



Photo: Innovative Design

Sustainable Schools Create Better Learning Environments

The objective of this Sustainable Schools Guide is to provide you with information that will allow your school system to make informed decisions regarding energy and environmental issues that are important to your school, community, and country.

The concept of sustainable development reflects an understanding that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. A Sustainable School not only embraces the concept of sustainability but is, in itself, a teaching tool for sustainability.

"Good teachers never teach anything. What they do is create conditions under which learning takes place."

S.I. Hayakawa

By implementing the sustainable design practices included within these guidelines, you will be taking a significant step forward in creating the physical conditions in which the learning process can thrive.



Photo: Innovative Design

Supporting Community Values

Supporting Your Educational Mission

Your school is an integral part of the local community and in many ways reflects the values of its residents. Schools have a long history of being the heart of communities. To retain long-term support of parents and the



Photo: Innovative Design

community requires an understanding of how these values should be properly reflected in the many different aspects of the educational process, including how you design, construct, and maintain your buildings.

By incorporating sustainable design strategies you can effectively promote these values, values that are important to every school and every community.

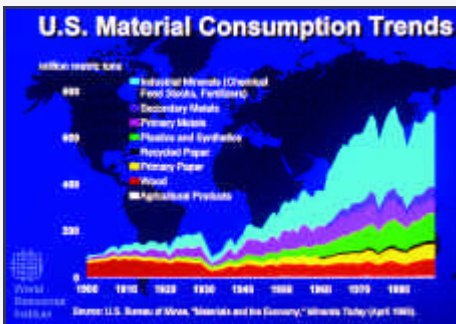
- Designing with History and Place in Mind
- Integrating Your School into the Community
- Sharing School Facilities with the Community
- Incorporating Long-Term Fiscal Policies
- Buying Locally
- Keeping Energy Dollars in Your Community
- Practicing Environmental Stewardship
- Educating the Community About Sustainability

By addressing these important issues, community support and involvement will grow. It will grow because everyone in the community will benefit.

Insuring Success



Photo: Innovative Design



Graph by WRI



Photo: Innovative Design

Student contest during Earth Day 2000 celebration



Photo: Innovative Design

Pedestrian-friendly school

✓ Establish Goals that Reflect Your Community's Values

Supporting sustainable approaches and integrating them into your school's design and activities is a win-win situation for your community and your school. Through the implementation of energy-saving strategies, the school saves money and taxpayers benefit. Additionally, your energy dollars don't leave your immediate area, but stay within the community, helping to build a stronger local economy.

Sustainable building implies the purchasing of local products and services. This is a more sustainable approach because much of the environmental impact associated with materials, products, and equipment purchased for construction involves transportation. The more transportation, the more pollution. Buying locally benefits your community in the same way that retaining your energy dollars helps - it strengthens your local economy.

Implementing energy-efficient, ecologically-sound, sustainable practices will have a direct impact on the air you breathe and the water you drink. Although your school is only a small part of your overall community, what you do, positively or negatively, will have an impact. By reducing energy consumption and utilizing environmentally-sound practices, your community becomes a better place to live.

✓ Get Your Community Involved

The sustainability of our planet can best be addressed by "thinking globally and acting locally." The more comprehensively you address the important issues surrounding sustainable development in the context of your community, the more impact you will have. This requires you to investigate and understand how your school impacts the rest of the community from an energy and environmental perspective and how the community impacts your school. It also requires that you involve every part of your community in the process.

By creating safe pedestrian walkways and bike paths that link neighborhoods to the school, traffic congestion, pollution, and busing costs can be greatly reduced. You can reduce the need for additional facilities and save resources by developing your school so that spaces can be shared by the community. It also adds value and importance to your school. To maximize these potentials requires coordinating with your neighbors, city and town planners, and developers. Your success in addressing these issues will mean a better community in which to live.

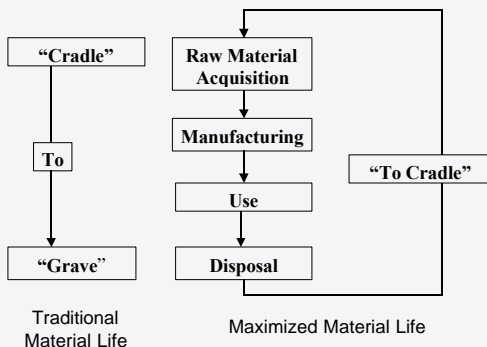
Community's Values



Photo: Innovative Design

Pedestrian friendly school

“Cradle to cradle” life cycle analysis



Using Solar Energy Creates Local Jobs

An analysis by the Wisconsin Energy Bureau found that using renewable energy sources creates about three times more in-state jobs than using imported fossil fuel. With a seventy-five percent increase in renewable energy use, Wisconsin would gain 62,000 jobs, \$1.2 billion in wages, and \$4.6 billion in new sales for local businesses.

■ Importance of Place

- incorporate traditional design elements and local materials as important parts of the architectural design
- develop the school design to reflect the history of the community

■ Integration into the Community

- locate the school to maximize potential as a community resource
- develop the school as an integral part of the overall community design
- incorporate walkways and bike paths that link the school into community sidewalks and greenways

■ Community Use

- design the school so that the athletic fields, gymnasium, media center, and classrooms can be shared at appropriate times with the community
- consider the need to develop the school as a disaster relief, emergency shelter

■ Long-Term Fiscal Responsibility

- implement energy efficiency and renewable energy systems that protect your school system and community against future energy cost escalation
- use life-cycle cost approaches to insure that the best long-term solutions are being implemented

■ Buying Locally

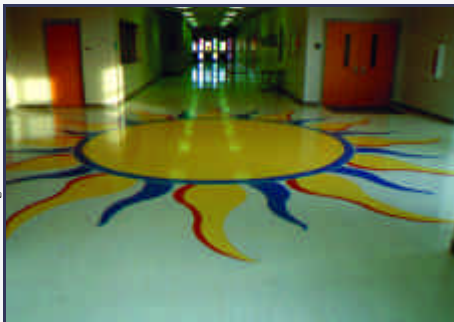
- emphasize the importance of buying local materials, products, and equipment during construction and for maintenance
- employ local labor

Saving Energy Helps Community Two to Three Fold

Studies of towns and cities in the United States indicate that for every energy dollar saved that does not leave the community, \$2 to \$3 in additional benefits will be reaped by that community. By saving energy at your school, the entire community benefits. A multiplier effect takes place that translates these energy saving into additional purchases of local goods and services and additional jobs.



Solar system save energy and helps out environment



Solar graphics in solar school

■ **Keeping Energy Dollars in Your Community**

- employ energy saving strategies that will result in your energy dollars staying within your community

■ **E** Environmental Stewardship

- require recycling of appropriate construction waste and incorporate recycling systems in your school to lessen burden on landfills and help the environment
- implement water conservation strategies that help preserve community water resources
- consider with the potential impact your school will have on local streams and the regional watershed
- incorporate energy-efficiency strategies and renewable energy systems to reduce energy requirements
- employ peak energy reducing strategies that help safeguard against electricity brownouts
- use zero-emissions or less-polluting buses and service vehicles to reduce localized air pollution

■ **A**n Educational Tool for the Community

- utilize the sustainable design features incorporated in your school to educate students and staff, as well as parents and other visitors to the school
- work with other community agencies and developers to take advantage of the opportunity to develop the surrounding pedestrian ways and parks as additional educational experiences

School Route Pathways

Howard County, Maryland

Contact:

James M. Irvin
Director of the Public Works Department
Howard County Department of Public Works
3430 Court House Drive
Ellicott City, MD 21043
Phone: 410-313-4401

A recent partnership between Howard County's Public Works Department and Department of Education has resulted in the installation of miles of new sidewalks that enable students to walk to school safely instead of riding a school bus. Before these sidewalks were installed, students who lived within walking distance of the school were forced to ride a bus for safety reasons.

In addition to improving child safety as they walk to school, the sidewalks benefit other members of the community who can now walk, jog, or bike through their neighborhood, as well as walk to nearby

recreational areas and shopping centers. Pedestrian transportation is an integral part of Howard County's multi-modal transportation system, and the sidewalks connect with public transit routes. Bicycles are permitted on the sidewalks, enabling riders, particularly children, to reach their destination without sharing the roadway with motorized vehicles. The new sidewalks also encourage parents to walk with their children on evenings and weekends to use playgrounds, basketball courts, and fields located on or near school grounds.

The simple, cost-effective step of installing a sidewalk or missing sidewalk link has eliminated 5,400 miles of vehicle trips and corresponding emissions. This program also allowed the Department of Education to reduce the number of school buses, which cost an average of \$10,000 to \$35,000 a year to operate, and to redirect those funds to educational programs. For example, one 900 foot walkway enabled 141 students



Photo: Howard County Dept. of Public Works

to walk to school, and eliminated three buses and 2,000 bus trips per year. This strategy also reduces traffic congestion from buses and parents driving children to school, and the air pollution associated with this vehicular traffic.

The Howard County Department of Public Works and the Department of Education have demonstrated that any community can take the simple step of installing a sidewalk, which immediately makes the community safer for children and other pedestrians and helps improve the local air quality.



Photo: Howard County Dept. of Public Works

Union 32 Community Building

Montpelier, Vermont

"The sunshine is always an added bonus."

"The building is an important part of the spirit of cooperation and collaboration at our school. I expect that we will continue to value it for years to come"

Dot Blake, Principal

Owner:

Union 32 Community Schools
930 Gallison Hill Road
Montpelier, VT 05602

Contact:

Andrew M. Shapiro
Phone: 802-229-5676

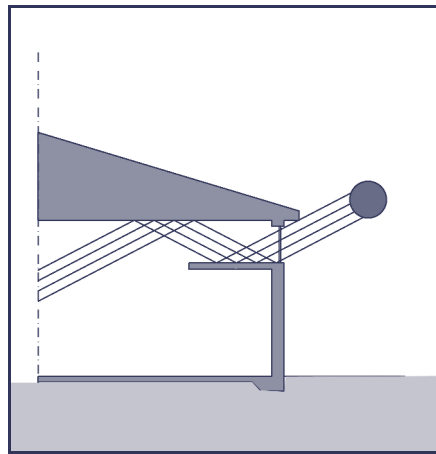
Faced with the prospect of severe overcrowding, the Union 32 High School in Montpelier, Vermont was preparing for the usual short-term fix -- rent portable classrooms. When this news reached Andrew and Carolyn Shapiro, local residents with children in the school, they were not pleased. As an expert in energy efficiency and healthy buildings, Andrew knew that the portable classrooms would likely create poor air quality, bad lighting, and high heating bills. The Shapiros proposed an alternative -- why not have the community work together to build the needed classrooms, and do it right?

Led by Andrew and Carolyn, over 300 volunteers donated time and skills to have the building ready for



Photo: Andrew Shapiro, VT

Sun rays bouncing on interior lightshelves onto ceiling



occupancy by the next September. Many materials were supplied by local businesses at reduced cost. All the exterior siding, trim, and interior trim came from stressed pine trees in a 100-acre woodland owned by the school, and framing lumber also came from a nearby source. The building was completed for a remarkable \$30/square foot -- less than the cost of set-up and two years rent for two portable classrooms!

The building was designed for energy efficiency and is projected to consume half the energy of the portable classroom alternative. Contributing to the energy savings is the row of high windows on the

southeast façade that bounce daylight off a wide interior lightshelf deep into the space. The walls are packed with 7½ inches of cellulose insulation, the windows are low-e with argon gas, and an energy recovery ventilator provides fresh air and saves energy on heating and cooling.



Photo: Andrew Shapiro, VT

Exterior view of windows over interior lightshelves

Perhaps as an indication of how strongly the community feels about this building, they have chosen to move it to make room for the new addition rather than simply tear it down. In addition to a great building (now called the Community Building), the school gained a higher level of commitment and support from the community.

Sunset School

Livermore, California

Environmental Education for Kids! (EEK!) is a comprehensive environmental education program developed by David Darlington that includes composting and recycling of paper, aluminum, and plastic.

Sunset school's principal, David Cooper, implemented the EEK! initiative because it provided a tangible way to involve and educate his students about the benefits of recycling and how it could help address many local and global environmental problems.

Cooper is especially pleased with the cafeteria recycling. The students separate everything they are throwing away so they are very aware of how much waste they are producing and how much is composted, recycled, or taken to the



Photo: Livermore Joint Unified School District

Forest City Schools

Forest City, Iowa

"We will give our students first hand experience in a technology that may be a big part of their energy future. We also want to share this data with other school districts and wind energy enthusiasts."

Dwight Pierson, Superintendent, Forest City Community Schools

The wind turbine project began when Paul Smith, then a student at Forest City High School, presented a research paper on wind energy to the town's school board several years ago as a Forest City High School senior. Smith began researching the benefits of wind turbines for his science project.

"Paul Smith did all the research. We knew we were in a prime area of the state for using wind energy. When we found it would be to the school's advantage, we made a presentation to the school board."

Ron Kvale, teacher and member of the Wind Turbine Task Force.

The presentation generated a great deal of interest and resulted in the installation of the 600 kWh wind turbine. The turbine began producing electricity for the school system in January, 1999. In addition to incorporating wind energy into the classroom curriculum, the school district maintains a web site with a microprocessor-based connection to the turbine displaying electrical production and wind energy data. The turbine provides 80% to 90% of the electrical needs of the community's entire school system.

The Forest City Community Schools view renewable energy and energy

Case Studies

Contacts:

David Cooper, Principal
David Darlington
1671 Frankfort
Livermore, CA 94550
Phone: 925-606-4752

landfill. In addition to the cafeteria paper, aluminum trays, which are used several times a week by the food service program, are taken to a Reynolds collection facility for recycling. Aluminum cans are the only recyclables for which the school receives money, but they do save a lot of money in landfill fees by recycling and composting so much other material.

Owner:

Forest City Community Schools
810 West K Street
Forest City, Iowa 50436
Phone: 641-585-2323

Contacts:

Ron Kvale, Science Teacher
Phone: 515-585-2323



Photo: Forest City Community Schools

efficiency as cost-effective ways to reduce electrical costs while being environmentally conscious and creating opportunities for students to study the benefits of renewable energy production in a hands on manner. The city and its municipal utility have contracted with the school system to buy all excess power generated.

For Helpful Resources and More Information

Initiatives

Alliance to Save Energy

www.ase.org/greenschools

American Electric Power's Solar Schools Project

www.aep.com/environment/solar

Energy Quest

www.energy.ca.gov/education

Energy Smart Schools

www.eren.doe.gov/energysmartschools

Maryland's Solar Schools Program Plan

www.energy.state.md.us/executiv.htm#Plan

On-Line Renewable Energy Education Module

solstice.crest.org/renewables/re-kiosk/index.shtml

Solar Energy: A Science Unit for Intermediate Grade Students

alpha.fsec.ucf.edu/ed/solar-unit

School Going Solar Program- IREC

www.schoolsgoingsolar.org

Solar Schools - Brighter Future

www.ises.org

Solar Now

www.eren.doe.gov/solarnow/solarnow.htm

SolarQuest

www.solarquest.com

Solar Schools

www.eren.doe.gov/solarschools

Training Student Organizers Program

www.cenyc.org/HTML/EE/mainee.htm

Watts on Schools

www.wattsonschoools.com

Organizations

American Solar Energy Society

www.ases.org/solarguide

Center for Renewable Energy and Sustainable Technology (CREST)

solstice.crest.org

Energy Center

www.caddet-re.org

Energy Efficiency and Renewable Energy Network (DOE)

www.eren.doe.gov

Florida Solar Energy Center

www.fsec.ucf.edu

International Solar Energy Society

www.ises.org

Interstate Renewable Energy Council

www.irecusa.org

Million Solar Roofs Initiative

www.millionsolarroofs.org

National Energy Education Development (NEED)

www.need.org/need

National Network of Energy and Environmental Education Professionals

www.leeric.lsu.edu/network/network.htm

National Renewable Energy Laboratory

www.nrel.gov/ceb.html

North Carolina Solar Center

www.ncsc.ncsu.edu

Solar Energy Industries Association

www.seia.org

Solar Energy Research and Education Foundation

www.seref.org

US Department of Energy

www.doe.gov

This document has been developed by Innovative Design with technical assistance from Padia Consulting, BuildingGreen, and the Sustainable Buildings Industry Council and has been extensively reviewed by a technical review committee with broad based expertise in education, as well as energy and environmental issues.

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This document was specifically developed for school board members and school system administrators and it is last in a six part series on how implementing energy-efficient, environmentally-sound construction practices can help you in addressing your educational mission.

The Sustainable Schools Guide includes:

- Reducing Operating Costs
- Buildings that Teach Sustainability
- Improving Academic Performance
- Protecting our Environment
- Improving Health, Safety & Comfort
- Supporting Community Values