrators should be neither hot nor cold as they teach and learn. Quality lighting makes visual tasks, such as reading and following classroom presentations, easier. The lighting for each room is "designed," not specified. Daylight and electric light are integrated, and glare is eliminated.

➤ **Energy efficient**

Energy-efficient schools save money while conserving nonrenewable energy resources and reducing atmospheric emissions.

- A high-performance heating, ventilation, and air-conditioning (HVAC) system uses high-efficiency equipment, is sized correctly for the facility's demands, and includes controls that boost system performance.
- The school's lighting system uses high-efficiency lights and fixtures, optimizes the number of light fixtures in each room, incorporates controls to ensure high performance, and successfully integrates electric lighting and daylighting strategies.
- The building shell integrates and optimizes insulation levels, glazing, shading, thermal mass, air leakage, and light-colored exterior surfaces.

➤ **Material efficient**

To the maximum extent possible, the school incorporates materials and products that are:

- nontoxic
- derived from sustainable yield processes
- high in recycled content
- easily recycled

➤ **Water efficient**

High-performance schools are designed to use water efficiently, saving money while conserving water. To accomplish this, the school minimizes water consumption, controls and reduces water runoff from its site, and recovers and reuses gray water to the extent feasible.

➤ **Easy to maintain and operate**

Building systems are simple and easy to use. Teachers have control over the temperature and lighting in their classrooms, and are trained how to most effectively use them.

➤ **Commissioned**

The school operates the way it was designed and meets the needs of the owner by implementing a formal commissioning process—a form of systems check for the facility. The process tests, verifies, and fine-tunes the performance of key building systems so that they perform at the highest levels of efficiency.

➤ **Environmentally responsive site**

Where possible, the school's site conserves existing natural areas, restores damaged ones, minimizes storm-water runoff, controls erosion, and enhances the school building's high-performance features.

➤ **A building that teaches**

By incorporating important concepts such as energy, water, and material efficiency, schools can become tools to illustrate a wide spectrum of scientific, mathematic, and social issues. Mechanical and lighting equipment and controls can be used to illustrate lessons on energy use and conservation. Daylighting systems can help students understand the daily and yearly movements of the sun.

➤ **Safe and secure**

Students and teachers feel safe anywhere in the building or on the grounds. A secure environment is created by optimizing opportunities for natural surveillance. Security technology is used to enhance, rather than substitute for, the design features.

➤ **Community resource**

The most successful schools have a high level of parent and community involvement. This involvement is enhanced when schools are designed to be used for neighborhood meetings and other community functions.

➤ **Stimulating architecture**

High-performance schools should invoke a sense of pride and be considered a genuine asset for the community.

➤ **Adaptable to changing needs**

High-performance schools need to be able to embrace new technologies and respond to demographic and social changes. Creating a school with these characteristics requires an integrated, "whole building" approach to the design process. Key systems and technologies must be considered together, from the beginning of the design process, and optimized based on their combined impact on the comfort and productivity of students and teachers. The result will be a finished school that is an enduring asset to its community—one that enhances teaching and learning, reduces operating costs, and protects the environment.

➤ **Cost effective**

When evaluating the value of high-performance design, it is necessary to consider all costs and benefits. High-performance schools are cost-effective because they:

- Can bring more money to the school by increasing average daily attendance.
- Keep more money in the school by significantly reducing the utility bills.
- Can take advantage of available incentive programs.
- Avoid societal and district costs of workers' compensation and litigation.

## Saving money with sustainable design

School facilities are investments. State government and local communities spend billions of dollars per year on new facilities for current and future generations of students. The separation of operational and construction budgets can create schools that are economically, environmentally, and educationally poor investments. Sustainable school design provides extraordinarily cost-effective ways to enhance student learning.

Life-cycle costing is a means to calculate and compare different designs to identify which is the best investment. Districts can use it to assess the total cost of ownership for a facility over time. All of the building expenses that can be calculated are included in the analysis: initial costs, operating costs, and maintenance. Only by evaluating all three of these parameters can a community understand how much a new school really "costs." Predicted costs for alternative design approaches can then be compared and evaluated against one another.

High-performance classroom glazing, for example, may cost more upfront but may result in energy savings that pay for the glazing in a few years and then continue to save money for the school for years to come. Life-cycle cost analysis is the key to making these kinds of comparisons and to creating new schools with the lowest long-term costs of ownership.

Note, however, life-cycle costing will only address some of the benefits of high-performance design. Many benefits, such as improved health and test scores, are valuable, but difficult to quantify monetarily.

➤ **Reduced operating expenses**

**High-performance schools cost less to operate.** School districts spend less for electricity, gas, water, maintenance, and other ongoing facility operating costs. Thus more of a school's budget is made available to be spent on salaries, books, teaching supplies, and other items with a more immediate connection to the true mission of schools: educating students. Integrated design is the key to savings of this magnitude.

➤ **Increased funds**

**Investing in high-performance measures** that increase the health of the school can bring monetary returns to your school. District funds come from a variety of state, federal, and local sources, and every district has a unique blend of sources.

High-performance schools can increase the amount of school funding by increasing average daily attendance. Many studies have correlated characteristics of the indoor environment to changes in student health, behavior, and performance. Estimating the degree to which absenteeism might be reduced by a given investment in high-performance design is unknown.

➤ **Financial incentive and technical assistance programs**

**Financial and technical assistance is currently available** to districts and designers in creating high-performance schools. Use the resource list at the end of this section to help you find these programs.

➤ **Avoided costs and litigation risk**

Poor indoor environmental quality in schools can cause both short-term (reversible) and long-term (chronic) effects in students and staff. The costs associated with poor health, reduced learning effectiveness, and increased frustration when indoor environmental quality problems

become unmanageable are difficult to quantify. Conversely, the cost of strained budgets and staff resources expended by districts for facility repairs due to insufficient maintenance, community-relations damage control, litigation, and workers' compensation claims are more easily measured. In addressing such problems, schools must use resources that would otherwise be available for educational and other programs.

**To make high-performance design a reality, school districts need to focus on five key elements:**

➤ **Set goals.**

Develop your high-performance goals early. Incorporating high-performance goals into your educational specifications is an excellent way to clearly specify what you want and how it correlates with your educational and architectural programs.

➤ **Communicate goals to designers.**

Include these goals in the educational specifications and designer request for proposals to communicate early your design intentions.

➤ **Pursue integrated design.**

Insist on the development of an integrated design team to take full benefit of design options that affect all of the other building performance.

➤ **Monitor construction.**

Communicate goals to contractor, and be wary of substitutions or changes to the design during construction without consulting the designer.

➤ **Verify goals.**

Commission the building to prove that you are getting what you paid for, and that the building has been built as designed, and designed to your specifications.

## Green schools in Minnesota

**Westwood Elementary** is an example of a LEED-certified school with a growing population of students in the Twin Cities metro area. Westwood Elementary is the first LEED-certified school in Minnesota with construction of the building focusing on energy conservation and efficiency, water conservation and efficiency, site maximization, use of natural daylight, and student and community leadership in an ongoing effort to reduce the overall ecological footprint of the school. For further information, see Marie Norman, Principal, or go to www.westwood.elkriver.k12.mn.us/aboutourSchool/aboutourschool.htm

**Hassan Elementary School** in Rogers is part of the Elk River School District. This building is designed to be 51 percent more energy efficient than is required by Minnesota building code, and will have a projected $64,000 in costs savings from reduced energy consumption (based on energy costs in 2004 when the building was designed).

**The School of Environmental Studies** at the Minnesota Zoo is a charter school for juniors and seniors in high school within the Apple Valley, Eagan, and Rosemount school district in the southern metro area. There are approximately 200 students and 20 to 30 faculty and staff. SES was designed with water and energy efficiency in mind, as well as good indoor air quality. The school has been in operation for more than 10 years. This year will be a milestone—the school is installing a wind turbine to power the school sustainably. Contact Principal Dan Bodette for information about SES's site, structure, and operations, 952-431-8750, 12155 Johnny Cake Ridge Road Apple Valley, Minnesota 55124.

For more information on high-performance schools built within Minnesota, contact Laura Millberg, MPCA: 651-215-0219, Laura.Millberg@pca.state.mn.us

# Smart growth

Taken in part from: Council of Educational Facility Planners International. "Schools for Successful Communities: An Element of Smart Growth." Sept. 2004. Shawn Allee. Great Lakes Radio Consortium. "School Districts Encouraging Urban Sprawl," transcript. 2004. 212th Congress. State of New Jersey. A3529 Moriarty, Mayer. 2006. www.sustainableschools.dgs.ca.gov/SustainableSchools/sustainabledesign/siting/siting.html. The Division of the State Architect's Sustainable Schools Resource.

The U.S. Department of Education estimates that by 2030, the U.S. student population will reach or exceed 60 million, (according to National Center for Education Statistics, Baby Boom, 2000). Schools will need to be constructed or expanded to serve the growing need for quality educational facilities. "Where and how schools are built or rebuilt will profoundly affect the communities they serve. In making the decisions these projects demand, school boards, educational facility planners, and communities will have to meet many goals—educational, environmental, economic, social, and fiscal," (Council of Educational Facility Planners International, 2004).

Smart growth encompasses several principles to meet these goals, which include:

- **Mixing land uses:** Housing, shops, offices, schools, etc. in neighborhood. Close proximity to necessary goods and services decreases transportation costs.
- **Efficient and compact building design:** This decreases costs. Water, sewer, electricity, phone service, etc. are cheaper to provide and maintain when compared to more dispersed communities.
- **Investing in walk-able neighborhoods and transportation options:** Transportation options encourages daily physical activity, reduces air pollution and traffic. To encourage walking, mix land uses, build compactly, and ensure safe/inviting walkways.
- **Sense of place:** Development should consider a community's history, culture, economy, and geography for defined neighborhoods. Preservation of buildings which are assets over time should be encouraged.
- **Redevelopment:** Existing infrastructure, stronger tax bases, greater range of jobs/services, and reduced fringe development are all benefits.
- **Predictable, fair, and cost-effective development decisions:** Government creates attractive investment climate for private sector, as well as funding structure that is adequate for densely populated neighborhoods with smaller schools.
- **Encouragement of community and stakeholder collaboration:** This involves obtaining input from residents, parents, businesses, and others early and often in development process.

Specific advantages of including school facility planning into smart growth strategies include an increased sense of community; decreased use of transportation (and the economic, environmental, social costs associated with it); decreased allocation of funds to infrastructure costs; a strong local economy; and strong sense of place. Incorporate smart growth concepts very early on in design and planning meetings. Take site selection into account when in the planning and design process.

# Site planning

Site planning is much more than choosing a site and the orientation of the building on the property. Site planning for a healthy sustainable school is highly dynamic and should be given great consideration. School development should be avoided on property that has been repurposed from industrial use, hazardous material storage or use, or where there is suspected environmental contamination. Greenfield (undeveloped land) use should be avoided as much as possible. Protection of topsoil, soil erosion, and minimizing particulate matter in air should be considered as well.

Other concepts to consider during site planning include transportation for students and employees (including alternative forms of transportation); impacts to green spaces; stormwater management (during and post construction); decreasing water runoff (during and post construction); decreasing impervious surfaces; decreasing "heat island" effect; optimization of daylighting, natural ventilation, as well as passive solar heating; and consideration for endangered species and wetlands.

The benefits to the school and the community are strong connections between the school and surrounding area, student and parent engagement, decreased environmental degradation, decreased transportation and infrastructure costs, reduction of urban sprawl, and decreased operating costs.

## Planning for healthy sustainable schools

There are many factors to consider when planning for construction or renovation of a school. The Minnesota Department of Education has a detailed guide for planning school construction projects, including information regarding state and local laws which must be followed.

The following is a list of factors that are a priority for planning a healthy sustainable school.

- Educational programs and services, environmental education.
- Student and community demographics in short and long term.
- Site size and location: The site will have a strong impact on the environment, energy consumption, and indoor environmental quality.
- Avoiding development on sites that were once used for industrial, storage, or high hazard purposes (unless cleanup of site is feasible).
- Partnering with local businesses and groups: For example, building school by YMCA to share facilities.
- Cost analysis of:
  - Renovation when compared to new construction.
  - Life-cycle costing for building components.
  - Reuse of site or structures.
- Local planning and zoning policies.
- Economic impacts.
- Environmental health, human health, safety, and sustainability.

## Case study: John A. Johnson Achievement Plus Elementary

Type of Project: Public/education

Buildingpsize: 75,000 renovation/15,000 addition

Location: St. Paul, Minnesota

Cost: $21 million

Completed: September 2000

Johnson Elementary, a former high school built in 1911, was renovated beginning in 2000 to serve the East Side neighborhood as a K-6 school for 300+ students. The school has a family resource center, parenting classes, housing and job referrals, child care, before and after school activities, public access to phones and computers, as well as health and dental services. Inside the school, the design incorporates energy efficiency and indoor environmental quality through the use of light sensors, daylighting and natural ventilation (operable windows), and no- or low-VOC finishes. Furthermore, the location of the school is within walking distance for students, a small percentage of the student population rides the bus to school.

The site is co-located with a YMCA. This partnership has saved the county a substantial amount of money by providing social services through shared programs such as the teen center, swimming lessons, use of the track, and health and special education classes. Restoration of the school and co-locating with the YMCA invigorated the neighborhood and encouraged other redevelopment projects.

# Resources for sustainable design

**Minnesota Sustainable Building Guidelines** are designed to document the actual costs and benefits of sustainable school building into five categories: performance management, site and water, energy and atmosphere, indoor environmental quality, and materials and waste. (Use of the Minnesota Sustainable Building Guidelines is now required for all new buildings that receive financing from state bond fund proceeds.) The Minnesota Sustainable Design Guide assists educators, administrators, architects, and contractors in the design and planning of a high-performance building.
www.msdg.umn.edu

**Sustainable Schools Minnesota: High-Performance Schools for Higher Performing Students**. Prepared as a result of a 2000 project with involvement from LHB Engineers and Architects, Factor 10, LLC, Intep/AW Consulting, and Elk River Area School District–ISD 728 with funding from the Office of Environmental Assistance (now part of the MPCA). This free 56-page document is aimed at school board members and other decision-makers involved in the design, construction, and management of schools, and aims to help them with pre-design decisions that can lead to higher performing schools and students. Free copies of the report are available from the MPCA's Learning Resource Center at 651-215-0232 or 800-877-6300, or download from:
www.pca.state.mn.us/oea/ee/highperformance.cfm

**Collaborative for High-Performance Schools**. This California collaborative was formed to facilitate the design of high-performance schools. CHPS has developed a comprehensive best practices manual, with separate volumes for planning, design, and criteria to be designated a CHPS school. Material specifications, including Section 01350 indoor air quality standards, are posted for free download.
www.chps.net/manual/index.htm

**Blueprint for a Green School**, (Jayni Chase, Scholastic, Inc., 1995). This book covers several green building components in schools, such as water and energy conservation, waste reduction and recycling, indoor air quality, and sustainable gardening. A useful resource for projects in existing school buildings. Also provides a thorough guide to environmental education materials for teachers. Order from Scholastic, Inc., 800-325-6149, ISBN 0-590-49830-4 ($26).

**High-Performance School Design online training.** Interactive courses on this site are offered free of charge as a public benefit for design and engineering professionals specializing in sustainable design for K-12 schools.
www.hpschooldesigntraining.com/nyserda/home.jsp

**The U.S. Green Building Council** (USGBC) is the nation's foremost coalition of leaders from every sector of the building industry working to promote buildings that are environmentally responsible, profitable, and healthy places to live and work. More than 6,000 member organizations work together to develop a variety of programs and services, and forge strategic alliances with key industry and research organizations and federal, state, and local government agencies. As of September 2006, they are reviewing new guidelines for schools. Go to their website and search "schools."
www.usgbc.org/DisplayPage.aspx?CMSPageID=1586

**National Clearinghouse for Educational Facilities High-Performance School Resource List**. NCEF's resource list of documents, reports, links, books, and journal articles exploring high-performance schools, including sustainability and green design issues, cost and funding concerns, and educational and community benefits.
www.edfacilities.org/rl/high_performance.cfm

**The Costs and Financial Benefits of Green Buildings**, California Integrated Waste Management Board, Sacramento, October 2003, (pdf, 120pp)
www.ciwmb.ca.gov/greenbuilding/design/costbenefit/report.pdf

# Notes

# Energy conservation

Sources: U.S. Department of Energy, Rebuild America EnergySmart Schools: www.rebuild.org/attachments/SolutionCenter/ASBOFinancial(1).pdf and National Best Practices Manual (except where otherwise indicated).

**An enormous opportunity exists to substantially improve the quality of existing schools and those yet to be built by incorporating energy-saving measures and smart practices into school design and construction.** The 118,000 public and private K-12 schools in the nation are spending about $6 billion annually on energy costs—much more than they need to. That money could be used to hire 30,000 new teachers or purchase 40 million new textbooks each year.

Rebuild America EnergySmart Schools has introduced energy-saving measures in 174 million square feet of school buildings, resulting in annual savings of more than $72 million.

## Energy-saving tips for schools

Source: The Alliance to Save Energy: www.ase.org/content/article/detail/625

Current energy modeling indicates school districts could save up to 50 percent in energy costs by incorporating energy-saving measures—daylighting, energy controls, and upgrades in electrical lighting, HVAC systems, and the building envelope—into the design and renovation of school buildings.

➤ **Electric lighting and daylighting**. Properly designed systems can substantially reduce the need for electric lighting, which can account for 35 percent of a school's electrical energy consumption. As an added benefit, waste heat from the lighting system is reduced, lowering demands on the school's cooling equipment. Daylighting provides these savings during the day when electricity rates are at their highest.

- Turn off lights when not in use. Have students make signs and stickers to remind people to turn off the lights when they leave a room. Put light switches where people can find and operate them.
- Remove unneeded light fixtures near windows, especially in unused corners or along banks of windows.
- Use energy-efficient compact fluorescent light bulbs (CFLs) and light-emitting diode (LED) bulbs.

➤ **The HVAC system** is one of the largest energy consumers in a school. It's expensive to heat and cool school buildings, but indoor temperatures must be comfortable so teachers can concentrate on teaching and kids can concentrate on learning. Even modest improvements in system efficiency can represent relatively large savings to a school's operating budget. You can save on energy costs without sacrificing comfort.

- Consider setting thermostats at 68 degrees for heating and 78 degrees for cooling.
- Using fans can make people feel degrees cooler, at much less cost than air conditioning.
- 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.
- Do not block the airflow around vents. Keep bookcases and other bulky items away from the heating and cooling units so they do not block and/or absorb the warm (or cool) air that should be coming into the room.
- Install programmable thermostats in areas like the cafeteria to minimize operating hours of the heating and cooling systems during low-occupancy periods.
- Turn down heat in the hallways, and keep classroom doors closed. Otherwise, the heat runs down the hall and outside—where it is wasted to the outdoors.
- Clean furnace filters regularly.
- Stop leaks to avoid infiltration in conditioned spaces.
- Work with facility staff to install permanent weather stripping, caulking, and insulation.

➤ **Renewable energy systems**. The nation's energy needs are expected to grow by 33 percent during the next 20 years. Renewable energy sources not only release fewer pollutants into the environment than traditional energy sources, but they save school districts money in the long term while also serving as valuable teaching tools for students and faculty. Ground source heat pumps can provide a 20 percent to 50 percent energy cost savings over traditional heating and cooling systems.

➤ **Computers, equipment, and appliances** use a significant amount of electricity.

- If your school computers have power-management features, make sure controls are set so they will go into the sleep mode when not in active use.
- Students should turn off monitors that will not be used for the next class period. All computer equipment should be turned off at the end of the day and on weekends, unless your network technicians specifically instruct otherwise.
- Save on energy costs by using Energy Star computers, monitors, printers, fax machines, copiers, and other equipment.
- Maintain appliances and replace old appliances.
- Clean refrigerator coils regularly.
- Restrict the use of personal refrigerators, heaters, and other appliances in classrooms and offices.

➤ **Involve the school district**. See if your district administrators would be willing to return a percentage of the dollars saved from your school's no-cost energy-efficiency changes.

## Snapshots of schools

➤ **Lighting:** The Broward County School District in Florida replaced 40-watt incandescent light bulbs in their exit signs with 3-watt LED bulbs, saving $22.68 per bulb per year, resulting in annual savings of $100,000.

➤ **Retrofitting:** Ohio's Springfield Local School District retrofitted 521,000 square feet of school building space and reduced its energy costs by 25 percent, saving the district $234,000 each year.

➤ **Air quality:** Wausau West High School in Wisconsin uses 100 percent outdoor air for heating and cooling, which has improved the school's indoor air quality and cut the school's natural gas costs in half, saving $100,000 annually.

➤ **Integrated design:** The Dalles School in Oregon, which opened in September 2002, was designed to use 50 percent less energy than traditionally built schools. The 97,000 square-foot school incorporates geothermal heating and cooling with a heat-recovery system, an adjustable fresh air ventilation system, and natural lighting. The use of horizontal sunscreens, light shelves and sensors, combined with solar tubes in each classroom, add up to substantial energy savings.

➤ **An example from Minnesota:** "Prior to benchmarking the energy performance of our buildings at ISD 622, we had no idea where to start. Benchmarking the 19 buildings gave us a clear indication of where to first focus our attention. After about one year of work concentrating on our least performing buildings, one of those buildings yielded 31 percent energy savings! Our best performing building maintained its excellent performance without our having to divert additional resources. Overall, our average improvement was 11 percent, made possible by focusing our efforts on the buildings with the greatest opportunities for cost-effective energy savings. In 2005, the school district's energy cost avoidance is a quarter of a million dollars."—Laurie Hawkins, Safety and Energy Efficiency Coordinator for North St. Paul, Maplewood, and Oakdale Schools, Independent School District 622.

# Elements of a successful energy program

Source: Minnesota Department of Commerce, State Energy Office

Even the simplest program designed to save energy can be effective. Often it's only a matter of getting people to change wasteful habits. Getting your school district to start saving energy and money may be as simple as putting in writing a few logical energy guidelines.

- ➤ Establish an energy-tracking system and appoint a person to maintain it.
- ➤ Benchmark past energy performance of all buildings. (Minnesota Buildings, Benchmarks, and Beyond is available at no charge to all public schools. Contact Darin Aguilar, The Weidt Group, 952- 938-1588, dka@twgi.com. )
- ➤ Track monthly and yearly energy and electrical power demand and provide monthly reports.
- ➤ Build school board and top-level administrative support and develop a supporting policy.
- ➤ Provide training for maintenance and operations staff.
- ➤ Integrate energy education with energy management.

# Energy resources

**Minnesota Department of Commerce State Energy Office**, Bruce Nelson, phone: 651-297-2313, fax: 651-297-7891, e-mail: Bruce.Nelson@state.mn.us

**Energy Star for K-12 School Districts,** The U.S. Environmental Protection Agency's website to aid schools with energy issues, includes curriculum and funding sources.
www.energystar.gov/index.cfm?c=k12_schools.bus_schoolsk12

**Energy Performance Benchmarking Tool,** Energy Star Buildings, U.S. Environmental Protection Agency. The free, online tool is password protected, and rates schools on a scale of 1 to 100. Schools that score a 75 or over and meet indoor environmental criteria earn the Energy Star label and a plaque to display on top-performing buildings.
www.energystar.gov/benchmark

**Schools for Energy Efficiency (SEE).** SEE is a self-implemented program in which each district works at its own pace initiating the SEE systemized plan of operational and behavioral energy-efficient strategies. Since the program was introduced in 2003, participating Minnesota school districts have saved an average of 11 percent on their total annual energy use. This equates to over $2 million in avoided energy costs. SEE is currently active in 250 schools within Minnesota's 14 school districts. Schools for Energy Efficiency, Hallberg Engineering, Inc., 1750 Commerce Court, White Bear Lake, MN 55110, 651-748-1100, fax: 651-748-9370, SEE Program Manager, Sheri Rosenthal.
www.seeprograms.com/overview.htm

**School Building Survey**, The Need Project, 2001 (pdf, 3pp). A basic survey to identify potential weaknesses in your school's current energy program.
www.eia.doe.gov/kids/classactivities/SchoolSurveySecondary.pdf

**Alliance to Save Energy—Green Schools Program.** Engages students in creating energy-saving activities in their schools, using hands-on, real-world projects. Through basic changes in operations, maintenance, and individual behavior, Green Schools has achieved reductions in energy use of 5 to 15 percent among participating schools.
Curriculum: www.ase.org/section/program/greenschl
School Operations and Maintenance: Best Practices for Controlling Energy Costs (pdf, 132pp):
www.ase.org/uploaded_files/greenschools/School%20Energy%20Guidebook_9-04.pdf

**Energy Savings in School Buildings,** National Clearinghouse for Educational Facilities. Includes extensive resource list.
www.edfacilities.org/rl/energy.cfm#10126

# Notes

# Water conservation

**The world's supply of fresh water is limited. As the demand for water continues to grow, water conservation will be vital to maintaining fresh water supplies.** Schools use a tremendous amount of water every day, and require water for their heating and cooling systems, restrooms, drinking and water faucets, locker rooms, cafeteria, laboratories, and outdoor playing fields and lawns.

**The world's supply of fresh water is limited.** Only about 3 percent of the world's water is fresh water—and of that 3 percent is located in ice caps.

## What your school can do?

➤ **Conserve water indoors**

- Don't let water run. For example, when washing hands, water is only needed to wet hands, and then rinse them off.
- Report leaks to maintenance staff immediately.
- Purchase efficient faucets and toilets when it is time to replace old models; newer models that use less water will cost less over the life of the fixture.
- Install timed or motion sensor faucets that will turn off automatically when not in use.
- Use toilet dams. In schools with toilet tanks, put toilet dams inside the tank to take up space that would otherwise be filled with water.
- Install aerators. These devices go inside faucets to reduce water flow and keep water pressure feeling strong.
- Use low-flow shower heads and timer shut-off devices to reduce water use during showers in locker rooms.

➤ **Conserve water outdoors**

- Maximize natural cover, and limit the amount of lawn area in landscaping designs.
- Consider planting more trees, shrubs, and ground covers—and less grass. These plants usually demand less water. Native species are particularly suited for this, as they have adapted to rainfall conditions.
- When mowing lawn and field areas, set the mower blades higher by two to three inches. Longer grass shades the soil, improves moisture retention, and grows thicker.
- Only water when necessary. Usually once a week will be enough, if rainfall is not sufficient. Water in the morning or evening to reduce evaporation.
- Do not over water. Put down no more than one inch to encourage deep grass roots. If an automatic irrigation system is used, make sure that it is properly installed and programmed to deliver the appropriate amount of water as well as to have rain shut-off capabilities.
- Apply mulch around trees, beds, and shrubs to control weeds, reduce evaporation, and promote plant growth.
- Add compost or other organic matter to the soil if necessary. This will help soil retain water so that schools will not have to water as frequently.

Adapted from the following sources: Natural Resources Defense Council's Green Squad and www.epa.gov
"Water Conservation Tips for Schools" U.S. EPA. www.epa.gov/region1/eco/drinkwater/water_conservation_schools.html
Fact Sheet: Schools and Water Efficiency. Natural Resource Defense Council's Green Squad

# Water resources

**Water Efficiency**. U.S. EPA's website on water efficiency with resources, tips, and tools, including free WAVE Water Management software.
www.epa.gov/owm/water-efficiency/

**Water Conservation Checklist**. The North Carolina Division of Pollution Prevention and Environmental Assistance created this useful, three-page checklist to help schools identify both immediate and long-term ways to reduce water consumption.
www.p2pays.org/search/pdfframe.asp?pdfurl=/ref/23/22009.pdf

**Slowing the Flow**. American School and University, vol. 76, nr.10, p. 38, 40-42, May 2004, Mike Kennedy. Describes water-saving fixtures for restrooms, including waterless urinals, dual-flush toilets, no-touch hand washers/dryers, and "graywater" toilets.
www.asumag.com/mag/university_slowing_flow/

**Water Conservation in Schools Resource List**. National Clearinghouse for Educational Facilities' complete list of water conservation resources.
www.edfacilities.org/rl/water.cfm#9674

## Funding

**Water Conservation Funding Opportunities**, Greening Schools.
www.greeningschools.org/resources/funding_opportunities.cfm

## Curriculum

**Water Pollution Prevention and Conservation**, U.S. EPA. This lesson plan provides guidance and activities to help teachers meet the following goals: describe water uses and sources, explain why water conservation is important, and explain how pollution prevention can be used to conserve water and prevent water pollution.
www.epa.gov/reg5rcra/wptdiv/p2pages/water.pdf

**Project WET**, Water Education for Teachers. Project WET activities engage students with hands-on, interdisciplinary lessons that teach important concepts about water.
www.projectwet.org

**Resources for Water Conservation and Purification**, EcoSchool Design. Scroll down to find a variety of educational tools.
www.ecoschools.com

**Water—Use It Wisely**. This site offers many engaging tools to teach students about water conservation, including online games.
www.wateruseitwisely.com/toolsLinks

# Green cleaning

Schools that clean well and disinfect surfaces have fewer problems with pests and the spread of germs. However, many of the products that are purchased for cleaning school buildings contain hazardous chemicals that pose a potential threat to human health and our environment.

Products that contain toxic chemicals include bleaches, bathroom cleaner and disinfectants, drain cleaners, paint strippers, adhesives, floor cleaners, window cleaners, and all-purpose and ammonia-based cleaners. In fact, toxic chemicals in cleaners are one of the main sources of indoor air pollution and can impact the health, comfort, well-being, and productivity of students, teachers, and staff. Damage to human health can include reproductive and developmental disorders, premature death, cancer, nervous system damage, damage to the kidney or other internal organs, birth defects, and hyperactivity in children. Aside from health impacts, millions of tons of cleaning products are washed down the drain every month, which can have adverse effects on the natural environment.

Cleaning supplies that are biodegradable and nontoxic reduce negative health and environmental impacts. "Green" cleaning products tend to not have chemicals such as phosphates or bleach in them. This reduces the overall impact cleaning chemicals have on the environment, once they have been used.

Minnesota Statute § 16B.122: "A public entity shall apply and promote the preferred waste management practices listed in Section 115A with special emphasis on reduction of the quantity and toxicity of materials in waste."

Source: Reprinted with permission from American School and University Magazine (asumag.com), Oct 1, 2003, Stephen P. Ashkin

## Creating a green cleaning program

- ➤ Analyze current products and practices.
- ➤ Secure full support and input from all levels of custodial personnel.
- ➤ Train and educate staff on proper storage, mixing, and use of products. Arrange for product vendors to train staff on efficient cleaning methods for using new products. Emphasize safety—remind staff that mixing products at higher concentrations is not more effective, just wasteful and potentially hazardous.
- ➤ Provide mixing stations in several locations to reduce product waste and encourage proper dilution.
- ➤ Set criteria and purchase cleaning products with the following characteristics (based on Green Seal standards):
  - available in concentrated form
  - biodegradable
  - not in aerosol cans
  - contain no toxic ingredients (no carcinogens or hazardous wastes)/nontoxic to human or aquatic life
  - packaged in recyclable/reusable container (minimal waste)
  - not petroleum-based; do not contain petrochemical compounds
  - produce minimal or no irritation to skin, eyes, or respiratory system (volatile organic compound levels less than 10 percent by weight when diluted for use)
  - avoid unnecessary dyes and fragrances
  - not corrosive or highly flammable
  - have a pH level between 2.5 and 12[2]
  - work optimally in room temperature water

**Consider this...**

Each year, about six out of every hundred professional janitors are injured by the chemicals that they use.[1] (Lost time and medical claims costs average $4,350 annually per 100 custodians.)

- ➤ Look for recycled products with the following characteristics: Do not use de-inking solvents containing chlorine or other chemicals listed in the Emergency Preparedness and Community Right-to-Know Act; do not use (chlorine) bleach (such as for paper and tissue products); avoid unnecessary dyes, inks, or fragrances; contain highest post-consumer recycled content possible.
- ➤ Learn how to read and use Material Safety Data Sheets (MSDS); know their limitations (they may not contain all ingredient information that companies consider proprietary information.
- ➤ Eliminate combined cleaner/disinfectant products and use disinfectants only when and where necessary. This includes:
  - knowing what organisms the school is really trying to reduce/disinfect against. (Disinfectants are formulated to target certain organisms or combination of organisms. It is important to use the right product for the right place.)
  - knowing what surfaces do (or do not) need to be disinfected, and how often.
  - cleaning surfaces thoroughly before disinfecting. (Disinfectants can only be effective through contact. A layer of surface grime is likely to prevent sufficient contact.)
  - using proper disinfectant mixing and cleaning procedures. (This includes leaving disinfectants in place for the correct amount of time before wiping surfaces clean.)
- ➤ Ensure proper disposal of hazardous materials and their empty containers.
- ➤ Follow and set good examples. Provide public education signs so visitors are aware of the important things the school is doing.
- ➤ Monitor how the program is going, address concerns, and make adjustments or updates.
- ➤ Continuously search for ways to improve health, safety, effectiveness, and environmental responsibility.

1. Western Regional Pollution Prevention Network. Janitorial Products: Pollution Prevention Project. Jan 2002. www.wrppn.org/Janitorial/jp4.cfm
2. Based on recommendations made by the National Park Service, Pacific West Region. Green Janitorial Products and Practices.

## Green cleaning: Top 10 opportunities

Source: The Ashkin Group

Keeping your school clean doesn't simply mean buying the least-toxic products. It involves a comprehensive plan for preventing dirt and spills in the first place.

- ➤ Work from a written plan.
  - Practice pollution prevention/source control.
  - Plan for the unexpected—weather, absenteeism, spills.
  - Establish cleaning days, cleaning zones, cleaning stewardship, and communications.
- ➤ Use entryway systems at all entrances.
  - High-quality mats inside and out—10 to 12 feet.
  - Erect barriers to reduce walking on turf and encourage use of sidewalks.
  - Sweep outdoor walkways.
- ➤ Manage chemical storage areas.
  - Indicator of organizational controls, planning, and training.
  - Safety and security saves time.
- ➤ Use environmentally preferable products.
  - Cleaning products: Green Seal GS-37, low VOCs, bio-based.
  - Hand soaps—avoid antimicrobial soap.
  - Concentrate/bulk (less packaging).
  - Sustainable floor care systems, such as zinc-free floor finish.

➤ Use dispensing equipment.
- Improves product performance and safety.
- Reduce consumption 35 to 65 percent.
- Reduces costs.

➤ Use environmentally preferable supplies.
- Comprehensive procurement guidelines.
- Toilet paper and paper towels (large rolls and touch-free dispensers).
- Recycled content and chlorine-free bleaching.
- Recycled-content plastic bags and disposables.
- Non-chemical tools (i.e. micro-fiber cloths).

➤ Use quality cleaning equipment.
- Carpet and Rug Institute Green Label vacuums: filtration, suction, airflow, durability, ergonomics.
- Filters on floor equipment.
- Carpet extractors to dry carpets.

➤ Ventilate during and after cleaning.
- Keep a log.
- Write replacement dates on the filters.

➤ Practice integrated pest management.
- Control the environment through good cleaning (eliminate food and water).
- Eliminate clutter (nesting and hiding places).
- Prevent entry.
- Monitor.
- Use the least toxic pest control products.
- Notify occupants.

➤ Practice stewardship and shared responsibility.
- Keeping things clean is everyone's responsibility: occupants, visitors, and contractors.

The Ashkin Group, 812-332-7950, SteveAshkin@AshkinGroup.com, www.AshkinGroup.com

## Studies and research

Research conducted in Europe and the United States has shown the effects of the indoor environment on worker productivity and student performance.

### Improved air quality

In the early 1990s, a study by Michael Berry at the University of North Carolina's Frank Porter Graham Child Development Center pinpointed improvements to the indoor environment accomplished through cleaning in a non-problematic building. The study involved members of the cleaning industry and used deep-cleaning methods, new equipment, and cleaning supplies. The research indicated that by reducing contaminants, better health outcomes could be expected, and these benefits could be achieved by following sound cleaning practices.

- Airborne dust declined 52 percent.
- Total VOCs declined 49 percent.
- Total bacteria declined 40 percent.
- Total fungi declined 61 percent.

### Better test scores

Recently, Berry and another team of researchers studied the Charles Young Elementary School in Washington, D.C. , to determine if student performance could be improved by improving the indoor environment without changing teachers, curriculum, technologies, or other strategies that schools typically use. The school underwent a major renovation and changed cleaning methods in what had been an old and decaying school. The resulting improvements:

- Passing math scores on standardized tests increased by 51 percent.
- Passing reading scores on standardized tests increased by 27 percent.
- Attendance increased by 4.5 percent.

Better cleaning was not the only change at Charles Young; major renovations took place, and the improved indoor environment helped to boost teacher morale and retention.

### Better health

A study by Leonard Krilov that sought to measure how cleaning might affect health and attendance was published in the *Journal of Infection Control*. His research team looked at children in a childcare setting run by the Association for Children with Down Syndrome in Bellmore, New York. The research focused on how deep-cleaning strategies affected health indicators and attendance.

Their findings:

- Number of illnesses declined 24 percent.
- Number of doctor visits declined 34 percent.
- Number of courses of antibiotics declined 24 percent.
- School absences declined 46 percent.

### Increased productivity

Researcher and consultant Judith Heerwagen has been assessing the effects of the indoor environment on worker productivity. Evaluating numerous studies, Heerwagen found that improving the indoor environment has boosted productivity anywhere from 0.5 percent to 7 percent (about three to 34 minutes saved per day).

Thorough cleaning also can reduce absenteeism by eliminating many of the bacteria, viruses, and other causes of illness. In that scenario, schools might come closer to a 7 percent boost in productivity. Barry Moore of Opus Consulting found that in the Syracuse (New York) Public School District, attendance increased 11.17 percent after workers adopted an improved cleaning strategy. The attendance boost meant a $2.5 million increase in state funding for Syracuse.

## Green cleaning resources

**The Quick and Easy Guide to Green Cleaning in Schools.** Easy-to-use information and tools to help you implement a green cleaning program in your school. 888-HSC-1810
www.greencleanschools.org

**Environmentally Preferable Purchasing of Cleaners**, Minnesota Pollution Control Agency. Includes local success stories and information about the state purchasing contract:
www.pca.state.mn.us/oea/epp/cleaners.cfm
Also check out Procuring Green Cleaners
www.pca.state.mn.us/oea/epp/cleaners-mn.cfm

**School Cleaning and Maintenance Practices Resource List**, National Clearinghouse for Educational Facilities. Comprehensive resource list.
www.edfacilities.org/rl/cleaning.cfm#7440

**INFORM's Cleaning for Health: Products and Practices for a Safer Indoor Environment**. Describes product evaluation methods, lists products meeting INFORM's environmental and performance criteria, and presents model specifications. This report also provides manufacturer contacts and other resources on green cleaners.
www.informinc.org/cleanforhealth.php

**Center for a New American Dream** has information about the benefits of green cleaning, success stories, policy recommendations, product recommendations, and news stories about the green cleaning movement.
www.newdream.org/clean/

# Notes

# Environmentally preferable purchasing

Source: Solid Waste Management Coordinating Board's Environmentally Preferable Purchasing Guide. www.swmcb.org/EPPG/default.asp

**Every product you buy affects human health and the environment in many and often unintended ways.** The purchase and use of environmentally preferable products can have a profound impact—and not just on the environment. From worker safety to budget savings, wise purchasing has a number of additional tangible benefits:

- ➤ Purchasing less-hazardous products can reduce regulatory liability, improve worker safety, and lower disposal costs.
- ➤ Using energy-efficient and water-conserving products can save money.
- ➤ Products that are reusable, refillable, more durable, or repairable create less waste and are more cost-effective in the long run compared to disposable or single-use products.
- ➤ Purchasing recycled products keeps recycling programs going and saves natural resources.

Federal and state laws support or require environmentally preferable purchasing (EPP) by the public sector. Designed to show that government can lead by example, these laws help pave the way for more options in the marketplace for consumers and businesses. (Minnesota Statutes §§ 115A.48, Subd. 3 and 16B.121-122)

**What is environmentally preferable purchasing?**

Environmentally preferable goods and services are those that have a lesser or reduced effect on human health and the environment when specifically compared with other goods and services that serve the same purpose.

## Making environmentally preferable choices

In today's marketplace, it can be challenging to make purchasing decisions that avoid pitfalls and make the best overall sense. Even identifying options and alternatives is no easy task.

### Questions to ask before purchasing a product:

One challenge in buying wisely is knowing which questions to ask. Depending on which product you are buying, all or only a few of the following questions will apply.

- ➤ Is the product less hazardous?
- ➤ Is it reusable or more durable?
- ➤ Is it made from recycled materials? Do we really need to buy a virgin product when the recycled version is just as good?
- ➤ What happens to the product at the end of its life? Can it be recycled? Will the manufacturer take the product back? Will it need special disposal?
- ➤ Does it conserve energy or water?
- ➤ Is it made from plant-based raw materials?

### Environmentally Preferable Purchasing Guide

The Solid Waste Management Coordinating Board's Environmentally Preferable Purchasing Guide is a very useful tool for schools wanting to begin an EPP program. Go to www.swmcb.org/EPPG/ to view the guide in its entirety.

The guide is a reference tool for government and school purchasers who want to buy more wisely. It will help you find ways to reduce workplace hazards, consume less energy, and protect natural resources. In each category, the guide surveys the latest field information and provides details on cost, performance, and vendors. And with extensive up-to-date lists of resources and contacts, additional help is readily available.

**Use the guide to help you:**

➤ Identify ways to reduce waste in the school.

➤ Write environmental specifications into your bid solicitations.

➤ Locate surplus and reuse programs to obtain low-cost or used equipment and supplies.

➤ Tap into websites and other resources related to environmentally preferable purchasing.

➤ Choose more environmentally preferable products in over 30 categories. Sections 4 through 10 of the guide discuss specific products and services commonly purchased by government and schools. To help you make an informed purchasing decision, the following topics are addressed for each product or service:

- general product background
- related environmental and health issues
- applicable laws and guidelines
- history of performance
- cost considerations
- product vendors
- sample specifications
- additional resources and websites

The guide uses symbols to help you quickly identify the environmental and health issues related to a particular product. These symbols also help identify the advantages that environmentally preferable products offer compared to similar products.

➤ **Less hazardous**

Products containing hazardous chemicals can pose health risks to employees and the public, as well as threaten the environment. In addition, hazardous products often require special and costly waste disposal methods. Buy products that are labeled with none of the following signal words or those with the lowest level of hazard possible.

- Caution: mild to moderate hazard
- Warning: moderate hazard
- Danger: corrosive, extremely flammable, or highly toxic
- Poison: highly toxic

➤ **Conserves energy**

Reducing energy use is important because most energy production contributes to problems such as carbon dioxide emissions (tied to global warming), mercury releases, acid rain, volatile organic compounds, and nuclear waste. The U.S. Environmental Protection Agency and U.S. Department of Energy developed the Energy Star label to help purchasers identify energy-efficient products. These products reduce utility bills and help the environment.

➤ **Recycled content**

Recycled-content products save energy and resources, while also keeping waste out of landfills and incinerators. Recycled-content products can be made with post-consumer content, pre-consumer content, or a mix of both. Products made with post-consumer recycled content support our recycling programs. If people do not buy products with post-consumer recycled content, manufacturers will no longer want the paper, cans, glass, or plastic we separate from trash. Pre-consumer content comes primarily from manufacturer scrap, and as such does not directly support such recycling efforts.

➤ **Prevents waste**

Minnesota generates over 5 million tons of municipal solid waste every year. Much of this waste comes from disposable and over-packaged products. Preventing waste can conserve natural resources and avoid the need to build new, expensive waste disposal facilities. To prevent waste:

- Reduce the amount of material you buy to accomplish any task.
- Reuse a product in its original form.
- Use repairable, refillable, or durable products.

➤ **Low volatile organic compounds (VOCs)**

VOCs evaporate (volatilize) easily at room temperature and often have a sharp smell. They are contained in many products, such as office equipment, adhesives, carpeting, upholstery, manufactured wood products, paints, solvents, pesticides, and cleaning products. Some VOCs can cause cancer in certain situations, especially when they are concentrated indoors. When VOCs hit sunlight, they create ozone, an air pollutant harmful to both people and plants. Many low-VOC versions of products reduce risks to human health and the environment.

➤ **Conserves water**

Less than 1 percent of the Earth's water is available for human consumption. There is no "new" water on Earth. Choosing products and services that conserve water, such as automatic flushers and low-flow faucets and toilets, can conserve this vital resource while reducing water and sewer bills.

➤ **End-of-life management**

What happens to a product after we use it? Some materials cannot go in the trash because they are hazardous in some way and therefore need separate—and sometimes expensive—special management. Some products are more easily recycled than others that do the same job. Making wiser buying choices can prevent a disposal concern at the end of a product's useful life, keep hazardous materials out of the environment, and expand options for recycling and reuse.

# Environmentally preferable purchasing resources

**Minnesota Recycled Products Directory**. The Minnesota Pollution Control Agency provides this searchable directory of recycled-content products made in Minnesota. Find everything from absorbents, bags, and chemicals to printing paper, recycling containers, and signage.
www.pca.state.mn.us/rpdir
Their general EPP website:
www.pca.state.mn.us/epp

**Cooperative Purchasing Venture**. A members-only program for public entities that enables parties to purchase goods and services at discounted prices under contracts established by the state of Minnesota. CPV has the potential to save money, while also offering many environmentally preferable products. All state agencies are required to buy off state contracts. Contact Sherry Brown, 651-201-2404
www.mmd.admin.state.mn.us/cpv2.htm

**Buy Clean: Helping Schools Create a Better Indoor Environment for Learning,** U.S. EPA. This site is designed for those who buy or use products in schools, but it also has lots of information on other school and non-school related environmental issues. It provides information on the Buy Clean program as well as links to other related programs, websites, and tools that can be used to create a healthy indoor environment for children in schools. For example, if you are a chemistry or science teacher, check out the many websites on green chemistry under "Related Programs–Green Chemistry" and "EPP Resources–Chemistry." These sites can help you design experiments that are educational as well as have lower environmental impacts. For procurement staff, there are many sources of how others have developed procurement language for green products, look under EPP for many general and specific examples.
www.epa.gov/oppt/library/pubs/archive/buy_clean/

**Green Seal**. Green Seal is an independent, nonprofit organization that strives to achieve a healthier and cleaner environment by identifying and promoting products and services that cause less toxic pollution and waste, conserve resources and habitats, and minimize global warming and ozone depletion. Use their site to find certified electric chillers, cleaners, fleet vehicles, maintenance products, floor-care products, paints, papers, windows, and doors.
www.greenseal.org

## Curriculum

**Buy Recycled**. Recycling Association of Minnesota's guide to purchasing recycled products for Minnesota's middle and high school students.
www.recycleminnesota.org

**I Buy Different**. World Wildlife Fund and Center for New American Dream youth website to educate teens about how their purchasing impacts the environment. They have developed a variety of tools and materials to help teens learn about the connections and take actions that make a difference. Along with all the other information on the website, you'll find a Community Action Guide with 30 activity ideas and some step-by-step advice on organizing projects to make a difference in your community. The Buy Different Action Center provides you with an opportunity to register and find out exactly how many resources you save when you take four simple actions. You can also create a team to see your total impact, or find out the global impact for everyone registering their actions.
www.ibuydifferent.org

**Good Stuff: A Behind the Scenes Look at the Things We Buy**. Created by the Worldwatch Institute, this guide explores categories like appliances, cars, fast food, meat, soap, and more. You can print the entire guide or simple fact sheets about the products you're interested in.
www.worldwatch.org/pubs/goodstuff/



# Reduce, reuse, recycle

Source: Consumer Handbook for Reducing Waste. www.pca.state.mn.us/oea/reduce/handbook.cfm

**In one week, the average Minnesotan throws away more than 25 pounds of garbage.** The garbage generated in one year in Minnesota, if it were compacted into garbage trucks, would fill four lanes of trucks, bumper-to-bumper, stretching from Albert Lea to International Falls.

Our trash causes other problems, too. Some of it contains toxic materials that seep into our water supply or filter into the air we breathe. Some of it ends up as litter, destroying the natural beauty of rural areas and adding unsightly clutter in city neighborhoods. In addition, continuing to produce so many things that end up as trash uses up our natural resources at a faster and faster rate.

The good news is we can have a major impact on the amount of garbage produced by becoming aware of how much we throw out and changing some of our habits about buying and using things. The fact is, packaging amounts to about half of the garbage households discard every year. The things we buy and throw out—both packaging and products we don't or can't continue to use—have a significant impact on the environment. By making our purchasing decisions with an awareness of this impact, we can help to alleviate our nation's solid waste problem, reduce litter, slow the depletion of our natural resources, and avoid the cost and environmental concerns of building more facilities to manage the garbage.

## Tips for reducing waste

### First step: Reduce

Source reduction prevents waste from being created. It reduces the amount or toxicity of waste at the source. Source reduction actually prevents the generation of waste in the first place, therefore it is the most preferable method of waste management.

Source reduction includes purchasing durable, long-lasting goods (and making them last longer by repairing them when necessary), reusing products and packaging, and reducing the amount of packaging that is discarded. It is also seeking products and packaging that are as free of toxics as possible.

Try these three steps to reduce waste:

- ➤ Buy concentrates, returnables, economy-sized containers, or products in bulk.
- ➤ Select products with the least-wasteful packaging.
- ➤ Buy, maintain, and repair durable products.

### Second step: Reuse

Reusing items by repairing them, donating them to charity and community groups, or selling them also reduces waste. Reusing, when possible, is preferable to recycling because the item does not need to be reprocessed before it can be used again.

➤ Buy reusable products and avoid single-use items.

➤ Reuse bags, containers, paper, boxes, and other items.

### Third step: Recycle

All public entities, including schools, are mandated to recycle at least three types of materials (Minnesota Statute § 115A). However, it remains a challenge for schools to start and maintain this as a permanent operation.

Recycling uses waste to make new products. Common recyclable materials are glass, paper, aluminum, and steel. New technologies are making it possible to recycle other materials as well.

Recycling has become a standard practice among many Minnesotans, particularly as curbside pick-up programs have expanded to serve most communities. However, we must purchase recyclable products as well as recycled products.

Recyclables are commodities like any raw materials. If there is demand for recycled materials in manufacturing, their value will go up and the prices paid to recyclers will be higher. Keep that demand high by searching for and buying products made from recycled materials. In doing so, we help support the recycled materials market and guarantee the success of our recycling programs.

➤ Buy recyclable products and make sure to recycle them.

➤ Buy products made out of recycled materials.

## Steps for successful school recycling

Source: Pennsylvania Department of Environmental Protection

Whether you are a school administrator concerned about rising solid waste disposal costs, or a recycling-conscientious student, setting up or improving an existing school recycling program can create a learning experience for everyone involved. When setting up a program, concentrate on areas that produce significant amounts of recyclables. Turn to the city or county solid waste or environmental service staff first. (Refer to the *Recycling Guide for Minnesota Schools* for specific step-by-step help. See resources on next page.

➤ Obtain top-level support from the superintendent and school administration, involve the custodial staff from the beginning, and educate all participants in the program.

➤ Find a local market, drop-off center, recycling service company, or a waste hauler that offers recycling services.

➤ Evaluate which recyclables are generated in different locations of the school in order to determine the best recycling bin locations.

- Administrative offices—office/computer paper, cardboard, toner cartridges.
- Classrooms—mixed paper and, in some schools, bottles and cans.
- Cafeteria—cardboard, steel cans, aluminum cans, bottles, and plastics.
- Library—paper, magazines, books, and newspaper.
- Vending areas—aluminum, glass, and plastic containers.

➤ Make sure recycling bins are well marked to ensure they will receive the intended recyclable material. Consider restricted openings on lids to cut down on contamination by trash or other materials (slots for paper and round holes for bottles and cans). Locate the bins close to trash containers in order to make the choice to recycle easy.

- ➤ Work with your city or county solid waste or environmental service staff custodial staff to develop a collection system. Adding recyclables to a collection does not increase the amount of material generated. If not properly managed, recyclables may find their way back into the trash. The recycling program diverts recyclables from the waste stream, which should allow the school to reduce the size of waste collection dumpsters or frequency of pickups. By doing this, the school may save money. If recycling is implemented properly for every school in the district, the savings can be significant.
- ➤ Educate and re-educate on your recycling program using the school newspaper, posters, web page, e-mail, school handbook, and student orientation. Update students and staff on the progress of the recycling program in order to involve them in the program and to demonstrate their contribution to improving the environment.

## Reduce, Reuse, Recycle Resources

**A Recycling Guide for Minnesota Schools**. Minnesota Pollution Control Agency's step-by-step guide on getting organized, planning, and executing a permanent recycling program.
www.pca.state.mn.us/oea/ee/recyclingguide.cfm

Factsheets on office waste reduction, school waste reduction, the paper-less office, and other 3 Rs information.

www.reduce.org

**WasteWise**. The U.S. Environmental Protection Agency's program that offers free technical assistance services that help you design and implement waste reduction practices, 1-800-EPA-WISE (372-9473).
www.epa.gov/wastewise
You can also refer to the U.S. EPA's general Reduce, Reuse, Recycle website for helpful information and resources.
www.epa.gov/epaoswer/non-hw/muncpl/reduce.htm

**Reuse + Recycling = Waste Reduction: A Guide for Schools and Groups**. Another helpful tool geared directly at schools from the U.S. Environmental Protection Agency.
www.epa.gov/wastewise/

**Recycling Association of Minnesota**. This site provides information about why to recycle, what can be recycled in Minnesota, where to recycle, and educational materials. Ellen Telander, Executive Director, 651-641-4560, P.O. Box 14497, St. Paul, MN 55114, e-mail: ramrecycle@comcast.net
www.recycleminnesota.org

**Waste Reduction Strategies for Each Department within a School District**, California Integrated Waste Management Board.
www.ciwmb.ca.gov/Schools/WasteReduce/Strategies.htm

**School Waste Audit Form**
www.oregongreenschools.org/pdf/SchoolWasteSortForm.pdf

**Waste and Recycling Assessment**
www.dnr.state.wi.us/org/caer/ce/greenschools/pdf/auditWaste.pdf

### Funding

**The Waste-Free Lunchbox**, program and fundraiser.
www.wastefreelunches.org

### Curriculum

**Reduce, Reuse, Recycle: A Waste Reduction Activity Kit,** EcoCycle.
www.eco-cycle.org/schools/

**Trash 4 Kids,** Solid Waste Agency of Lake County. www.trash4kids.org/activities.html

# Notes

# Paper reduction

Source: www.reduce.org/paper/index.html#3Es and www.pca.state.mn.us/oea/p2week/gov-paper.cfm

Is your school using paper for most of its correspondence and educating? School budgets are decreasing. It makes economic and environmental sense for schools to reduce paper use and paper waste.

The cost of purchasing the paper is not the only cost associated with copying and printing. For each sheet of paper used, an organization incurs not only purchasing costs, but also costs for storage, copying, printing, postage, disposal, and recycling—and it adds up. A recent Minnesota study estimates that associated paper costs could be as much as 13 to 31 times the purchasing costs (not including labor).

Note, according to Minnesota Statute §115A.48, Subd. 3, "educational institutions shall aggressively pursue procurement practices which encourage solid waste reduction." For this reason, reduce paper use whenever possible and purchase recycled paper for printing, duplicating, and general office use. Over the full life cycle of paper products, recycling provides extensive and measurable environmental advantages compared to virgin paper.

## Tips for reducing paper use and waste

- ➤ Print on both sides.
- ➤ Use e-mail instead of faxes.
- ➤ Switch to electronic publication.
- ➤ Eliminate duplicates on mailing lists.
- ➤ Adjust fonts, margins, and spacing to fit more on page.
- ➤ Reuse paper printed on one side.
- ➤ Request printing, writing, and xerographic papers with a minimum of 30 percent post-consumer material. Since some recycled papers may cost more, use the savings from reduced paper use to offset any added cost. Currently, the price of 30 percent post-consumer paper is fairly cost competitive with virgin (around 15 cents more per ream). School districts are allowed to buy off state contract if they become a Cooperative Purchasing Venture Member ($500/year fee). Several school districts are already CPV members. www.mmd.admin.state.mn.us/cpv2.htm
- ➤ Look for recycled paper products that are chlorine-free.
- ➤ Use a print shop with the "Great Printer" designation for environmentally responsible printing.
- ➤ Offer direct deposit for your employees.
- ➤ Reuse student handouts whenever possible.
- ➤ For articles and reading material for students, print two pages per sheet and double side the copies.
- ➤ Use overheads and boards whenever possible.
- ➤ Have students take quizzes on scrap paper, or do them electronically.
- ➤ Preview documents before printing.
- ➤ Be sure your printers and copiers are set to default to "double-side" each page. Talk to the information technologist or copier service representative for more information on how to do so.

## Did you know?

In the United States...

- ➤ The average office worker uses 10,000 sheets of copy paper each year.
- ➤ The United States alone, which has less than 5 percent of the world's population, consumes 30 percent of the world's paper.
- ➤ Over 40 percent of wood pulp goes toward the production of paper.
- ➤ Printing and writing paper equals about one-half of U.S. paper production.
- ➤ The costs of using paper can run 13 to 31 times the cost of purchase.
- ➤ Even with recycling efforts, paper makes up over 25 percent of Minnesota's garbage—we're throwing away a lot of resources!

- Print only the pages you need. Most software programs provide this option under the print function.
- Use revision features in word processing software and teach students how to use these features as well.
- Keep copiers and printers in good repair. Let your copier maintenance person know when a copier is performing poorly (toner is low, jams frequently, etc.). This reduces jamming and waste.
- Eliminate unnecessary forms, or make them available electronically.

## Paper reduction resources

**Paper Reduction Toolkit.** The Minnesota Pollution Control Agency created a set of tools for you to use in creating and implementing a campaign to reduce office paper use in your organization. You will find resources that you can adapt to target waste and educate staff members.

- Fact sheets and fun facts
- A fun introductory movie: The E's of Office Paper Reduction
- Posters and clip art
- E-mail tips

The kit is available on a free CD/DVD set. To order, call 651-297-3955 or e-mail: madalyn.cioci@pca.state.mn.us.

# Food waste reduction

Food waste reduction eliminates or reduces waste before it is created—so there is less to recycle, compost, or otherwise throw away. This means school districts will spend less on disposal of waste. These added savings can be put back into educating students.

## Tips to reduce food waste in schools

➤ **Establish a baseline of purchasing, materials use, and waste generation patterns to identify waste prevention strategies, implement new strategies, and measure progress.**

➤ **Reduce portion size and allow students to take what they will eat.**

- Allow students to determine their own portion sizes by offering a salad bar or a buffet-style food service.
- Offer samples of food as a grocery store would do to encourage students trying new and healthy food.
- Post signage to remind students to take only what they will eat.
- Educate students on importance of portion size and nutrition in curriculum.

➤ **Encourage students to pack a no-waste lunch.**

- Schools can encourage students to bring their lunches in reusable containers and boxes instead of disposable containers.
- Offer incentives to students for bringing lunch packed in reusable containers.

➤ **Provide a food exchange table.**

- A food exchange table is a centrally located table in the lunchroom where students and staff can place their untouched and unopened food items for others to enjoy. This can save a great deal of waste.

➤ **Donate food that is still considered safe to serve by FDA standards to a local food shelf.**

➤ **Use reusable tableware that can be washed in a dishwasher.**

- Use washable dining trays, mugs, utensils, plastic glasses instead of disposable ones.
- Use a beverage dispenser with reusable glasses.
- Use cloth napkins versus paper.
- If cloth napkins are not an option, encourage students to take one napkin at a time by putting paper napkins in dispensers instead of placing them in piles.

➤ **Eliminate individual packaging and purchase in bulk to cut down on packaging of food.**

- Purchase condiments, sweeteners, salt, pepper, and milk in bulk. Use dispensers instead of individually packaged servings.
- Purchase in bulk when possible (for example, milk, flour, and rice).
- Use reusable shipping containers, especially for frequent deliveries from nearby vendors.

➤ **Work with vendors to find opportunities to prevent waste.**

- Incorporate waste prevention stipulations into purchasing contracts.

➤ **Educate and coordinate.**

- Meet with students to educate them on ways to reduce food waste and its importance, brainstorm new innovative methods for reducing waste.
- Educate food service staff to avoid overproduction and to distinguish between food that is servable, re-servable, or should be discarded.
- Form an environmental committee composed of food service staff, school administration, educators, students, and the maintenance/recycling manager.

- Publicize efforts and success stories of waste reduction strategies.
- Provide posters/flyers on waste prevention/reduction strategies in the cafeteria.
- Require new or renovated kitchens have facilities with dishwashers and storage for bulk goods.
- Send a flyer to parents informing them of waste reduction goals and how they can help when making lunches.
- Providing nutrition education will incline students to choose healthy options and eat the portions they take.

➤ **Other strategies**

- Schedule lunch times when students will be ready to eat.
- The U.S. Department of Agriculture offers several options, which allows for increased meal flexibility, so students do not over-eat and tend to finish their meals.
- Implement an "offer vs. serve" policy in cafeteria: Students choose which healthy items to take, while still meeting USDA School Lunch Program Guidelines.
- Promote the school lunch program and offer fewer a la carte and outside vendor options, which tends to be packaged in individual servings, which creates more waste, and competes with the school lunch program.

## Food waste reduction resources

**Food Wise Schools: Food Waste in School Elimination Handbook**, a guide that provides schools information on reducing cafeteria waste, reducing student food waste, and reducing food waste that is landfilled. This guide is the first of its kind and offers practical examples and hands-on activities for implementing food waste reduction projects or programs in Minnesota's schools.
www.eagle-bluff.org/FoodWISE.html

**State of California Integrated Waste Management Board**. Food waste reduction tips and ideas for cafeterias that will save resources and costs to the school cafeteria.
www.ciwmb.ca.gov/BizWaste/FactSheets/FoodSrvc.htm
This section of the site is designed to help school district food service providers reduce waste generation, practice pollution prevention, and conserve energy and other natural resources. Small changes to current operations can lead to large savings and can make the difference between long-term profit and loss.
www.ciwmb.ca.gov/Schools/WasteReduce/Food/

**Getting an "A" at Lunch** (pdf version). With information for schools on preventing food waste, reducing food/school lunch waste, and managing waste.
www.informinc.org/reportpdfs/wp/GettinganA.pdf

**Food waste reduction website** from the Institute for Local Self Reliance Waste to Wealth Program and includes a guide on how to reduce food waste.
www.ilsr.org/recycling/wrrs/food/food.html

# Composting

Composting is different from food waste reduction; it sustainably disposes of waste—rather than initially reducing consumption or reducing waste at the source. By composting, you can convert organic waste, schoolyard trimmings, leaves, and many kinds of kitchen scraps into a dark crumbly mixture, which can be used to improve the soil and reduce the school's use of fertilizer and water.

Composting involves separating organic, non-animal products from the general waste stream. In Minnesota, Independent School District 196 conducted a pilot program during the 2002-2003 school year. The project reduced the amount of waste that would have gone to landfills by more than 800 tons, saving the district money through reduced waste disposal costs. These savings could be put back into a local school and community. A great deal was learned about the practicality of continued education, enforcement, and implementation of such a program.

➤ Items that can be composted in schools:

- food scraps
- milk cartons
- paper bags
- grass clippings
- coffee grounds and filters
- eggshells
- house plants
- leaves
- nut shells
- sawdust
- shredded newspaper
- tea bags, wood chips
- wool and cotton rags
- other organic solid waste

If your school chooses to contract out through your waste management services to compost some refuse, check with your provider for a complete list of items that are acceptable. The ISD 196 final composting report discusses what items were able to be composted in the composting facility in their area.

➤ Items that should not be composted in schools:

- dairy products
- fats, grease, lard, and oil
- meat or meat scraps
- yard trimmings treated with chemicals or pesticides
- animal waste
- diseased or insect-ridden plants

# Composting resources

**Report from composting program in ISD 196** pilot program during the 2002-2003 school year. This includes methodology, results, recommendations, etc. This was a district-wide program funded by Dakota County, and had a fairly large initial impact on reducing the amount of waste that was landfilled.
www.swmcb.org/files/196FinalReport.pdf

**EPA web page** for healthy school resources with information on composting programs for schools.
www.cfpub.epa.gov/schools/top_sub.cfm?t_id=43&s_id=281




# Indoor air quality

Source: Minnesota Department of Health

**The air inside a building can be more polluted than the air outside.** In schools, this can be exacerbated when ventilation is poor and classrooms are full. A classroom holds more people than that of an office or home. Poor ventilation has the potential to cause contamination build-up from mold, dust, and fibers; radon and mercury gases; and fumes from paint, pesticides, cleaning products, or other products that off-gas volatile organic compounds (VOCs). When air quality is poor in schools, it may cause headaches, nosebleeds, dizziness, upset stomach, asthmatic attacks, as well as other symptoms. Children's developing lungs are more apt to be susceptible to respiratory problems due to poor indoor air quality (IAQ).

The federal government, as well as most state and local governments, do not have enforcement capabilities regarding indoor air quality in schools. But Minnesota has some specific requirements for IAQ coordinators (see Minnesota Statute § 123B.57). Every public school district is required to have an IAQ coordinator, and they are listed at the Minnesota Department of Health website, along with information about the progress schools are making. www.health.state.mn.us/divs/eh/indoorair/schools/progress.htm

Once you understand the basics that influence indoor air quality in a school, you will note that prevention and problem solving mainly involve two major actions—the management of pollutant sources and the use of ventilation to control pollutants. Following are the key principles:

- ➤ Many IAQ problems can be prevented by school staff and students.
- ➤ When IAQ problems happen, they can often be resolved using the skills of school staff.
- ➤ The expense and effort required to prevent most IAQ problems is much less than the expense and effort required to solve problems after they develop.

## Importance of indoor air quality

The U.S. Environmental Protection Agency's studies of human exposure to air pollutants indicate that indoor levels of pollutants may be 2 to 5 times—and occasionally more than 100 times—higher than outdoor levels. These levels of indoor air pollutants are of particular concern because most people spend about 90 percent of their time indoors. Comparative risk studies performed by the U.S. EPA and its science advisory board have consistently ranked indoor air pollution among the top four environmental risks to the public.

Failure to prevent indoor air problems, or failure to act promptly, can have consequences such as:

- ➤ Increasing the chances for long-term and short-term health problems for students and staff.
- ➤ Impacting the student learning environment, comfort, and attendance.

- ➤ Reducing productivity of teachers and staff due to discomfort, sickness, or absenteeism.
- ➤ Faster deterioration and reduced efficiency of the school physical plant and equipment.
- ➤ Increasing the chance that schools will have to be closed, or occupants temporarily moved.
- ➤ Straining relationships among school administration, parents, and staff.
- ➤ Creating negative publicity that could damage a school's or administration's image and effectiveness.
- ➤ Creating potential liability problems.

Indoor air problems can be subtle and do not always produce easily recognized impacts on health, well-being, or the physical plant. Children are especially susceptible to air pollution. For these reasons, air quality in schools is of particular concern. Proper maintenance of indoor air is more than a "quality" issue. It includes safety and good management of our investment in the students, staff, and facilities.

Good indoor air quality contributes to a favorable learning environment for students, productivity for teachers and staff, and a sense of comfort, health, and well-being for school occupants. These combine to assist a school in its core mission—educating children.

## Understanding IAQ problems and solutions

Over the past 40 or 50 years, exposure to indoor air pollutants has increased due to a variety of factors—the construction of more tightly sealed buildings; reduced ventilation rates to save energy; the use of synthetic building materials and furnishings; and the use of chemically formulated personal care products, pesticides, and housekeeping supplies. In addition, our activities and decisions, such as delaying maintenance to "save" money, can lead to problems from sources and ventilation. Four basic factors affect IAQ:

- ➤ sources of indoor air pollutants
- ➤ the heating, ventilation, and air-conditioning (HVAC) system
- ➤ pollutant pathways
- ➤ occupants

### Sources of indoor air pollutants

Indoor air contaminants can begin within the building or be drawn in from outdoors. If pollutant sources are not controlled, IAQ problems can occur, even if the HVAC system is working properly.

**Typical sources of indoor air pollutants**

| Outside sources | Building equipment | Component/furnishings | Other indoor sources |
|---|---|---|---|
| **Polluted outdoor air**<br>• Pollen, dust, fungal spores<br>• Industrial emissions<br>• Vehicle emissions<br>**Nearby sources**<br>• Loading docks<br>• Odors from dumpsters<br>• Unsanitary debris or building exhausts near outdoor air intakes<br>**Underground sources**<br>• Radon<br>• Pesticides<br>• Leakage from underground storage tanks | **HVAC equipment**<br>• Microbiological growth in drip pans, ductwork, coils, and humidifiers<br>• Improper venting of combustion products<br>• Dust or debris in ductwork<br>**Non-HVAC equipment**<br>• Emissions from office equipment (volatile organic compounds, ozone)<br>• Emissions from shops, labs, cleaning processes<br>• Vehicle emissions | **Components**<br>• Microbiological growth on soiled or water-damaged materials<br>• Dry traps that allow the passage of sewer gas<br>• Materials containing volatile organic compounds, inorganic compounds, or damaged asbestos<br>• Materials that produce particles (dust)<br>**Furnishings**<br>• Emissions from new furnishings and floorings<br>• Microbiological growth on or in soiled or water-damaged furnishings | • Science laboratories<br>• Vocational arts areas<br>• Copy/print areas<br>• Food preparation areas<br>• Smoking lounges<br>• Cleaning materials<br>• Emissions from trash<br>• Pesticides<br>• Odors and volatile organic compounds from paints, caulk, adhesives<br>• Occupants with communicable diseases<br>• Dry-ease markers and similar pens<br>• Insects and other pests<br>• Personal care products |

Air pollutants consist of numerous particles, fibers, mists, molds, bacteria, and gases. It may be helpful to think of air pollutant sources as fitting into one of the categories shown in the table.

In addition to the number of potential pollutants, indoor air pollutant levels can vary within the school building, or even a single classroom. Pollutants can also vary with time, such as only once each week when floor stripping is done, or continuously such as when fungi is growing in the HVAC system.

### HVAC system design and operation

The heating, ventilation, and air-conditioning (HVAC) system includes all heating, cooling, and ventilating equipment serving a school. A properly designed and functioning HVAC system:

- ➤ Controls temperature and humidity to provide thermal comfort.
- ➤ Distributes adequate amounts of outdoor air to meet ventilation needs of school occupants.
- ➤ Isolates and removes odors and pollutants through pressure control, filtration, and exhaust fans.

Not all HVAC systems are designed to do all of these things. Some buildings rely only on natural ventilation. Others lack cooling, and many have little or no humidity control.

### Pollutant pathways

Airflow patterns in buildings are caused by mechanical ventilation systems, human activity, and natural effects such as wind. Air pressure differences created by these forces move airborne pollutants from areas of higher pressure to areas of lower pressure through any available openings in building walls, ceilings, floors, doors, windows, and the HVAC system. An inflated balloon is an example of this driving force. As long as the opening to the balloon is kept shut, no air will flow, but when open, air will move from inside (area of higher pressure) to the outside (area of lower pressure). Even if the opening is small, air will move until the pressures inside and outside are equal.

### Building occupants and health

Building occupants in schools include the staff, students, and other people who spend extended periods of time in the school. The effects of IAQ problems on occupants are often vague symptoms rather than clearly defined illnesses. Symptoms commonly attributed to IAQ problems include:

- ➤ headache, fatigue, and shortness of breath
- ➤ sinus congestion, cough, and sneezing
- ➤ eye, nose, throat, and skin irritation
- ➤ dizziness and nausea

All of these symptoms, however, may also be caused by other factors, not necessarily air quality problems. Environmental stressors such as improper lighting, noise, vibration, overcrowding, and psychosocial problems (such as job or home stress) can produce symptoms that are similar to those associated with poor air quality.

Because people are different, one individual may react to a particular IAQ problem while surrounding occupants have no noticeable ill effects. In other cases, complaints may be widespread. In addition to different degrees of reaction, an indoor air pollutant or problem can trigger different types of reactions in different people. Some groups that may be particularly susceptible to effects of indoor air contaminants include:

- ➤ allergic or asthmatic individuals, or people with sensitivity to chemicals
- ➤ people with respiratory disease
- ➤ people whose immune systems are suppressed due to radiation, chemotherapy, or disease
- ➤ contact lens wearers

### Six basic control strategies

There are six basic methods for lowering concentrations of indoor air pollutants. Specific applications of these methods are noted in the Indoor Air Quality Tools for Schools Kit (go to "How to Order the Kit" in the IAQ resources list).

➤ **Source management** includes source removal, source substitution, and source encapsulation. Source management is the most effective control method when it can be practically applied. The best prevention method is never to bring unnecessary pollutants into the school building. Examples of source removal include not allowing buses to idle near outdoor air intakes; not placing garbage in rooms where HVAC equipment is located; and banning smoking within the school. Source substitution includes actions such as selecting less toxic art material or interior paint than the products which are currently in use. Source encapsulation involves placing a barrier around the source so it releases fewer pollutants into the indoor air.

➤ **Local exhaust** is very effective in removing sources of pollutants before they can be dispersed into the indoor air, exhausting the contaminated air outside. Well-known examples include restrooms, kitchens, and science lab fume hoods.

➤ **Ventilation** uses cleaner (i.e., outdoor) air to dilute the contaminated (i.e., indoor) air that people are breathing. Generally, local building codes specify the amount of outdoor air that must be continuously supplied to an occupied area. For situations such as painting, pesticide application, or chemical spills, temporarily increasing the ventilation can be useful in diluting the concentration of fumes in the air.

➤ **Exposure control** includes the principles of time of use and location of use. An example of time of use would be to strip and wax floors on Friday after school is dismissed. This allows the floor products to offgas over the weekend, reducing the level of odors or contaminants in the air when the school is occupied. An example of location of use involves moving the contaminating source as far as possible from occupants, or relocating susceptible occupants.

➤ **Air cleaning** primarily involves the filtration of particles from the air as the air passes through the ventilation equipment. Gaseous contaminants can also be removed, but usually this type of system should be engineered on a case-by-case basis.

➤ **Education** of the school occupants is critical. If school staff are provided information about the sources and effects of contaminants under their control, and about the proper operation of the ventilation system, they will better understand their indoor environment and can act to reduce their personal exposure.

### How do I know if there is an IAQ problem?

Diagnosing symptoms that relate to IAQ can be tricky. Acute (short-term) symptoms of IAQ problems typically are similar to those from colds, allergies, fatigue, or the flu. There are clues, however, that can serve as indicators of potential indoor air problems:

➤ The symptoms are widespread within a class or within the school, potentially indicating a ventilation problem.

➤ The symptoms disappear when the students or staff leave the school building for the day.

➤ The onset is sudden after some change at school, such as painting or pesticide application.

➤ Persons with allergies, asthma, or chemical sensitivities have reactions indoors but not outdoors.

➤ A doctor has diagnosed a student or staff member as having an indoor air-related illness.

A lack of symptoms does not mean that the quality of the air within the school is acceptable. Symptoms from long-term health effects (such as lung cancer due to radon) often do not become evident for many years. For this reason, schools should establish a preventive indoor air program to minimize exposure of students and staff to indoor air pollutants.

### What should I do if I think a school has an IAQ problem?

The Indoor Air Quality Tools for Schools is an easy-to-use kit that shows schools how to carry out a practical plan of action at little or no cost, using in-house staff. The kit includes simple checklists for all school employees, a flexible step-by-step guide for using the checklists, an *Indoor Air Quality Problem Solving Wheel*, a fact sheet on indoor air pollution sources and solutions, sample memos to help school personnel respond to inquiries, and sample policies.

# Indoor air quality resources

## How to order the kit

The Indoor Air Quality Tools for Schools Kit, item number 055-000-00503-6, can be purchased for $22 from the U.S. Government Printing Office. The kit is co-sponsored by the National PTA, National Education Association, Council for American Private Education, Association of School Business Officials, American Federation of Teachers, and the American Lung Association. MasterCard and Visa are accepted. For telephone orders, call 202-512-1800, or send a check or money order to:

Superintendent of Documents
P.O. Box 371954
Pittsburgh, PA 15250.

## General resources

**Minnesota Department of Health**. School health guide tool for districts and school staff to promote safe and healthy school environment.
www.health.state.mn.us/divs/fh/mch/schoolhealth/guide.html

**Minnesota Department of Health, Indoor Air Quality in Schools**. Includes comprehensive management plans and list of IAQ coordinators, along with information about the progress schools are making. Parents can obtain checklists or self-help information so they can properly evaluate their child's home or other out-of-school situation. Parents can obtain information about school facility construction, maintenance and housekeeping practices, chemicals used, mold and HVAC-related information, chemical producing academic subjects, pesticides and herbicides, and the like to determine the extent to which school activities contribute to a child's symptoms.
www.health.state.mn.us/divs/eh/indoorair/schools/progress.htm

**U.S. Environmental Protection Agency Tools for Schools (TfS)**. Comprehensive tool kit free to schools to improve indoor air quality. Download at the website or order a free kit by faxing a request on school letterhead to IAQ INFO at 703-356-5386. For more information, call 1-800-438-4318.
www.epa.gov/iaq/schools/index.html

**Indoor Air Quality and Student Performance**
www.epa.gov/iedweb00/schools/pdfs/publications/iaq_and_student_performance.pdf

**Information on IAQ within schools** is a good source of information for the health and safety staff in Minnesota schools—it dictates much of the actual IAQ work done in schools.
www.education.state.mn.us/mde/Accountability_Programs/Program_Finance/Facilities_Health_Safety/index.html
For more information,
www.health.state.mn.us/divs/eh/indoorair/schools/#contact
Or contact Dan Tranter, Indoor Air Unit, Minnesota Department of Health, 625 N. Robert Street, St. Paul MN, 55155-2518, Mailing address: P.O. Box 64975, St. Paul, MN 55164-0975, 651-201-4618, e-mail: daniel.tranter@health.state.mn.us

## Funding

**Minnesota Department of Health**. Local financing, loans, grants, etc.
www.health.state.mn.us/divs/eh/indoorair/schools/resources.htm#fin

## Curriculum

**Tools for Schools Curriculum for K-3**, U.S. Environmental Protection Agency.
www.epa.gov/region01/eco/iaq/

**Hydroville, USA: Challenge Problems for High School Students**, (Packet 3, Challenge Problem IV, An Indoor Air Quality Case Simulation), 541-737-8892
www.hydroville.org

**ToxRAP: Toxicology, Risk Assessment and Pollution**. Using air pollution as an example, students (grades K-9) learn to recognize the hazards of air contaminants in their environments, evaluate the potential health risks of these contaminants, and, when necessary, control hazards to reduce risks.
www.eohsi.rutgers.edu/rc

**Radon and Indoor Air Quality School Resource CD**. This program is meant to be a tool for junior high teachers to develop IAQ curriculum for their students as part of the scientific method. The disk includes a variety of materials on both radon and indoor air and sample lesson plans in those areas. Contact Terrence Allan at 216-443-7500.

**NESCAUM's Air Currents Project**. Air Currents is a curriculum for grades 6 through 12, using science and math principles to teach environmental education through indoor air and outdoor air projects. Very good resources listed, as well as lesson plans, tips for teachers, etc. 617-367-8540.

**Teacher's Guide to Indoor Air Quality**. The National Safety Council's Environmental Health Center has developed the Teacher's Guide to Indoor Air Quality. It is 113 pages of curriculum including a variety of handouts and activities.
www.nsc.org/public/ehc/iaq/teachgde.pdf

## Mold

**Recommended Best Practices for Mold Investigations in Minnesota Schools**, Minnesota Department of Health (pdf, 34 pp)
www.health.state.mn.us/divs/eh/indoorair/schools/schools.pdf

**Recommended Best Practices for Mold Remediation in Minnesota Schools,** Minnesota Department of Health, (pdf, 44 pp)
www.health.state.mn.us/divs/eh/indoorair/schools/remediation.pdf

## Asthma

**National Asthma Education and Prevention Program.** Ask about obtaining four publications: Managing Asthma: A Guide for Schools, Asthma and Physical Activity in School, How Asthma Friendly is Your School?, and the Asthma Awareness Curriculum. 301-592-8573
www.nhlbi.nih.gov

**Managing Asthma in the School Environment**, (pdf, 22pp), U.S. Environmental Protection Agency.
www.epa.gov/iaq/schools/managingasthma.html

## Outdoor air quality

**Sign up for air quality alerts.** The daily air quality index is important for coaches and anyone conducting outdoor activities.
www.pca.state.mn.us/air/aqi-subscribe.html

# Integrated pest management

**Pesticides are powerful tools for controlling pests. However, pesticides need to be used carefully and judiciously, especially when used in sensitive areas where children are present.** Children are more sensitive than adults to pesticides. Young children can have greater exposure to pesticides from crawling, exploring, or other hand-to-mouth activities.

Since children spend so much of their day at school, the U.S. EPA is encouraging school officials to adopt integrated pest management (IPM) practices to reduce children's exposure to pesticides. IPM provides an opportunity to create a safer learning environment—to reduce children's exposure to pesticides as well as eliminate pests.

In 2000, the Minnesota State Legislature passed the Parents' Right to Know Act, which requires schools to notify parents when pesticides of a certain toxicity are intended to be used and recommends that schools implement integrated pest management programs. For the full language of the law, go to www.revisor.leg.state.mn.us/stats/121A/30.html.

The Minnesota Department of Health and the Department of Agriculture have information about implementing the law and IPM. Refer to the resource list following this section for website addresses and contact information.

## Protecting children in schools from pests and pesticides

School administrators and others who have decision-making responsibilities for pest management in and around school buildings should know safer options exist.

Integrated pest management is a safer, and usually less costly option for effective pest management in the school community. A school IPM program employs commonsense strategies to reduce sources of food, water, and shelter for pests in school buildings and on school grounds.

### Elements of an IPM program

- The problem or pest is identified before taking action.
- Vegetation, shrubs, and wood mulch should be kept at least one foot away from structures.
- Cracks and crevices in walls, floors, and pavement are either filled or eliminated.
- Lockers and desks are emptied and thoroughly cleaned at least twice yearly.
- Food-contaminated dishes, utensils, surfaces are cleaned by the end of each day.
- Garbage cans and dumpsters are cleaned regularly.
- Litter is collected and disposed of properly at least once a week.
- Fertilizers should be applied several times (e.g., spring, summer, fall) during the year, rather than one heavy application.
- If pesticides are necessary, use spot treatments rather than area-wide applications.

Your school should designate areas where food is prohibited. If your school does not already have food-free zones, look around and suggest areas where food should and should not be allowed. If your school is going to keep pests out of the classrooms without using chemical pesticides, then food has to stay out of the classrooms, too.

# What is integrated pest management?

Source: Minnesota Department of Agriculture, www.mda.state.mn.us/ipm/fsoverview.pdf

There is a delicate balance between protecting our children and other school occupants from unnecessary exposure to pesticides and protecting them from the health risks associated with pest organisms. It is to everyone's advantage to protect and maintain indoor air quality as children may be more sensitive to environmental health threats.

Integrated pest management looks at pest problems using a multi-tactic approach. It considers all aspects of the interactions between people and the pest, to find the easiest way to resolve the problem with the lowest overall risk to people's health and the school environment. IPM considers factors that allow pests to become problems in the first place and uses a combination of cultural, physical, biological, and chemical pest management strategies. The most important strategy is communication and cooperation among school officials, teachers, staff, custodians, and parents. How people use and manage a school determines the pest problems that will occur.

IPM emphasizes regular inspections and monitoring to detect pests before they become a problem, making it easier to manage them in less toxic ways. Inspections, information on the pest's life cycle, setting action thresholds, and information on how the school facility is used determine when and what action is taken. IPM's flexibility to adapt to any pest problem is what makes it work. IPM does not rule out the use of pesticides. Pesticide use is weighed against other less toxic and more permanent methods.

## The four basic IPM components

➤ **Monitoring**

IPM is based on consistently inspecting and monitoring for pests to determine the location and degree of infestation. Monitoring includes traps, visual inspections, and interviews with staff members, and can be incorporated into other activities such as cleaning. Proper identification of the pest is critical to gathering information about the pest's life cycle and habits. Identification is essential for selecting the combination of strategies that will be most effective and knowing when to implement them. Map out and prioritize problem areas in the buildings or on school grounds. Take thorough notes to help you determine what to do now and in the future.

➤ **Setting action levels**

School officials must set thresholds to determine if and when action should be taken against a certain pest. The action level is the number of pests that can be tolerated before treatment is necessary. While health concerns are always most important for determining the action threshold, economic and aesthetic factors cannot be ignored. An example of an action threshold would be detecting one mouse. Because mice can pose a significant health threat, action should be taken immediately. In other words, one mouse is too many.

➤ **Applying IPM strategies**

IPM employs a multi-tactic approach, integrating several strategies to combat a particular pest. Criteria for selecting a treatment strategy are:

- least hazardous to human health[2]
- least disruptive of natural controls
- least toxic to non-target organisms
- most likely to be permanent
- easiest to carry out safely and effectively
- most cost-effective
- most site-appropriate

There are four common types of control strategies that remove a pest's food, water, and shelter, and limit its access into and throughout buildings and on school grounds.

- **Cultural control** is a preventative measure using fertilization, plant selection, and sanitation to exclude problematic pests and weeds.
- **Physical control**, or pest exclusion, is another preventative strategy. It includes creating barriers; modifying conditions such as temperature, light, and humidity; trapping; and manually weeding.
- **Biological control** makes use of a pest's natural enemies. This strategy introduces beneficial insects or bacteria to the environment or, if they already exist, provides them with the necessary food and shelter and avoids using broad-spectrum chemicals, which could inadvertently kill them.
- **Chemical control** is used after all other control strategies are deemed inappropriate or ineffective. Target-specific, low-toxicity pesticides should be applied in a manner that will maximize the effectiveness of pest management and minimize the exposure to humans and other non-target species. Spot treat if possible to reduce exposure.

➤ **Evaluation**

Program evaluation involves reviewing monitoring data, actions taken, treatment impacts and effectiveness, and any other relevant observations. These reports will provide information on previous and current pest populations and which strategies were applied. Comparing data will clearly indicate which pest management strategies were most effective for the amount of time and money spent. IPM practices and procedures can be modified, if necessary, based on past experience, results, and gained knowledge.

Ask yourself questions about the program.

- Was the treatment(s) effective?
- What were the effects on non-target species?
- What worked and what did not?
- What can I do differently next time?
- Should I consult an outside source of expertise for further IPM recommendations?
- Is the program compatible with current public expectations?

Remember, be flexible! The key to a good IPM program is adaptability and allowing for continuous fine-tuning in your program. Keeping other school personnel informed and involved will help make them aware of the school's IPM program and its advantages.

[1] Modified from *A Practical Guide to Management of Common Pests in Schools,* developed by the Illinois Pest Control Association, Illinois Department of Health, Structural Pest Control Advisory Council and University of Illinois Extension, 1999.
[2] Taken from *Integrated Pest Management for Schools: A How-to Manual,* United States Environmental Protection Agency, Region 9, 1998. 2002

# IPM resources

**IPM in Schools**, Minnesota Department of Agriculture. In response to the 2000 Minnesota Right-to-Know Act that encourages schools to use IPM, the MDA developed this site and a variety of resources for schools. It includes fact sheets about IPM in general, specific insects, specific weeds, specific plant diseases, and rodents, as well as presentations and resources for kids. Contact Jeanne Ciborowski, Coordinator, IPM Program, 651-201-6217, e-mail: Jeanne.ciborowski@state.mn.us
www.mda.state.mn.us/ipm/IPMinSchools.html

**Pesticides in Schools**, Minnesota Department of Health. This site relies heavily upon external links, but also provides information about the Minnesota Parent's Right-to-Know Act, model pesticide notices, and contacts for evaluating pesticide risks and safety. 651-201-4899, e-mail: hra@health.state.mn.us.
www.health.state.mn.us/divs/eh/pesticide/schools.html

**U.S. Department of Agriculture Cooperative State Research, Education, and Extension Service**. IPM information and links to resources.
www.csrees.usda.gov/ProgView.cfm?prnum=6672

**Integrated Pest Management in Schools**, U.S. EPA. This site provides general information about integrated pest management, how to know if your school is really using IPM, how you can get started, common pests in school settings, and regional resources.
www.epa.gov/pesticides/ipm/

**Integrated Pest Management in Schools: A How-to Manual**, U.S. EPA.
www.epa.gov/pesticides/ipm/schoolipm/index.html

**IPM in Schools Nationwide Directory**, U.S. EPA, contact Don Baumgartner, 312-886-7835, e-mail: baumgartner.donald@epa.gov
www.epa.gov/reg5rcra/ptb/pest/ipm/index.html

**Beyond Pesticides** provides useful information on pesticides and alternatives to their use. Their site includes an extensive amount of pesticide fact sheets, alternatives fact sheets, how-to fact sheets, daily news, research, and state-specific information.
www.beyondpesticides.org

Their publications include *Safer Schools: Achieving a Healthy Learning Environment through Integrated Pest Management*
www.beyondpesticides.org/schools/publications/

**School Pesticide Use**: Resources for Promoting Healthier Schools, Northwest Coalition for Alternatives to Pesticides. These resources include the following useful publications: Restoring Healthy School Landscapes, "Hot" New Tools and Time-Tested Natural Methods for Managing School Landscapes, Unthinkable Risk: Children Are Exposed and Harmed When Pesticides Are Used at School, Steps Parents and Teachers Can Take to Reduce School Pesticide Use, Elements of a Sound and Effective School Pesticide Minimization Policy, and more.
www.pesticide.org/schools01.html

## Model policies

**Hopkins Pest Management Policy**
www.hopkins.k12.mn.us/Pages/District/policies/eplcy/ebab.htm

**Integrated Pest Management Policy**, Los Angeles Unified School District.
www.calisafe.org/policy.html

**Model School IPM Policy**, Northwest Coalition for Alternatives to Pesticides.
www.organicconsumers.org/school/pdf/IPMpolicy.pdf

**Sample Integrated Pest Management Policy**, Marin County Office of Education.
www.pesticidefreezone.org

## Research and publications

**Are Pesticides Taking Away the Ability of Our Children to Learn?** Mary O'Brien, staff scientist, Northwest Coalition for Alternatives to Pesticides.
www.pesticide.org/AbilityChildLearn.pdf

**Unthinkable Risk: How Children Are Exposed and Harmed When Pesticides Are Used at School**, Northwest Coalition for Alternatives to Pesticides.
www.pesticide.org/UnthinkableRisk.html

## Curriculum/student projects

**Pesticides Reduction**, U.S. Environmental Protection Agency.
www.epa.gov/reg5rcra/wptdiv/p2pages/pestici.pdf

# School bus diesel emissions

Source: Union of Concerned Scientists

**More than 23 million children rely upon buses to carry them safely to school,** and most of the 442,000 school buses on the road today are powered by diesel fuel. There's no warning on the outside of diesel school buses that the black smoke coming out of the tailpipe could be hazardous to children's health.

## Health impact of diesel pollution

Diesel emissions affect all people, but children are particularly vulnerable. Outdoors more often than adults, children's small bodies and maturing lungs experience greater exposure to harmful air pollutants. New studies in California find that air pollution not only exacerbates children's asthma, but may actually cause asthma in otherwise healthy children.

Pollution from school buses may be hazardous to the health of students and staff. Yale researchers found the air inside diesel school buses contained 5 to 15 times more toxic soot than the outside air. The public health threat from diesel school bus emissions is threefold:

- **Air toxics.** Diesel exhaust contains 41 chemicals that the State of California has identified as toxic air contaminants. The health risks of air toxics vary from pollutant to pollutant, but are all serious, including cancer, immune system disorders, and reproductive problems. The State of California estimates that diesel causes 70 percent of all airborne cancer risk.
- **Soot.** Most particulate matter emitted by diesel buses is tiny enough to evade the body's defenses and lodge deep in the lungs. Numerous public health studies have linked diesel soot to missed school days, asthma hospitalizations, chronic bronchitis, heart disease, and even premature death.
- **Smog.** Urban ozone, or smog, impairs the respiratory system, causing coughing, choking, and reduced lung capacity. On smoggy days, hospital admissions, especially for asthma, escalate. Repeated exposure to smog may permanently injure lungs.

**Fuel facts (2004)**

| | Soot per year per bus | Smog per year per bus |
|---|---|---|
| Natural gas | 0.5 pounds | 150 pounds |
| Low-emission diesel | 0.6 pounds | 200 pounds |
| Conventional diesel | 5.6 pounds | 200 pounds |
| Average bus on road | 13.7 pounds | 415 pounds |

## Cleaning up our school buses

Older school buses carry a double-edged threat: They are safety hazards as well as polluters. There are about 3,000 school buses on the road today that do not have to meet minimum safety requirements. Built before 1977, these buses do not have to meet standards for passenger seating and crash protection, rollover protection, body joint strength, and fuel system integrity.

All newer buses have to meet a stringent series of federal motor vehicle safety standards designed to prevent accidents and provide our children with high levels of safety should a crash occur.

### EPA's new regulations

Recognizing the dangers of diesel pollution, the U.S. EPA passed new emissions standards for diesel trucks and buses. These standards require that buses built after 2007 release 90 percent less soot and 95 percent less smog-causing emissions than today's buses.

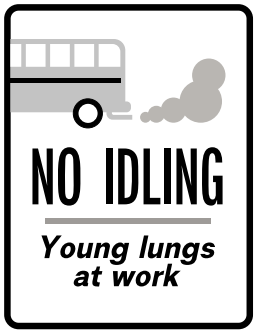
### Clean, safe alternatives

There are clean and cost-effective alternatives to standard diesel-powered school buses. Compared with a conventional diesel bus, buses powered by alternative fuels such as natural gas can cut soot by 90 percent and smog-forming pollutants by nearly one-third. Cleanup technologies for diesel engines show the potential to slash soot pollution by 85 percent or more.

Federal legislation to provide funds for clean vehicles will help ensure our children travel in safe and clean school buses. A $300 million grant program could fund the replacement of about 2,300 of our country's dirtiest diesel buses, built before more protective federal standards were enacted in 1991. For more information, e-mail: cleanschoolbus@ucsusa.org or visit CleanSchoolBus.org

## Reducing exposure to diesel emissions

In May 2002, Minnesota adopted legislation (Minnesota Statute § 123B.885) to protect the health and safety of children from harmful diesel bus emissions. This law calls for schools to reduce the unnecessary idling of school buses in front of schools, and reroute bus parking zones away from air-intake vents (or if necessary, relocate the air-intake vents).




### What your school can do:

- Adopt a "no-idling" policy. Require that buses turn off their engines when waiting for students. Your school can go even further by implementing a no-vehicle-idling policy for cars, delivery trucks, and buses.
- When school bus drivers arrive at loading or unloading areas to drop off or pick up passengers, they should turn off their buses as soon as possible to eliminate idling time and reduce harmful emissions. The school bus should not be restarted until it is ready to depart.
- If buses need the engine to run flashing lights during longer duration loading and unloading, consider installing an extra battery and changing the circuit configurations so the flashing lights can be powered by the battery without the engine running.
- At school bus depots, limit the idling time during early morning warm-up to what is recommended by the manufacturer and/or permitted by state anti-idling laws (generally 3 to 5 minutes). In colder climates, block heaters, which plug into electrical outlets, can help warm-up the engine to avoid starting difficulties and shorten warm-up time.
- In the winter, schools can provide a space inside the school where bus drivers who arrive early can wait.
- Ensure school buses are regularly maintained.
- Reinforce smart driving practices such as following at least three car lengths behind any vehicle with visible exhaust or a noticeable odor.
- Make sure everyone understands the importance of the new guidelines. Post reminders on bus dash boards.
- Inform drivers of the potential risk to their health from breathing diesel exhaust and the benefits of not idling.
- Establish a program to recognize drivers. For example, create buttons that drivers who pledge to follow the guidelines can wear.

For more information visit the U.S. Environmental Protection Agency's School Buses web page. www.epa.gov/ne/eco/diesel/school_buses.html. Or the Minnesota Pollution Control Agency's web page, which has a variety of resources including the poster to the left and other signs and flyers: www.pca.state.mn.us/oea/ee/noidle.cfm

# Improving fleet management practices to reduce diesel emissions

Source: Excerpts from Asthma Regional Council of New England, www.asthmaregionalcouncil.org/about/_BusToolkit.htm

➤ **Avoid idling to reduce engine wear.**

- Running an engine at low speed (idling) causes twice as much wear on internal parts as driving at regular speeds does. Additional wear can increase maintenance costs and shorten the life of the engine. Typical fuel consumption during engine start-up is equivalent to about 30 seconds of engine idling.

**The cost of idling**

School buses typically use about half a gallon of diesel fuel for each hour they idle. If a company operates 50 buses and each bus reduces its idling time by 30 minutes per day, at $2.50 per gallon of diesel fuel, the company would theoretically save 2,250 gallons of fuel and more than $5,600 per school year in fuel costs. www.epa.gov/otaq/schoolbus/idle_fuel_calc.htm

➤ **Stagger arrival and drop-offs (queuing strategies).**

- Queued idling buses tend to have the highest levels of particulates and black carbon.
- Idling buses typically accumulate diesel exhaust that may be retained during the ride, depending upon bus ventilation rates.
- Particulate and carbon concentrations rise rapidly once idling begins. Strategies to reduce idling and wait times amongst buses are very effective in reducing particulates.

➤ **Avoid caravanning for field trips and events.**

- Caravanning with other school buses or diesel buses can create a chain of harmful emissions passed from bus to bus.
- School bus drivers should be instructed to avoid caravanning with other diesel buses whenever possible.

➤ **Seat children near the front of bus.**

- If conventional diesel buses are not full, children should be encouraged to sit closer to the front of the bus.
- Studies conducted in California indicate the front of the bus compartment receives less exhaust intake than the rear.

➤ **Use routing software or employ detailed routing strategies.** [1]

- Routing software can be very effective in reducing drive time, which reduces children's exposure to diesel emissions while riding the bus and can save on fuel costs.
- Districts and/or bus providers can purchase and use routing and planning software that has helped numerous districts reduce fleet size, save on fuels, and minimize rider time.
- In MSAD 47 School District in Maine, approximately 2,100 students ride 34 buses on 48 single routes every school day morning and afternoon. The fleet averages 400,000 miles annually. In the first year using routing software, over 22,000 miles were eliminated, and a newly budgeted route was postponed. During the second year, an established route was totally eliminated. Over two years, the district saved approximately $80,000 and significantly reduced the diesel emissions in the community.

➤ **Tailor length of bus route to buses of different ages.**

- The length of bus routes affects the magnitude of children's exposure to air pollutants in the interior compartment.
- Consider using new buses on longer routes to minimize overall emissions.

[1]Goff, L. "VersaTrans Software and E-911 Road Centerline Data Improve School Bus Routes and Save Money," as extracted from www.state.me.us/newsletter/mar2004/versatran_software_and_e.htm, March 2004.

### School bus maintenance checklist

- ➤ Visually "inspect" bus at least every 41 working days or 15,000 miles and meet manufacturer recommended maintenance.
- ➤ Inspect the exhaust system. Check for sounds, holes, cracks, and visible exhaust to minimize leakage into the bus cabin.
- ➤ Inspect windows, doors, and gaskets for "leaks" to minimize exhaust inside the bus.
- ➤ Change oil every 3,000 miles or 3 months. Frequent oil changes help engines run clean.
- ➤ Use blended fuels or fuels that will not gel to help the engine run cleanly and efficiently.
- ➤ Service the exhaust gas recirculation valve regularly to help reduce potential NOx emissions.

Asthma Regional Council, The Medical Foundation, 622 Washington Street, 2nd Floor, Dorchester, MA 02124, 617-451-0049 x504, www.asthmaregionalcouncil.org

## School bus resources

**Minnesota Pollution Control Agency.** Offers sample letters to help explain the law, posters, and camera-ready signs for Clean Air Zones. They have also gathered information on private, federal, and state funds to help your school reduce students' exposure to diesel emissions. The site includes a list of local and national organizations working on this issue.
www.pca.state.mn.us/oea/ee/noidle.cfm

**Project Green Fleet** is a partnership among businesses, government agencies, and non-profit organizations to reduce pollution emitted from Minnesota school buses and to protect children's health. Project Green Fleet will help school districts and other school bus operators reduce diesel emissions by installing pollution-control equipment on Minnesota school buses to make them cleaner and safer for our children and our communities. Bill Droessler, Director, Clean Air Minnesota, 612-334-3388 ext. 103, e-mail: bdroessler@mn-ei.org
www.projectgreenfleet.org

**Clean School Bus USA Program**, U.S. Environmental Protection Agency. Clean School Bus USA brings together partners from business, education, transportation, and public health organizations to work toward these goals: encouraging policies and practices to eliminate unnecessary public school bus idling; upgrading ("retrofitting") buses that will remain in the fleet with better emission control technologies and/or fueling them with cleaner fuels; and replacing the oldest buses in the fleet with new, less polluting buses. Website offers health and technology information, grant information, and a lot more. 734-214-4780, e-mail: cleanschoolbusUSA@epa.gov
www.epa.gov/cleanschoolbus/

**Asthma Regional Council's Toolkit for Reducing Diesel Emissions**. Includes Powerpoint presentation, fact sheets, model policies, model newsletter articles, driver training resources, signs, maintenance and management practices, and more. Questions can be directed to the Asthma Regional Council of New England, 617-451-0049 (x512) or e-mail: sroberts@tmfnet.org
www.asthmaregionalcouncil.org/about/BusToolkit.htm

### Driver resources

**Anti-Idling Training for School Bus Drivers**, "Drive Clean, You Hold the Key" Training Module and video developed by the Massachusetts Department of Environmental Protection. To obtain a copy of the anti-idling training package, call 617-292-5958

### Curriculum

Sierra Club
www.northstar.sierraclub.org/campaigns/air/schoolbus/curriculum.html

### Reports and publications

**Children's Exposure to Diesel Exhaust on School Buses**. Environment and Human Health Inc.
www.ehhi.org/reports/diesel/

**What Parents Need to Know About Diesel School Buses**, Natural Resources Defense Council.
www.nrdc.org/air/transportation/qbus.asp

**No Breathing in the Aisles: Diesel Exhaust Inside School Buses**, Natural Resources Defense Council.
www.nrdc.org/air/transportation/schoolbus/sbusinx.asp

# Nutrition

Given the growing epidemic of obesity in the United States and the link between nutrition and academic performance, we must work together to ensure that healthy foods are available throughout the school environment—in school meal programs, a la carte offerings, snack bars, vending machines, and fundraising efforts.

Effective July 2006, a federal school wellness policy passed, requiring all schools to plan and implement a policy that includes goals for nutrition education, physical activity, and nutritional guidelines for all foods served and sold. Also, a vending machine ban establishes schools cannot have foods of minimal nutritional value competing with reimbursable meals during lunchtime.

➤ **Our children eat too little of the right foods and too much of the wrong foods.**

- Only 2 percent of school-aged children meet the food guide pyramid serving recommendations for all five major food groups.[1] Only about one in five kids gets "5 a day" of fruits and vegetables.[2]
- Less than a third of school children consume the recommended milk group servings on any given day. Teenagers drink twice as much carbonated soda as milk.[3]
- Children's diets are high in added sugars. For all children, added sugars contribute an average of 20 percent of total food energy.[1] Nearly half of 8th- and 10th-grade kids eat three or more snacks daily, with most of these snacks high in sugar, sodium, and fat.[4]

➤ **Many school environments reinforce poor eating habits.**

- More students are choosing to purchase foods from "competitive" sources such as a la carte and vending, which have no nutritional requirements.[5]
- The amount of milk purchased by school districts fell by nearly 30 percent from 1985 to 1997. Districts bought 1,100 percent more soft drinks during the same period.[6]
- According to the Centers for Disease Control and Prevention, 43 percent of elementary, 74 percent of middle/junior high, and 98 percent of senior high schools have either a vending machine or a school store or snack bar where students can purchase food or beverages.[5]

➤ **Good nutrition is a good investment.**

- Research shows when a child's nutritional needs are met, the child is more attentive in class, has better attendance, and fewer disciplinary problems.
- Studies also show proper nutrition improves school performance and overall cognitive development.
- Properly nourished children more actively participate in the education experience, which benefits them, their fellow students, and the entire school community.

## What your school can do

➤ Transform vending machines and a la carte items, by offering healthier foods and beverages such as fruit, bagels, cheese, yogurt, and salad, as well as milk, water, and 100% juice drinks.

➤ Explore "healthy" fundraisers, including the sale of non-food items such as candles, sunscreen, wrapping paper, and T-shirts.

➤ Where applicable, participate in a farm-to-school project or grow produce on school grounds for student consumption.

**References**

1. Food, Nutrition, and Consumer Services/USDA. Foods Sold in Competition with USDA School Meal Programs: A Report to Congress. 2001.
2. CDC. Youth Risk Behavior Surveillance—United States 2001. MMWR, June 21, 2002, 51, (SS04): 1-64.
3. USDA. Team Nutrition Call to Action: Healthy School Nutrition Environments.
4. American School Health Association, Association for the Advancement of Health Education, and the Society for Public Health Education. The National Adolescent Student Health Survey. Oakland, CA: Third Party Publishing, 1989.
5. CDC (Division of Adolescent and School Health). School Health Policies and Programs Study, 2000.
6. Nestle, M. Food Politics. Berkeley: University of California Press, 2002.

# Farm-to-school facts

Source: Wisconsin Homegrown Lunch, A joint project of the REAP Food Group and the University of Wisconsin's Center for Integrated Agricultural Systems, Doug Wubben, project coordinator, dwubben@wisc.edu, www.reapfoodgroup.org/farm-toschool

According to the Centers for Disease Control, 15 percent of school-age children (and more than 10 percent of preschool children) are overweight—nearly triple the number of two decades ago. Not surprisingly, studies indicate a marked rise in children's weight-related medical conditions that were once uncommon in children, including type II diabetes and high blood pressure. Unhealthy eating habits—along with lack of exercise and genetics—play a major role in this epidemic.

U.S. family farms are in similar crisis. The increasing role of multi-national corporations in controlling commodities jeopardizes the existence of small, independently owned farming operations. The decline of moderate-scale farms providing for their local food systems, as well as the loss in our nation's rural, cultural landscape are also part of this trend.

## Farm-to-school programs help remedy these problems.

By helping school districts buy food from local growers, such programs can increase the nutritional value of children's lunches and teach eating habits dependent on less heavily processed foods. At the same time, such a program helps provide a reliable market for local small and mid-sized farmers.

Farm-to-school efforts are experiencing a range of success in many school districts around the country. Recognizing the value of farm-to-school programs for children, farmers, and school food services, the federal government has taken steps to encourage schools to purchase fresh food directly from local farmers. For example, the U.S. Department of Agriculture's *Small Farms/School Meals* initiative has helped connect farmers with school districts in several states, including Kentucky, Iowa, Nevada, Florida, New York, New Jersey, Vermont, and California. In addition, the USDA may award funding for fledgling farm-to-school projects through several grant programs, including the Community Food Projects Competitive Grants Program and the Sustainable Agriculture Research and Education Program.

Several school districts around the country have successfully developed state, local, or school-district food policies, which provide legal precedent for school food services purchasing local and sustainably raised food. Such policies provide excellent models for farm-to-school programs that are at earlier stages of development. To view a sample California school district food policy, go to www.eecom.net/projects_school_examplepolicy.pdf.

## Benefits of farm-to-school programs

Farm-to-school programs take a win-win approach. By encouraging school districts to buy fresh, seasonal products from local farmers who use environmentally sustainable farming methods, such programs introduce children to a variety of healthy foods. This also helps support their region's agricultural economy in the process. Farm-to-school programs aim to counteract negative trends in the current food system, providing a healthy alternative to children and families targeted by fast food marketing. Farm-to-school programs benefit the school and the community.

➤ **Children**

Farm-to-school programs offer equitable access to fresh, healthy, locally grown foods to all children. This especially important for children from lower income families, who rely most on school meal programs. Farm-to-school programs foster children's understanding of where food comes from and the role they, as consumers, play in the food system. Taking part in a farm-to-school program helps students feel more connected to their communities and to the natural world, while encouraging a lifetime of healthy eating habits and informed consumer choices.

➤ **Teachers**

Many farm-to-school programs offer nutrition-education resources to teachers, which help schools integrate nutrition programs into their curricula. Experiential opportunities, such as field trips to farms and restaurants, school gardening, composting, and taste-testing local products, further help teachers link learning to the lunchroom.

➤ **School food service**

The economic viability of buying locally grown food is very important to school food services involved in farm-to-school efforts. Buying from local farmers reduces long-distance transportation and handling of foods, sometimes resulting in lower costs. In addition, some school food service directors have found that farm-to-school programs boost revenue by drawing more students into school lunch programs.

➤ **Community**

Farm-to-school programs deepen connections between schools and their communities. Farms and farming are an integral part of our cultural landscape, deserving of our respect and sustained support. Children's budding understanding of the role they play in their local food system enters into discussions at home, encouraging families to become supporters and consumers of locally and sustainably produced foods.

➤ **Farmers**

Agricultural areas are increasingly threatened by sprawling urban development. Farm-to-school programs help preserve family farms and farmland by developing stable, institutional markets for local agricultural products. Farm-to-school projects support and promote local and sustainable agriculture in the short term, through direct purchases and in the long term, through education of the next generation of consumers.

➤ **Environment**

Sustainable agriculture refers to farming methods that are ecologically sound (protecting the health of our waters, soils and air), humane, health-promoting, and economically just. By supporting sustainable producers through consumer demand, individuals can use their purchasing power to vote for a healthy food system and a healthy environment.

## School nutrition resources

**Rethinking School Lunch**, Center for Ecoliteracy. RSL includes an online 175-page RSL guide, an ongoing essay series "Thinking outside the Lunchbox," a downloadable model wellness policy guide, and more. Rethinking School Lunch builds on the premise that hands-on experience growing and preparing food is a powerful way for children to discover that healthy food tastes good, and to learn about the cycles, seasons, other processes of nature, and the relationship between the health of natural and social systems.
www.ecoliteracy.org/programs/rsl.html

**The Quick and Easy Guide to School Wellness**. A multi-media how-to guide with information, advice, tools, and resources for taking action on your wellness plan. Free copy online.
www.healthyschoolscampaign.org/campaign/wellness/order.php

**Citizens for Healthy Options in Children's Education**. Campaign to provide more plant-based options in school cafeterias.
www.choiceusa.net

**Action for Healthy Kids** is the only nonprofit organization formed specifically to address the epidemic of overweight, undernourished, and sedentary youth by focusing on changes at school. They work in all 50 states and the District of Columbia to improve children's nutrition and increase physical activity, which will in turn improve their readiness to learn.
www.actionforhealthykids.org

**Soft Drinks and School Age Children**, Healthy School Nutrition Environments' comprehensive tool kit for change.
www.fns.usda.gov/tn/Healthy/Soft_Drinks/index.html

**How to Get Organic Milk Into Your Kids' School: A Parents' Toolkit for Change**
www.organicvalley.coop/pdf/parents_toolkit.pdf

**National Farm-to-School Program**. Initiated in 2000, the National Program has spearheaded the development of the farm-to-school movement across the country, successfully assisting organizations in starting up and sustaining farm-to-school efforts, fundraising, and providing informational resources, education and training for farm-to-school stakeholders.
www.farmtoschool.org

**Farm-to-School Program** provides training and technical assistance to catalyze farm-to-school projects, so children can enjoy tasty fruits and vegetables, while connecting with the source of their food; and farmers can develop an additional source of income.
www.foodsecurity.org/farm_to_school.html

**Buy Local Food and Farm Toolkit: A Guide for Student Organizers**
www.oxfamamerica.org/pdfs/food_farm_toolkit.pdf

**School Foods Tool Kit: A Guide to Improving School Foods and Beverages**, (3 pdfs), Center for Science in the Public Interest.
www.cspinet.org/schoolfoodkit

## Research

**The Learning Connection: The Value of Improving Nutrition and Physical Activities in Our Schools**, (pdf, 42pp), Action for Healthy Kids.
www.actionforhealthykids.org/special_exclusive.php

**Farm-to-School: Case Studies and Resources for Success**, (pdf, 54pp), National Farm-to-School Program.
www.foodroutes.org/doclib/243/FarmtoSchool-Success.pdf

**National Farm-to-School Publications and Case Studies**
www.farmtoschool.org/pubs.htm

**Food and Behavior Research**
www.fabresearch.org

**Studies Show that Diet May Trigger Adverse Behavior in Children**, Center for Science in the Public Interest.
www.cspinet.org/new/adhdpr.html

## Surveys and audits

**Food Service Survey**, Community Food Security Coalition.
www.foodsecurity.org/sample_foodservice_survey.pdf
www.foodsecurity.org/sample_farmer_survey.pdf

## Funding opportunities

**Farm-to-School Funding Sources**, Community Food Security Coalition.
www.foodsecurity.org/farm_to_school.html#funding

## Curriculum

**School Market Program**, The Food Trust.
www.thefoodtrust.org/php/programs/school.market.program.php

**Curricular Resources on Gardening, Cooking, Nutrition, and the Food System**, Farm-to-School.
www.farmtoschool.org/tools.htm

**Garden-based Learning**, Life Lab.
www.lifelab.org/products/index.html

## Farm directories

**Local Harvest**
www.localharvest.org

**Minnesota Stewardship Food Network**. The Land Stewardship Project's list of local organic and sustainable farmers who sell directly to consumers.
www.landstewardshipproject.org/foodfarm-main.html#SFN

**Minnesota Grown Directory.** Minnesota Department of Agriculture lists over 500 Minnesota farmers' markets, pick-your-own berry farms, apple orchards, nurseries, Christmas tree farms, and other growers who sell direct.
www.mda.state.mn.us/mngrown/directory.htm

**Minnesota Food Association**
www.mnfoodassociation.org



# Mercury

Source: Indiana Department of Environmental Management fact sheet. 800-451-6027, www.IN.gov/idem, January 2003

Children, by virtue of their size and stage of development, are more prone to mercury poisoning than adults. They are also more likely to have serious effects from long-term exposure to mercury vapors. Mercury is a neurotoxin that can cause damage to the brain and central nervous system. Long-term exposure to mercury can result in symptoms that may progressively worsen and lead to personality changes, stupor, and coma. If a spill does occur in a school, proper clean up is costly, difficult, and dangerous. And if cleaned up or stored improperly, mercury vapors can contaminate the air, exposing all that breathe it.

It only takes 3 grams deposited each year (approximately 1/25 of a teaspoon) to contaminate a 60-acre lake. And that mercury can find its way into the fish we eat.

According to Minnesota Statute § 121A.33, certain uses of mercury are prohibited in schools:

"After December 31, 2007, a school shall not:
(1) purchase or use elemental mercury for any purpose; and
(2) purchase or use an instrument of measurement that contains mercury, including, but not limited to, a thermometer, barometer, or sphygmomanometer, or a manometer containing mercury

After December 31, 2009, a school shall not:
(1) store elemental mercury for any purpose;
(2) store an instrument of measurement that contains mercury, including, but not limited to, a thermometer, barometer, sphygmomanometer, or a manometer containing mercury.

## Where can mercury be found in schools?

➤ **Science and chemistry laboratories and classrooms**

Check for mercury thermometers, air pressure gauges (barometers), mercury compounds, and elemental mercury. Mercury may have been used historically in a school's laboratory. The laboratory may still have containers of mercury or mercury compounds in storage.

➤ **School classrooms and facilities**

Look for mercury-containing thermostats, thermometers, barometers, and silent wall switches. There are economical, mercury-free alternatives for these products. Fluorescent light bulbs also contain trace amounts of mercury, but because they are very energy efficient, their continued use in schools is recommended.

➤ **Nurse's office**

The nurse's office may have quite a bit of elemental mercury—in thermometers and blood pressure devices. There are also certain nasal sprays and contact lens solutions that contain thimerosal, phenylmercuric acetate, or phenylmercuric nitrate. These compounds all have mercury in them, and have mercury-free alternatives.

A more extensive list of mercury-containing items can be found at www.in.gov/idem/mercury.

**Once schools have identified the mercury, how can they dispose of it properly?**
Recycling mercury-containing items is the only safe way to dispose of them properly. Even small amounts of mercury disposed of improperly can harm the environment. Never dispose of mercury or a mercury-containing products by pouring it down the drain, putting it in the trash, or burning it in barrels or incinerators.

**Removing mercury is cheap insurance for schools**
When managed correctly, mercury is not considered to be a general health threat to children in schools. However, it's not unusual for children to find mercury in a school and then spill or dump it in the school, on buses, or at home. Under some circumstances, such a spill can lead to toxic exposure levels.

Eliminating mercury is cheap insurance. By doing so, schools can avoid costly cleanups. Mercury cleanups can cost $5,000 to $250,000 and typically include short-term school closures. In the northeastern Minnesota pilot project, about $89 was spent for each pound of mercury eliminated. Cost to eliminate mercury from a building averaged about $309. (Costs do not include staff time.)

## Clancy, the MPCA's mercury-detecting dog

Source: Minnesota Pollution Control Agency

Clancy, the mercury-detecting dog, is one of the tools the Minnesota Pollution Control Agency (MPCA) is using to check schools and other facilities for spilled and "hidden" mercury.

By locating spills so they can be cleaned up, Clancy is helping ensure that people will not continue to breathe mercury vapor from the spills.

Clancy is part of the MPCA's statewide Mercury-Free Zone Program, which works to:

- reduce the risk of potential mercury exposure to students and school staff.
- prevent releases of mercury to the environment by eliminating mercury from schools.
- educate students and staff about the dangers of mercury.

The program also seeks to establish mercury-free zones in colleges and universities. Through the MPCA's Mercury-Free Zone Program, a total of 1,560 pounds of mercury has been collected from 663 of the state's 1,842 middle, junior, and senior high schools. More than 22,000 students, teachers, and citizens have been educated about the dangers of mercury. Minnesota schools still contain large quantities of mercury.

**Is Clancy's health at risk from being exposed to mercury?**
Clancy's exposure to the mercury he has found has been minimal. Every six months, a veterinarian analyzes a sample of Clancy's blood for mercury. Each time his blood has been tested, the results are below the detection limit.

**For more information**
Clancy and Carol Hubbard, his trainer and handler, are prepared to teach students and others about the dangers of mercury, how people get exposed to it, and its proper handling and recycling. To arrange an inspection, call Carol Hubbard at 651-282-2604 or e-mail her at carol.hubbard@pca.state.mn.us. You will be asked details about your facility, such as its size, address, number of employees and whether you have reason to be concerned about mercury on the premises.

# Mercury resources

**Healthy Schools: Mercury in Schools**. The Minnesota Department of Health (MDH) staff toxicologists are available to provide consultation to schools about mercury exposures and health risks. MDH also works closely with the Minnesota Pollution Control Agency to provide information to the public about preventing mercury exposures. For additional information about mercury health risks, contact sacweb@health.state.mn.us, or 651-215-0880 (or toll free, 800-657-3908, press "4").
www.health.state.mn.us/divs/eh/schools/mercury.html

**Mercury-Free Zone Program**, Minnesota Pollution Control Agency. This program, free for schools, includes a school audit, a school pledge, educational tools, and a visit from Carol Hubbard and Clancy, the mercury-detecting dog. To arrange an inspection, call Carol Hubbard at 651-282-2604 or e-mail: carol.hubbard@pca.state.mn.us. You will be asked details about your facility, such as its size, address, number of employees, and whether you have reason to be concerned about mercury on the premises.
www.pca.state.mn.us/programs/mercury-free

**Schools and Mercury**, U.S. Environmental Protection Agency.
www.epa.gov/mercury/schools.htm

**Mercury Brochures for Schools**, New York State Department of Health. Easy-to-read brochures about the basics of mercury in schools for superintendents, facilities managers, science teachers, nurses, and more.
www.health.state.ny.us/nysdoh/environ/hsees/mercury/

**Sample Resolution for Mercury-Free Purchasing and Purchasing Policy**
www.newmoa.org/prevention/mercury/schools/Resolution.pdf

**Mercury in Schools**, North Carolina Department of Environment and Natural Resources. Extensive list of resources on mercury in schools.
www.p2pays.org/mercury/school.asp

**Mercury in Schools**. The University of Wisconsin Extension's Solid and Hazardous Waste Education Center developed this mercury in schools website including mercury recycling information, mercury management in schools, educational materials for students, the latest information on mercury sources, health advisories and reduction programs, cultural uses, mercury at home, mercury in the community, environmental impacts, and the history of mercury use.
www.mercuryinschools.uwex.edu

**Mercury-Free Alternatives for Schools**
www.epa.state.il.us/mercury/school-mercury.html

## Curriculum

**Mercury: In Your Community and the Environment**, (pdf, 49pp), Wisconsin Department of Natural Resources.
www.epa.gov/glnpo/bnsdocs/merccomm/merccomm.pdf

**Mercury Resources**, Wisconsin Department of Natural Resources.
www.dnr.state.wi.us/org/caer/ce/greenschools/resourcesMercury.htm

# Notes

# Lead

Sources: U.S. EPA and Natural Resources Defense Council

**Lead is highly toxic and exposure to even low levels of lead can permanently affect children.** In low levels, lead can cause nervous system and kidney damage, learning disabilities, shortened attention span, and reduced IQ. High levels of lead can have devastating effects on children, including seizures, unconsciousness, and, in some cases, death. New research indicates that no amount of lead is safe for a child.

According to the Centers for Disease Control and Prevention, almost one million American children under the age of six have elevated levels of lead in their blood. Exposure to lead-contaminated dust is the most common way to get lead poisoning. Low lead doses are a concern for children, since continuing exposure can add up to a significant dose over time.

## Children's special vulnerability

Children engage in more hand-to-mouth activity than adults, crawling and playing on the ground, they ingest more contaminants in dust or dirt. This high exposure comes at a time when children's bodies are building their vital organs and skeletal and neural structures; lead is particularly toxic to children's developing nervous systems.

Most children do not display overt symptoms of poisoning. Because their symptoms (ranging from irritability to stomach upset) may not be immediately recognizable as lead-related, the majority of cases go undetected.

## Lead hazards in schools

The most common lead hazards in schools are lead-based paint, lead dust, and contaminated soil. Other sources of lead hazards are older plumbing fixtures, vinyl miniblinds, painted toys, jewelry, and furniture made before 1978, which may be painted with lead-based paint, lead smelters, or other industrial sources. Pottery and leaded crystal can contaminate food and liquids stored in them.

Most lead poisoning occurs when people swallow lead paint chips or breathe in lead dust. Lead-based paint is defined by the Environmental Protection Agency as any paint that contains more than 0.5 percent lead by weight (or about 1 milligram per square centimeter of painted surface). This is the "action level" at which the EPA recommends removal of lead paint if it is deteriorating and chipping.

According to *Reducing Lead in Drinking Water: A Manual for Minnesota Schools*, drinking water is usually not the main source of children's lead exposure. But due to the on-again, off-again pattern of water use in schools, stagnant water in plumbing has a greater opportunity to come in contact with lead. Schools need to be mindful of the contact time between water and lead in plumbing, such as over long holidays or school breaks.

The National Lead Information Center (NLIC) provides the general public and professionals with information about lead hazards and their prevention. NLIC operates under a contract with the U.S. Environmental Protection Agency, with funding from EPA, the Centers for Disease Control and Prevention, and the Department of Housing and Urban Development. Contact the National Lead Information Center for detailed information or questions: 800-424-LEAD [5323], 422 South Clinton Avenue, Rochester, NY 14620.

# Lead resources

**Reducing Lead in Drinking Water: A Manual for Minnesota's Schools**, (16pp). This manual was designed to help Minnesota's schools minimize the consumption of lead in drinking water by students and staff. It offers step-by-step instructions for testing and reducing lead in drinking water. It includes a discussion of legal background and requirements, testing for lead in school drinking water, flushing taps, testing taps, flushing and retesting, other corrective actions, and reassessment. Contains a glossary, a list of Minnesota laboratories certified to analyze lead in drinking water, a lead-testing record form, and a list of other resources.
www.health.state.mn.us/divs/eh/water/schools/pbschoolguide.pdf

**Lead Poisoning Prevention**
www.health.state.mn.us/divs/eh/lead/fs/steps.pdf

**3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance**, U.S. Environmental Protection Agency, Office of Water, Washington, DC , Dec 2005, (99pp), Report No: EPA 816-B-05-008. Provides training for school officials to raise awareness of the potential occurrences, causes, and health effects of lead in drinking water; to assist school officials in identifying potential areas where elevated lead may occur; and to establish a testing plan to identify and prioritize testing sites. Instruction for testing drinking water in schools to identify potential problems and take corrective actions is included, as is advice on how to keep students, parents, staff, and the larger community aware of lead monitoring programs, potential risks, the results of testing, and remediation actions. The manual is specifically targeted at schools that receive water from water utilities or water suppliers such as cities, towns, and water districts. Appendices include a glossary, 18 references and referrals, and a list of state drinking water programs.
www.epa.gov/safewater/schools/pdfs/lead/toolkit_leadschools_guide_3ts_leadschools.pdf

**Lead Safety in Schools**, National Clearinghouse for Educational Facilities Resource List. NCEF's resource list of links, books, and journal articles on lead hazards in paint, soil, and water; managing lead in schools; and lead safety and school modernization.
www.edfacilities.org/rl/water_safety.cfm

**Working in a Lead-Safe School**, Facts for School Maintenance Workers, University of California, Labor Occupational Health Program, Berkeley , 2000, (28pp). This booklet is intended for school custodians and maintenance staff who may work around lead while doing their day-to-day tasks. The discussion includes facts about where lead is found, exposure risks and ways that exposure can take place, effects on the body, and ways to help eliminate lead from school property. The booklet discusses Occupational Safety and Health Administration requirements for protecting workers who are involved in lead work, how much lead exposure is too much, and ways to safely work around lead.
To order booklet, contact: Lead-Safe Schools Project, Labor Occupational Health Program, University of California, 2223 Fulton, St., Berkeley, CA 94720-5120; 510-642-5507
www.lohp.org
www.ist-socrates.berkeley.edu/~lohp/graphics/pdf/leadsafe.pdf

**Safety recalls: Lead**. There is still concern about lead in toys, jewelry, and lunch boxes. These are imported items, where high levels of lead have been discovered in paints, clasps, and trinkets. Recalls are reported by the Consumer Product Safety Council. To subscribe for e-mail notice of recalls, call the CPSC recall hotline at 800-638-2772 or go to:
www.cpsc.gov/cpsclist.asp

# Chemicals management

Source: U.S. Environmental Protection Agency, www.epa.gov/region7/education_resources/teachers/ehsstudy/ehs1.htm

In Minnesota, schools are required to have a hazardous waste management plan for properly handling hazardous wastes (Minnesota Statute § 123B.57). Proper chemical management is critical to preventing and/or controlling a variety of environmental, health, and safety (EHS) issues within any facility. The first step toward initiating proper chemical management is the creation of an accurate chemical inventory along with a copy of the material safety data sheet (MSDS) for each item listed on the inventory. An MSDS is an informational document prepared by the chemical manufacturer or distributor which describes chemical, environmental, and health and safety information available for a particular compound. Understanding the materials present at the school will enable you to understand the issues associated with these substances.

Properly recognizing and controlling the hazards inherent to these materials will enhance your ability to create a safe school with minimal environmental liabilities. Failure to properly manage your materials can create a myriad of difficult and interrelated EHS issues.

## Hazardous materials audit

In order to initiate a hazard analysis of a school system, it is imperative to identify the number, type, volume, and location of the hazardous materials present throughout the school system. The preparation of the chemical inventories provide this basic information. Using this information, you can then identify and prioritize the hazards present throughout the school system as a means to most effectively respond to the problems detected.

## Lessons to keep in mind

- **Be persistent:** Change does not come easily and if motivation for the changes comes from outside the school system, it is likely you will encounter greater resistance to change.
- **Inspect and verify:** Two heads are better than one. Someone must review your actions in order to verify the accuracy and completeness of the task. In addition, the reviewer may have a different perspective and may note something originally overlooked.
- **Provide staff with training and guidance:** The staff must understand the significance of environmental, health, and safety issues in the classroom and the potential hazards and liability associated with these concerns. Training should be conducted during the initial phase of investigating EHS issues. Annual refresher training should also be initiated.
- **Establish staff accountability for chemical use and misuse:** The school system should adopt formal policies requiring the staff to review chemicals and experimental procedures for environmental, health, and safety concerns. The school system should also adopt chemical storage requirements as a means to control access and prevent the theft of materials.
- **Review the text and reference materials used by the staff for instructions regarding environmental, health, and safety issues:** Acquire textbooks and reference materials which describe proper chemical handling and disposal methods. You should also contact state and local environmental, and health and safety agencies to determine if any more specific requirements exist for your area.

### Tips and suggestions

- **Use a smoke bomb to test mechanical ventilation:** This simple and inexpensive test can provide you with a quick and easy qualitative assessment of the function of a chemical fume hood or kiln exhaust. The use of brightly colored smoke will enable you to easily determine if exhaust may be escaping from the test unit, the ductwork associated with the unit, or if the exhaust is reentering other portions of your ventilation system. This is only a quick and dirty analysis designed to check for major problems. This approach does not replace the need to have a trained professional inspect, maintain, and calibrate these units.
- **Seek assistance from local resources:** We are all in this together. Tap into the assistance available from federal, state, and local environmental, and health and safety agencies. Do not overlook local residents, corporations, and medical facilities. These groups have a vested interest as parents and taxpayers, and are frequently willing to provide technical expertise and assistance.
- **Consider chemical compatibility when storing your inventory:** Do not store your materials in alphabetical order but by chemical hazard classification. Failure to consider chemical compatibility prior to storage could cause reactive materials to be stored together and result in a small fire becoming a catastrophic hazardous materials incident. Your emergency responders will appreciate your efforts.
- **Adopt a microscale curriculum:** The microscale concept is to alter your experimental procedures so that you use approximately 1/10th of the amounts originally planned for by the author. Conversion to microscale may require the purchase of new glassware, however the benefits include the development of better techniques by the staff and students, decreased chemical usage, lowered exposure to hazardous materials, and a reduction in hazardous waste generated.
- **Adopt a less-toxic curriculum:** As mentioned, you must review the curriculum to determine if safer, less toxic alternatives can be implemented. Frequently many options exist for providing the same educational experience, however some motivation must be provided to prompt the search for a safe alternative. Consult your state pollution prevention agencies for assistance.
- **Encourage chemical suppliers to post MSDSs on the Internet:** In order to enhance your accessibility to chemical information, encourage your suppliers to post their MSDS databases on the Internet. A number of colleges and universities have begun this effort. Your support and assistance will further the cause and enhance the ability of emergency responders and medical personnel to respond to a chemical accident.

# Chemical Management Resources

**University of Minnesota Chemical Safety Day Program** (CSDP) is a cost-effective waste management program available to educational institutions and nonprofit organizations throughout Minnesota. The CSDP works under the state hazardous waste contract and tailors the program to each customer's specific needs. Contact: Andrew A. Kimball, Chemical Safety Day Program Manager, 612-626-1553, e-mail: kimba013@umn.edu.

**Chemical Management and Usage**, U.S. EPA. This site has a detailed story of a school district's chemical inventory and follow-up actions. Scroll toward the bottom of the first page to find a great list of resources such as OSHA regulations and software, NIOSH information and toxicological registry, chemical management information, a searchable chemical database, a large MSDS database, safety auditing guidance, and much more.
http://cfpub.epa.gov/schools

**Schools Chemical Cleanout Campaign**, U.S. Environmental Protection Agency.
www.epa.gov/epaoswer/osw/conserve/clusters/schools

**Massachusetts Institute of Technology's Green Chemical Alternatives Wizard** is a web-based tool designed to provide information on chemical alternatives for some of the most commonly used hazardous solvents and substances in research laboratories. The Green Chemical Alternatives Wizard provides over 200 journal references and case studies that detail alternative chemicals and/or processes available for hazardous solvents, reagents, and cleaning agents.
http://web.mit.edu/environment/academic/purchasing.html

**Chemical Management Resources**, Wisconsin Department of Natural Resources. This is a diverse list of resources for building managers, teachers, and students.
www.dnr.state.wi.us/org/caer/ce/greenschools/resourcesChemical.htm

**Chemical Safety for Teachers and Their Supervisors**, American Chemical Society.
membership.acs.org/c/ccs/pubs/Chemical_Safety_Manual.pdf

**Hazards in the Art Classroom**, University of Florida.
www.arts.ufl.edu/art/rt_room/teach/art_hazards.html

**Remedies for Reducing Formaldehyde in Schools**, California Air Resources Board.
www.arb.ca.gov/research/indoor/pcs/formald_remedies.PDF

## Chemical information

**Agency for Toxic Substances and Disease Registry.** Federal office offering information on toxic substances, health effects, etc.
www.atsdr.cdc.gov

**Material Safety Data Sheet Index**, Safety Information Resources, Inc.
www.hazard.com/msds

**Small Scale Chemistry**, Colorado State University. Offers materials for chemistry education that increases student safety and reduces school's liability.
www.smallscalechemistry.colostate.edu

# Notes

**Minnesota Pollution Control Agency**

www.pca.state.mn.us

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