

# BUILDING MINDS, MINDING BUILDINGS

Our Union's Road Map to Green and Sustainable Schools



*A Union of Professionals*



Randi Weingarten, President

Antonia Cortese, Secretary-Treasurer

Lorretta Johnson, Executive Vice President

Copyright © American Federation of Teachers, AFL-CIO (AFT) 2008. Permission is hereby granted to AFT state and local affiliates to reproduce and distribute copies of this work for nonprofit educational purposes, provided that copies are distributed at or below cost, and that the author, source and copyright notice are included on each copy. Any distribution of such materials by third parties who are outside of the AFT or its affiliates is prohibited without first receiving the express written permission of the AFT.

A photograph of a brick school building entrance. A person in a light blue jacket is walking away from the camera on a sidewalk. In the foreground, there is a large green ceramic planter with a small plant. The building has a covered entrance with white columns and a set of double glass doors. Large windows are visible on the upper floor. The text 'BUILDING MINDS, MINDING BUILDINGS' is overlaid in blue, with 'MINDING' being significantly larger than the other words. Below it, the subtitle 'Our Union's Road Map to Green and Sustainable Schools' is written in a smaller, black font.

**BUILDING MINDS,  
MINDING  
BUILDINGS**

Our Union's Road Map to Green and Sustainable Schools





# Table of Contents

- 1** Introduction
- 3** Why Going Green Is a Union Issue
- 10** What Makes a School Green
- 16** Health, Productivity and Going Green
- 24** Saving Money by Going Green

## Green School Profiles

- 8** Lockport Township High School, Lockport Township High School District 205, Illinois
- 14** Maywood Academy High School, Los Angeles Unified School District, California
- 20** Pleasant Ridge Montessori School, Cincinnati Public Schools, Ohio
- 28** Barnard Environmental Studies Magnet School, New Haven School District, Connecticut
- 30** Tarkington School of Excellence, Chicago Public Schools, Illinois

## Green Resources

- 34** AFT's Commitment: 2008 Resolution on Green Schools and Colleges
- 37** Contract Language on School Staff Participation in Construction Projects
- 38** School Design that Matters
- 40** Resources, Initiatives and Advocacy Groups
- 42** Endnotes



Acknowledgments: Produced by the staff of the AFT's health and safety program with the contribution of primary author Amanda Spake.



Mary / had / pens  
mother got her / long  
How many pens



# Introduction

Late in 2006, the AFT released the first report in this series, *Building Minds, Minding Buildings: Turning Crumbling Schools into Environments for Learning*. Our second report, which covers the green schools movement is a natural follow-up; it highlights the great work of AFT members and affiliates involved in ensuring that our schools are designed and built in healthy and sustainable ways.

At our most pragmatic, we know that green schools save money. Energy-efficient buildings keep skyrocketing energy costs in check, which in turn frees money for crucial academic and student support services. But “going green” is about much more than just saving money: Green schools mean healthier environments for students and staff. Research shows that better environmental quality yields more productive human beings and greater academic achievement for all students.

Ideally, construction of green schools is prompted by community action at the grass-roots levels with all stakeholders involved—teachers, school staff, parents, students, the community and policymakers. Community action in school construction naturally leads to community involvement. The finished building will continue to draw the wider community inside long after the school is erected. You’ll read about the Green Family Night at Tarkington School in Chicago and about families that spend time in the school after hours at yoga, fitness and dance classes. You’ll read about Barnard School in New Haven, Conn., which has developed partnerships with museums and nonprofit groups.

Union leadership and union action are vital to the success of these efforts. Our members want to be a strong voice in the design, construction and operation of green schools, but they need to be supported in that regard. At PS/IS 210 in Manhattan, my home city, parents and union activists lobbied to bring the Green Schools program to their school. Our Cincinnati local is central to efforts there to meet new state facilities requirements for LEED certification.

From start to finish, green schools demand union involvement. You’ll see that in all the schools you will read about in these pages. I encourage you to use this guide to learn more about this exciting movement and then mobilize your members to action for a healthy environment for every single person who walks into a school building.

**Randi Weingarten**

**AFT President**

“High-performing schools—healthy and sustainable; designed, built and maintained to spark learning and generate pride—cannot be reserved for select communities. They must be part of the academic agenda for every American student.”

FROM **BUILDING MINDS,  
MINDING BUILDINGS:**  
TURNING CRUMBLING SCHOOLS INTO  
ENVIRONMENTS FOR LEARNING







## Chapter One

# Why Going Green Is a Union Issue



“We passed a strong resolution in support of green schools at our state and national conventions. Not only do green schools deliver superior learning environments, they also generate significant savings in energy costs, which can be steered into classroom resources and school services for students.”

**DAVID HECKER, PRESIDENT,  
AFT MICHIGAN AND AFT VICE PRESIDENT**

For two decades, the American Federation of Teachers has been documenting the high cost of deteriorating schools. Students, teachers and staff pay the price for these deplorable building conditions in the form of lower educational achievement, lost income and health problems. The breakdown of America’s education infrastructure exacts a heavy toll not only on those who spend their days inside school walls, but also on the environment in general.

Schools are unique buildings and play an important role in determining the health, educational achievement and future success of their principal occupants. “Kids are the weakest members of our society, and the way we house and educate them is the way we value them,” says architect Anja Caldwell, a member of the Maryland Green Building Council. Schools often become models for the communities they serve.

AFT affiliates have a long history of actively supporting and financing community bond campaigns to replace or renovate inadequate school buildings. But after winning many hard-fought bond battles, too many AFT leaders and their members have been disappointed by the results. Conventional school construction often falls short: Teachers, staff and students inherit new buildings with leaking roofs, inadequate ventilation and other nightmares. Until recently, few comprehensive standards had been developed to guarantee that schools are built well.

PHOTOS: BRUCE CRIPPEN

The frustration with the conventional school construction process led AFT delegates to pass a resolution at the July 2008 convention to support a worldwide movement taking shape to direct schools and school construction toward a “green school” model.<sup>1</sup>

## What Is Green?

Green schools are education buildings that operate in harmony with the natural environment. They are built to reduce energy costs and conserve natural resources, make use of recycled and recyclable materials, and operate in a sustainable manner. Rather than simply meeting local building codes, many of today’s green schools are designed and constructed to standards promulgated by the U.S. Green Building Council (USGBC) and the national Collaborative for High Performance Schools (CHPS).<sup>\*</sup> These standards are exemplified in the USGBC Leadership in Energy and Environmental Design (LEED) rating system (see page 11 for full details on the LEED system), developed to improve the health, productivity and learning of students and to enhance school environments, through the use of sustainable, cost-efficient designs. “When we talk about green schools, we call it a win, win, win,” says Rachel Gutter, schools sector manager for the U.S. Green Building Council. “It’s a win for the occupants, it’s a win for the bottom line, and it’s a win for the environment.”

The concept of “green architecture” is as old as the ancient Greeks and Romans, who built their homes and buildings facing south to take full advantage of heat from the sun. The first attempt at a green school was Rose Elementary, built in 1948 in Tucson, Ariz., by architect Arthur Brown. To keep costs down, Brown used the roof itself as a solar collector. Fans, recycled from the former forced-air heating system, pushed sun-heated air into classrooms.<sup>2</sup>

Today’s green schools make Brown’s early experiment look primitive. Yet, the basic ideas remain the same:

- Cut energy costs through creative use of daylighting,<sup>†</sup> solar heating, and shade and building placement.
- Improve air quality by minimizing or eliminating sources of indoor and outdoor pollution.
- Reduce noise to aid teaching and learning.
- Use recycled and recyclable building materials.
- Conserve water resources.

<sup>\*</sup>There are state-level CHPS operations in California, Massachusetts and New York.

<sup>†</sup>Researchers and designers define “daylighting” as the use of natural light to illuminate building spaces. In a well-designed classroom, daylighting is broadly distributed through the classroom with little or no glare. The goals of daylighting are to reduce reliance on electric lighting and to connect occupants to the outdoors.



PHOTO: THOMAS GIRIOR

- Make the school structure a laboratory for learning and a tool to educate students in environmental stewardship.

## Benefits of Greening

Green schools address one of the greatest challenges in human history: climate change. Fuels and materials used to construct, heat, cool and light buildings—including most conventional schools—produce nearly half of all the greenhouse gases, a major cause of global warming, and a key source for both indoor and outdoor air pollution.

A recent AFT report cites Government Accountability Office studies<sup>3</sup> showing that some 15,000 U.S. schools suffer from indoor air that is unfit to breathe. In addition to greenhouse gas emissions, conventional building materials and furnishings release toxic chemicals, volatile organic compounds, such as formaldehyde, and other substances to the air inside the school. Mold spores, common in deteriorating schools with leaky roofs, along with other biological organisms add to this polluted mix, triggering allergies, and are suspected of increasing new cases of respiratory diseases,<sup>4</sup> particularly asthma, which is the most common chronic illness among children under age 15. Asthma also is the leading cause of student absenteeism in schools, accounting for more than 14 million missed school days each year. Work-related asthma is also highly prevalent in education employees according to the National Institute for Occupational Safety and Health (NIOSH).<sup>5</sup>

Through both conservation and reliance on renewable energy sources, a green school can reduce greenhouse gas emissions significantly: an estimated 1,200 pounds of nitrogen oxide; 1,300 pounds of sulfur dioxide; 585,000 pounds of carbon dioxide, the principal greenhouse gas; and 150 pounds of particulate matter *every year* from one school alone. Higher ventilation rates in green schools dilute the concentration of indoor pollutants as well as control humidity and temperature, which results in less mold and reduces the spread of viruses. Use of nontoxic building materials, floor and wall coverings, and green cleaning products also reduces chemical emissions.

Improved air quality translates into an estimated 25 percent drop in asthma, and as much as a 20 percent decline in viral illnesses, such as flu, or symptoms of “building sickness,” like headaches and fatigue. Students and faculty have fewer sick days, lower rates of absenteeism, and decreased medical costs. There is also evidence that better air quality improves student productivity and test scores, and by providing a better working environment, increases teacher retention rates.

The National Academy of Sciences (NAS), which looked at the advantages of green schools in a 2006 report,<sup>6</sup> noted that excessive background noise found in many conventional schools is impairing students’ ability to learn and achieve. The NAS noted that background noise levels in many classrooms are 10 times too loud. High background

---

“Building green schools will put millions of dollars back into classrooms.”

**RACHEL GUTTER**  
**U.S. GREEN BUILDING COUNCIL**





PHOTO: BRUCE GRIPPEN

noise in schools affects students' memory, attention and speech recognition. Studies of 9- and 10-year-olds show that chronic exposure to aircraft and road traffic noise reduces reading comprehension and cognitive performance. Noise levels in schools also can cause voice strain for teachers and may contribute to absenteeism.

Green schools are designed to control noise from heating and cooling systems, and reflected noise from outdoor or indoor spaces. The acoustical standards for green schools are set to ensure that a teacher's voice is clearly understood by younger children against background noise. As a result, cognition and productivity improve.

Green school design emphasizes the use of high-performance lighting, daylighting and natural outdoor views, while managing glare. Research beginning in the 1930s has consistently shown that good lighting improves test scores and plays a major role in student achievement, and bad lighting reduces student performance. An analysis of the results from 53 recent studies on daylighting in green schools indicates this design feature also leads to higher student achievement.

Green schools, in short, offer "what most teachers wish for in a classroom," says Rachel Gutter of the U.S. Green Building Council. "You want a place where you can breathe and the students can breathe healthy air, where you don't have to strain your voice to be heard. You want a place you can enjoy with access to daylighting and views, a classroom that is comfortable in temperature, not too hot or too cold. You want an environment optimized for learning ... a place that is comfortable, healthy, and set up for teaching and learning needs."

## Saving Green

The only argument *against* green schools, in fact, is the misconceived notion that green schools cost more to build—that they come at a premium price. Teachers sometimes are made to believe that money for building green schools will take funds away from their classrooms. But this is not the case, says Gutter. "Building green schools will put millions of dollars back into classrooms. This is a choice that is going to free up money for teachers and their classrooms, not take it away from them." She points to a cost analysis recently done by Ohio<sup>7</sup> that has led the state to decide it will now build only LEED-certified green schools.

In 1997, Ohio set up a School Facilities Commission and embarked on an ambitious program to rebuild all 3,500 of its public schools. The state began with the school districts in the highest-poverty areas, building conventional schools according to its own state school construction standards. When the U.S. Green Building Council released its LEED rating system for green schools in 2007, Ohio did an analysis of the cost of building and operating a model 130,000-square foot green middle school, versus a 130,000-square foot conventional middle school of the type the state was then building.

“The model showed we would save \$6 million over the 40-year life of that one school if we built a LEED-certified green school,” says Franklin Brown, planning director for the Ohio School Facilities Commission. “Then, we put that figure into a spreadsheet of all the schools the state was rebuilding, and we found we would save \$1.4 billion in energy savings alone if we built green schools,” compared with the conventional way the state had been building schools.

This was a stunning statistic. In September 2007, the Ohio School Facilities Commission adopted a resolution requiring that all schools designed after that date, and built partially or fully with state funds, achieve a level of LEED certification. “Any state can do this same type of analysis,” says Brown. In fact, he’s recently traveled to Arkansas and Missouri to discuss why Ohio decided to go green, the financial imperatives and what the state feels it will get for its green investment.

Brown likes to list all the attributes of Ohio’s new schools: “environmentally friendly materials, so we don’t raise asthma levels and reduce absenteeism for students and staff; daylighting in every classroom; better temperature and humidity control; we plan to eliminate toxins, like formaldehyde; we’re going to greatly improve acoustical quality of the classrooms. ...” But in the end, he says, going green is about improving the quality of education available to Ohio children. “All of this will enable our schools to attract a higher level of staff,” Brown adds. “Everybody is going to want to work in these schools.”

When Brown travels and speaks to educators in other states, he says they can’t hear enough about the advantages of green schools. “But they don’t think it’s possible to do in their state. I tell them that if Ohio can build only green schools, then other states can do it, too.” So far, 12 states and the District of Columbia have passed legislation requiring that all new schools be LEED-certified or meet standards set by state incentive programs that are similar to the LEED rating system.\*

The ultimate value of going green to any school district or state education system will be whether green schools can draw and retain good teachers, and increase students’ desire to learn. So far, on those tests green schools are getting high marks. “My colleagues love this school,” says Marjorie Drucker, who teaches at the Barnard Environmental Studies Magnet School in New Haven, Conn. “They love what this green focus has brought to the school, the gardens, the ability to work with outside environmental partners, and the way it enhances the children’s educational experience beyond the core curriculum.” The students, she says, love coming to school as never before. “It’s fascinating and energizing, and it provides them with the momentum to get excited about school.” Could there be a better argument for going green?

\* States with requirements: Arizona, Colorado, Connecticut, Hawaii, Illinois, Maryland, Rhode Island, Washington and the District of Columbia. States with incentives: California, New Hampshire, New Mexico and Pennsylvania. New York has developed detailed Collaborative for High Performance Schools guidelines. Other states, such as, Texas are in the process of developing similar guidelines.

Students love coming to school as never before. “It’s fascinating and energizing, and it provides them with the momentum to get excited about school.”

**MARJORIE DRUCKER  
BARNARD ENVIRONMENTAL  
STUDIES MAGNET SCHOOL**



PHOTOS: LEE BALGEMANN

## Lockport Township High School, Lockport, Ill.

**K**enny Kirkland, custodial supervisor at Lockport Township High School, in Lockport, Ill., is a pioneer in the use of green cleaning products. Illinois law mandated the use of these products in all schools beginning in May 2008. "But we got on the bandwagon early," Kirkland says. In 2004, one of the school's salesmen brought in a Green Seal product\* and told Kirkland that "this is going to be the wave of the future." Kirkland was skeptical, at first. "I thought 'yeah, sure,'" he recalls.

But Kirkland took the idea to William Thompson, director of facilities for Lockport Township High School District 205, and the two men discussed the pros and cons of going to green cleaning. Thompson had been testing indoor air quality in the high schools and was looking for ways to reduce con-

\* Green Seal is a nonprofit organization that has been certifying a wide variety of products including commercial cleaners since 1992. Companies that want to receive Green Seal certification must document rigorous scientific testing of their products to prove they do little or no harm to the environment and human health.

taminants in classroom air. He and Kirkland "were the two guys who got this going," remembers Thompson. "We tested different green products one at a time, and as we switched over, we'd give them to the custodians to try out. We discovered these things clean as well as the other stuff we were using. They were healthier, they were cost neutral and the custodians liked them. The custodians seemed to take pride and ownership in the change." The Lockport district went green as a matter of policy in 2005.





For custodians like Barbara Wright, who has worked at the high school's east campus

for three years, the change to green cleaning gave her new insights into the impact of her work. "Kenny relayed the message that the district had made the decision to go green," Wright says. Kirkland explained to the custodial crew that the chemicals contained in traditional cleaning products end up in landfills. "We don't realize it, but they get into the air, earth and water," Wright explains. But the products they use now don't get back into the earth. "They don't ruin the environment."

Wright also has found that the green products are far easier on her skin. The conventional cleaners made her hands dry out, crack and sometimes break out in a rash. The green products "don't affect my skin like a



lot of the older chemicals," she says. And the downside? The only thing Wright's found is that it's more difficult to clean hard-water stains from the toilets.

Kirkland says that there's an increasing variety of effective green cleaners these days. "There are better products all the time. And it's better for the environment," he says. Going green also has reduced some of the stress in his job. "I don't have to worry about toxic chemicals getting sprayed all over the school."

## Chapter Two

# What Makes a School Green

“No one has better insight into what makes classrooms the best possible learning environments than the teachers and paraprofessionals who work in them. That’s why school districts should know they’ll get better results by involving school staff and their union in school design decisions.”

LORRETTA JOHNSON,  
EXECUTIVE VICE PRESIDENT,  
AMERICAN FEDERATION OF TEACHERS

There are a number of factors that make a school green, and two of the most important are the planning process by which the school is designed, and the standards used to construct and operate the building. These two aspects of school construction separate a green school from every other type of conventional facility. To guarantee that buildings meet the need of schools and staff, it’s critical to get union members involved in these processes early.

**The Charrette:** One of the ways planning for a green school is done is by means of a several-day meeting, or a series of meetings called a charrette. The word “charrette” comes from a kind of final exam given to architectural students in France in the 1800s. The students were presented with an architectural design problem to solve within an allotted time. When the time was up, they would take their drawings from their studios to the school in a two-wheeled cart called a “charter.”

The term evolved into a word describing a visual brainstorming session by design professionals. Today, a “green school charrette” is a planning process that brings together students, parents, teachers, staff, the community, district officials, architects, engineers and every other type of stakeholder in a school. Working together, their role is to design a school building that meets the diverse needs of its students, teachers and staff; is healthy and pleasant to spend the day in; is economically and environmentally sustainable; is useful to the community; and satisfies local and national green building standards.

“The idea of a charrette is a meeting of the minds,” says Robert J. Kobet, president and CEO of Sustainaissance International, a consulting company specializing in green school construction. Kobet, an architect by training, is conducting charrettes in Florida and Ohio, two states with ambitious green school building programs. “The extent to which the stakeholders are diverse and nontraditional is directly related to how successful a green school charrette will be,” he says.

In Ohio, for example, Kobet often facilitates meetings between groups that work on a specific design problem common to all Ohio green schools. In Florida, however, the charrettes tend to be large, public meetings focusing on all the design features for just one school. “The great thing that happens is the insight that planning teams get when they hear input from a diverse population on what is important to them,” Kobet explains. “If you don’t, for example, include people representing the curriculum—such as teachers, the school and the community—then you are not availing yourselves of what a green school has to offer.”

Kobet’s message was underscored by the teachers, staff and other union members, as well as the community and parents, who participated in the long-running charrette to plan the new Pleasant Ridge Montessori School (see page 20), Ohio’s first LEED-certified school, which opened in fall 2008. “Originally, there was a design committee made up of teachers and staff members, community members, and the architect. We met many times over the course of a year,” says Donna Kinney a charrette participant and former Pleasant Ridge teacher. “We had someone on our committee who was an architect at the University of Cincinnati who pushed for a lot of the elements we would need to become a LEED-certified green school. The school district really didn’t know about what we were planning until we had to present it at a board meeting. But in the end, I think the exciting thing is everybody having a say—the teachers, the staff, the district, the architects, the community.”

**LEED Certification: Leadership in Energy and Environmental Design (LEED)**—that plaque on the wall—is a third-party, trademarked rating system for all types of construction projects. The LEED for Schools rating system, which is designed specifically for K-12 schools, differs from the LEED systems for other buildings in that it takes into account the special needs of children, teachers and staff, as well as the unique nature of schools in the lives of families and communities.



PHOTO: LEE BALGEMANN



---

“LEED certification is like a report card for designing, building, and operating a school.”

**RACHEL GUTTER**  
**U.S. GREEN BUILDING COUNCIL**

LEED for Schools places a high priority on classroom acoustics, for example, and indoor air quality, mold prevention, ventilation, lighting, incorporation of the school’s green features into the curriculum, and use of the school by the community. Energy efficiency to save school districts cash plays a central role in LEED certification. Jessica Kates, a manager for sustainable and high-performance buildings at Gilbane Construction, a Rhode Island-based company that builds green schools in Connecticut and other states, says green architects and construction firms think of LEED certification as “an achievement test for the building.”

The way a school becomes LEED-certified, is through a rating and points system in each of these categories:

- Sustainability of its location, given transportation and open space needs of its occupants and the community it serves;
- Energy and water conservation and use of renewable energy sources;
- Use of recycled, renewable and nontoxic construction materials, and recycling of materials during construction and operation;
- A high level of indoor environmental quality—meeting standards for clean air, low noise, comfortable temperatures, daylight and high-performance lighting, elimination or prevention of mold and toxic emissions from furnishings or construction materials;
- Innovation in design, and use of the school building as a teaching tool and a community asset.

Once ratings are totaled in each category, a school may be awarded certification at one of four ascending levels: certified, silver, gold or platinum. And after a school is certified, there is a LEED for Existing Buildings, which focuses on maintenance practices needed to keep the school operating as intended.

“LEED certification is like a report card for designing, building, and operating a school,” explains Rachel Gutter of the U.S. Green Building Council. “This is how you know what you’re getting. This is a way teachers, staff, parents, school districts and the community at large can be assured that children are going to school in healthy places, and that their tax dollars are being well spent.”

There are state voluntary incentive and rating programs similar to LEED that have been adopted by California, Massachusetts, New York and other states. The Collaborative for High Performance Schools or CHPS National, a coalition of these states, has a process similar to the LEED for Schools rating system while giving a bow to regional climate and construction differences. CHPS has also created a rating system for portable, modular or temporary structures (often referred to as “relocatables”). Any teacher or paraprofessional who has spent time in a portable building knows that conditions there can be miserable. Standards for these buildings will help rid schools of substandard portables.

Most states are moving toward use of some type of CHPS or LEED rating system for school construction “because it gives people the incentive to build green,” says Tom Rog er of Gilbane Construction, project manager for a \$1.4 billion school reconstruction effort in New Haven, Conn., which is the largest per capita school construction project in the nation. “It’s either LEED or some sort of energy-efficiency standard for school buildings, because anything you do to save energy generally pays for itself,” Rog er adds.

In Rog er’s mind, there is nothing wrong with these state and local standards, such as CHPS in California, or MA-CHPS in Massachusetts, because they generally follow the guidelines inherent in LEED for Schools. State officials often give districts the choice of using LEED certification or these local incentive programs, or both, to meet green school standards. “New Haven has its own standards, which emulate LEED,” Rog er says, “and all of the new schools will be capable of LEED certification.” But it also makes sense to have local rating standards, he adds. One good example might be rainwater reuse and storage, one LEED rating category, where geography and weather conditions may dictate different incentives. “In the Northwest, for example, you wouldn’t want to collect and store all that rainwater. But in the Southwest, water conservation is a much higher priority.”

In the end, successful planning and certification of a green school works best as the result of a public process where all stakeholders participate. “It’s not a top-down, cookie-cutter process,” says Rog er. Each of New Haven’s new schools has an advisory committee made up of teachers, the principal, staff, neighbors, local politicians and others who meet monthly—New Haven’s version of green school charrettes. “During the design phase, this advisory committee has direct input into the design of the school,” says Rog er. “This gets a lot of local and education input into the process, and generates a huge sense of ownership in the project. Where you have an advisory process like this, the end result is so much better.”



PHOTO: BRUCE CRIPPEN

# Maywood Academy High School, Maywood, Calif.



Located about eight miles southeast of downtown Los Angeles, Maywood is the most densely populated city in California. About 6,500 households and 28,000 residents are crowded into 1.2 square miles, a parcel of land where two freeways meet. The city's residents are young; nearly 63 percent of households include children under age 18. So, good schools are a priority.

The Los Angeles Unified School District (LAUSD) chose Maywood as the site for one of its first two showcase green schools. The Maywood Academy High School, which opened in 2006, now has nearly 1,500 students. The curriculum offers classes in visual and performing arts, architecture and design, film and

television, and information technology. And the building was designed to enhance student achievement in each of these areas.

Maywood's three-story structure incorporates maximum use of daylight through windows, light shelves and solar-tube skylights on the top floor. Most spaces offer natural ventilation, and the doors and windows are connected to the heating and cooling system, so when windows are open, the systems cycle down.

Reclaimed water is used to irrigate native, drought-resistant landscaping. An underground rainwater detention system reduces storm-water runoff. Maywood's energy performance is about 30 percent better than

that required by California law. The school is within walking distance for most students, near public transit, and provides bike lanes and bike racks to encourage cycling rather than driving to school.

The high school has a large number of students for whom English is a second language (more than 96 percent of the city's population is Latino), so noise reduction and good acoustics were key to the school's design. Every classroom features sound-absorbing wall panels and ceiling tiles, and dual-pane windows reduce noise from traffic and freeways. Mechanical systems are isolated from the classrooms to further limit noise.





“The teachers do not complain about the outside noise here,” says Maywood principal Sandra English. “We like the look of the school, the polished concrete floors, and there are a lot of windows.” She is especially impressed with the solar-tube skylights that brighten the third floor. “At first, teachers didn’t want to be on the third floor,” she says, because they had to navigate so many stairs. “But now they like it better because of the light.”

English is disappointed, however, that so many of Maywood’s teachers close their blinds, shutting out the daylight that was so carefully designed into this green school. She thinks teachers and staff may not be aware

of studies showing the positive impact that natural light has on student performance. This points to one important aspect of maintaining and using green schools once they have been built: educating teachers and staff about the many benefits of green design.

LAUSD facilities chief Guy Mehula discussed this topic when the school opened. “We have different systems at Maywood Academy,” he says. “Not only does the facilities staff have to be trained on using the systems, but it is important that teachers and other staff are educated as well so they can maximize the school’s green features.” Principal English says that this kind of education has yet to be implemented, but she thinks

teachers and staff would be very open to it.

Attendance at Maywood is in the 90th percentile, one of the highest daily attendance records in the district. Evelyn Mahmud, LAUSD’s former director of support services, believes the school’s high attendance reflects the decision to build green. “The message sent to the students in this community is: ‘You do matter,’ ” Mahmud says. Students had the option of going to Maywood or a conventional high school, she adds. “They chose Maywood because it is new and environmentally beautiful, and they have a sense of pride in being the first students at the school.”

## Chapter Three

# Health, Productivity and Going Green

“Even buildings are part of the village our children must have to ensure their best education. Safe and healthy school buildings are keys to a sound education.”

**DENNIS KELLY, PRESIDENT,  
UNITED EDUCATORS OF SAN FRANCISCO  
AND AFT VICE PRESIDENT**

---

When architect Anja Caldwell first came to the United States from her native Germany 11 years ago, she was appalled at the way school buildings were designed and constructed here. “In Germany, we built every school to very high standards,” she says. “But when I came to this country, I learned how *unsustainable* building is done—some of the schools I’ve seen are just terrible.”

As the former green building manager for the Montgomery County, Md., schools, Caldwell led construction of the district’s first LEED-certified school, Great Seneca Creek Elementary, which opened in 2006. The school is still in its infancy, Caldwell says, but positive changes already are obvious. “I think the increase in productivity is the biggest advantage for me,” she says. “All of the things you read about green schools—the improvement in student productivity, a decline in absenteeism with daylighting and better air quality—they’re all true. We saw that at Great Seneca.”

AFT members witness firsthand the consequences of working and learning in a poorly built environment. Their observations are supported by several studies from education researchers, environmental scientists and state school commissions. The collective findings document the powerful effect the quality of a school’s indoor environment has on the productivity and achievement of those who spend their days inside that school. The top four environmental factors in buildings that most affect the health and performance of occupants are:

- Indoor air quality;
- Dampness and thermal comfort;
- Acoustics; and
- Lighting and views.

Through the LEED rating system and state certification programs, green schools are designed and constructed to address each of these factors.

Indoor air quality in many of today's conventional schools is an impediment to learning and achievement. "There are some [conventional] school buildings where the ventilation is so poor, and you have 30 kids in a room. The carbon dioxide levels go up so high, it's amazing that anyone can even stay awake," says Tom Rog r, project manager for the New Haven, Conn., green school construction program.

Richard Shaughnessey, director of the Indoor Air Program at the University of Tulsa, studied the impact of ventilation on achievement in fifth-grade classrooms in 54 elementary schools. Test scores in both reading and math suffered in classrooms with the poorest ventilation, while scores in better ventilated rooms were higher.<sup>8</sup> Similarly, a study of 409 classrooms in Idaho and Washington found that student absences jumped by 10 percent to 20 percent in rooms with poor ventilation.<sup>9</sup>

Can higher ventilation rates actually improve academic performance?<sup>10</sup> That's what researchers in Denmark wanted to find out. They took one fourth-grade classroom with typical ventilation (about half the ASHRAE\* standard) and gave the students math, reading and reasoning assignments. In another classroom, children were assigned the same tasks, but the ventilation was increased to just over the ASHRAE standard. After a week, the conditions were reversed in both classrooms, so the same children were tested under both conditions. In classrooms with increased ventilation, children's test scores were higher: 14 percent higher in addition; 15 percent in multiplication; and 14 percent in subtraction and numbers comparison.

The Denmark researchers also showed how room temperature was linked to performance. When the room temperature was reduced from around 80 degrees or higher to 68 degrees, these fourth-graders completed 28 percent more subtraction problems and read about 24 percent faster. A previous study found that the best temperature range for learning reading and math is between 68 degrees and 74 degrees. A comfortable humidity level is usually 40 percent to 50 percent. The ability to learn declines as room temperatures increase above 74 degrees, particularly if humidity and dampness also increase.

Green schools tackle serious indoor air, temperature and moisture problems both by diluting air pollutants with more ventilation and by reducing sources of indoor air pollution. Heating and air conditioning systems that meet national ventilation standards, and keep temperature and humidity at comfortable levels, are required for green school certification. Likewise, windows that open, views and daylight are also part of the rating system. School design and construction that improve indoor environmental quality beyond the standards earn a school more points toward a higher level of certification.

Green schools are making use of new types of ventilation systems, carbon dioxide sensors

\* The American Society of Heating, Refrigeration, and Air Conditioning Engineers develops standards for its members and for others professionally concerned with refrigeration processes and the design and maintenance of indoor environments.



PHOTO: BRUCE CRIPPEN



---

“Many of the reasons that had been put forward for eliminating windows had to do with construction costs, operating costs, security, privacy, distractions. Now, we know that the benefits most likely outweigh the disadvantages. Staff and children are happier, healthier and have better cognitive function. And that is the main purpose of the building, right?”

**LISA HESCHONG**  
**HESCHONG MAHONE GROUP**

to control air flow, and other new systems to enhance classroom comfort and reduce energy consumption. HVAC (heating, ventilation and air conditioning) systems used in conventional schools mix the room air with fresh incoming air and recirculate it, recirculating contaminants at the same time. Displacement ventilation, like its green cousin, underfloor air ventilation, makes use of a natural floor-to-ceiling air flow pattern to more efficiently remove heat and contaminants from the classroom, as they bring outside air in.

Another tried-and-true way to improve classroom air and temperature is by opening the windows—if they can be opened. According to the U.S. Green Building Council, “Operable windows are perhaps the single most desired feature [school] occupants request. ...” Windows don’t just increase ventilation, they also let in daylight, specifically, full-spectrum sunlight. Windows and daylight were central to school design until the 1970s, when windowless offices and classrooms came into fashion because they were thought to be more energy-efficient. But a 1992 Canadian study<sup>11</sup> on lighting in schools set the notion of windowless classrooms on its head.

The study compared two groups of age-matched schoolchildren exposed to different types of classroom lighting over a two-year period. Students exposed to full-spectrum light, equivalent to daylight, had fewer absences, nine times less tooth decay, better moods, and they grew nearly an inch taller than those in classrooms with traditional fluorescent lighting. The importance of daylighting in schools became clearer as some of the first daylight green schools began to open.

In a 1999 study on daylighting in more than 2,000 classrooms in California, Colorado and Washington, conducted by the Heschong Mahone Group,<sup>12</sup> students with the most daylighting in their classrooms learned about 21 percent faster than students in rooms with the least amount of daylight. In schools in Capistrano, Calif., these researchers also discovered that students with the largest window areas progressed 15 percent faster in math and 23 percent faster in reading, compared with those having smaller windows or none at all. Subsequent follow-up studies have verified or expanded these results.

“We were especially surprised by the strong statistical association between better views and better performance,” says lead researcher Lisa Heschong. “Many of the reasons that had been put forward for eliminating windows had to do with construction costs, operating costs, security, privacy, distractions. Now, we know that the benefits most likely outweigh the disadvantages. Staff and children are happier, healthier and have better cognitive function. And that is the main purpose of the building, right?”

Just as the impact of daylight was ignored by school planners for years, noise levels in many conventional schools have not been a top priority in conventional school design. A report by Congress’ Government Accountability Office reported that more than 11 million students attend schools where classrooms do not meet minimum acoustical standards.<sup>13</sup>

A large body of research shows that excessive noise impairs students' memory, speech recognition, their ability to pay attention, and among the youngest students—kindergarten through grade 2—their ability to learn to read. The youngest students need quiet to hear how words break apart phonetically and to discriminate between the sound of similar words with very different meanings, such as “pit” and “pet.”

The vast majority of teaching relies on students being able to hear and understand spoken speech, and being able to read and comprehend at grade level or higher. So, green school certification requires that schools meet the classroom noise standard set by the American National Standards Institute of a maximum ambient noise level of 35 decibels. This is the level of ambient noise over which a teacher's voice can be clearly heard and understood. By comparison, a whisper is around 20-25 decibels, and the human voice spoken normally is from 65 to 70 decibels.

Even as the number of green schools increases, research on the impact they are having on health and learning has yet to catch up with the excitement these schools are generating among educators. But some very encouraging reports have been completed:

- In North Carolina, two elementary schools with among the lowest test scores and rates of teacher retention in the state, were replaced in 2002 by one new green school, Third Creek Elementary in Statesville. The same students, with the same teachers, improved from only 60 percent at grade level in reading and math to 80 percent on grade level—the largest gain in the school system.
- In Oregon, students moving into the new Ash Creek Intermediate School in 2002 experienced a 15 percent reduction in absenteeism and 50 percent fewer cases of colds and flu, attributed to better indoor air quality.
- A report prepared for the Washington Legislature in 2005 on the projected impact of building high-performance green schools, predicted that if new schools were green, the state could expect to see:
  - Five percent higher student test scores;
  - Five percent fewer teachers leaving the state schools; and
  - Fifteen percent less absenteeism.

Over the next few years, the benefits of green schools will be documented, as more schools open and more studies are completed. Teacher Natasha Schaefer, who recently switched from a conventional school to the Tarkington School of Excellence (see page 30), a green school in Chicago, captures much of their promise when she describes the differences she sees in her students and her colleagues in the new school. “This is a work in progress for us,” she says. “It’s new to us. But having taught three classes of kids at this school now, I see the difference. They show up. They like being here. They are super involved. I believe that will directly affect their learning process. And for the teachers, you have room to grow here. You see the potential, and you want to be a part of that.”



PHOTO: LEE BALGEMANN



# Pleasant Ridge Montessori School, Cincinnati, Ohio





When teachers, staff, parents and members of the Pleasant Ridge community in Cincinnati, Ohio, came together the first time three years ago to discuss a new Montessori school proposed by the Cincinnati Public School District, no one knew it would become the state's first LEED-certified green school. The story of how this declining neighborhood school—plagued by below-average test scores and a dwindling student population—became the jewel of the school district shows how going green can offer new life to public education.

It began with a charrette—though most people didn't know their meetings were called that when they first took place about three years ago. "Originally there was a design committee made up of teachers and staff members, community members, the architect and others," says former teacher Donna Kinney who was involved in the planning process. "We met many times over the course of the year. We had someone on our committee who was an architect at the University of Cincinnati who pushed for a lot of the elements we would need to become a LEED-certified green school."

The two architectural firms the district had contracted with to design the new school were very receptive to the planning group's green ideas, Kinney says, but a green building was not what the district had envisioned. Jeffrey Sackenheim, an architect at SHP Leading Design, says that in response to the community's interest in sustainability, his firm scrapped designs for a conventional school after attending some of the planning meetings. Number one on the community's agenda "was a green school that would have a positive impact on students and staff."



No one was sure how the Cincinnati school board would react to the change. The construction costs for the green school would run a bit higher than the district's plan for a conventional building to replace the 100-year-old elementary school. "There are some things that we were planning that will be cost-effective later on," says Kinney, "but the maintenance budgets and the construction budgets for the district are different."

This question of separate budgets is a problem many union and green school advocates face. Kinney thinks the group at

Pleasant Ridge was able to circumvent any objections by showing the district both the future cost savings and the advantages a green school would have in attracting new students to an out-of-date institution that had been losing students for more than a decade.

"Each year the enrollment would drop a little bit," recalls Shawn Williams, who has taught at Pleasant Ridge for more than 15 years. "We were losing students to charter schools, private schools, to all types of schools. The problem was the program. Our

test scores weren't as good as the private schools'."

Teachers were eager to be trained in the Montessori method because they believed it would help the students achieve more, faster. They also felt improvement in the educational program went hand in hand with a new type of school. "Pleasant Ridge was out in front because of the architect who was involved with the community planning," says Ohio School Facilities Commission director Franklin Brown. But it didn't take long for the state as a whole to catch up.

As discussed in Chapter One, in 1997 Ohio embarked on a massive program to rebuild all of the state's 3,500 schools; building green schools, as opposed to conventional ones, would save the state an estimated \$1.4 billion in energy bills alone. All schools built after September 2007 must achieve at least LEED Silver certification. Ohio plans to build about 250 new green schools in the next two years; 40 are currently under construction and have registered for LEED certification. Pleasant Ridge Montessori is "the first K-8 school to be LEED-certified," Brown says proudly.

The new Pleasant Ridge opened in August 2008 to rave reviews from teachers, staff, parents, students, the local community and education officials alike. "The rooms allow us to set up a Montessori school the way it should be set up," says Williams. "There is a lot of daylight, and a peaceful environment. The building allows the kids to focus on their work and master what they're learning."

All classrooms have large southern-exposure windows to maximize daylighting. Radiant floor heat and underfloor air-delivery systems will save energy costs, aid in removal



of pollutants, and help maintain proper temperature and humidity in the school. Indoor air quality and temperature control in the classrooms is an enormous improvement, Williams says. "The old school had no air conditioning, and it would get so hot and muggy with Cincinnati's 98-degree days that the kids couldn't focus." Use of nontoxic floor tiles and formaldehyde-free carpeting also will improve indoor air quality. The custodial staff has been working with local environmentalists on the use of green cleaning products, and the school has established

a schoolwide recycling program for paper, plastics and aluminum. Plans for future installation of solar panels will reduce energy costs even further.

Although the school opened only a few months ago, the building already is becoming part of the curriculum. "We're talking more about the environment to the students," explains Williams, "and how to protect it. We're discussing the aspects of the building that work toward that goal. The kids are really curious; they can see various parts of the building, and they are fascinated





by it.” A statewide planning group is working on ways to make the sustainable design features in Ohio’s new green schools useful tools in the curriculum.

And as many had hoped, enrollment in Pleasant Ridge is skyrocketing. The school was projected to have 317 students in the 2008-09 school year. “But we’ve enrolled over 500,” Williams says. Community interest and excitement over the new Pleasant Ridge have been phenomenal, she adds. “We had an open house before we even moved in. There were hundreds of people

who came—alumni, the community, parents, prospective students, teachers, staff and representatives from the district. We had information sessions where potential students and their parents could come before school opened. We had tours. And people were constantly saying: ‘Tell me about the green school. What materials are they using?’ People were fascinated that the lights go off when the class leaves the room to conserve electricity,” Williams says.

What all of this means is that Pleasant Ridge is experiencing rebirth and growth be-

yond anyone’s expectations. “We’ve added a lot of new students, and they keep coming,” Williams says. “We’ve added new teachers, new instructor paraprofessionals, and we’re going to continue to add.” But perhaps the most important change for Williams, and many teachers and staff, has been the outpouring of public effort to make this new green school a symbol of pride and progress in the community. “It has been amazing to me,” she says, “how much the community has rallied around to support us as we have gone through the transformation.”



## Chapter Four

# Saving Money by Going Green

“When you consider the rising cost of energy and the growing awareness of the fiscal and environmental impacts of operating school buildings, it only makes sense to invest in green buildings. Building green means districts can greatly reduce their energy bills—a savings we can pass on to students in the form of more resources for learning.”

LOUIS MALFARO, PRESIDENT,  
EDUCATION AUSTIN (TEXAS) AND  
AFT VICE PRESIDENT

In 2001, Guy Mehula, chief facilities executive of the enormous Los Angeles Unified School District, faced what at first seemed to be an insurmountable task. LAUSD was beginning a \$20.3 billion new school construction program, one of the largest in the nation, and the district was strapped for funds. In February 2001, the board of education unanimously passed two resolutions mandating that all new schools meet sustainability standards set by California’s Collaborative for High Performance Schools, the state’s rating system similar to LEED. “I was told I had no choice but to make these schools green,” says Mehula. “It was tough at first.”

When LAUSD embarked on its new school construction program, building green schools was viewed by many in the education community as risky and expensive. “Surveys show that people believe it will cost 10 percent to 15 percent more to build green schools,” says Gregory Kats, managing director for Good Energies, a venture capital firm that invests in renewable energy. Kats, an expert on the finances of green construction, has extensively studied the costs and benefits of green schools for the AFT, the American Institute of Architects, the state of Massachusetts and others. This notion that green schools cost a lot more to build, he says, is a myth.

“If you can debunk that myth,” asserts Rachel Gutter, of the U.S. Green Building Council, “then there is really no argument against green schools.”

Building green schools may have cost more in the past, Kats agrees. “But from the 30 schools we’ve looked at, it costs only about 1.5 percent to 3 percent more in initial costs for construction and certification” of a green school. “The energy savings more than make up for that within 10 years.” Studies show that these are some of the ways green schools save utility and energy costs:

- **High-performance systems:** On average, green schools require 30 percent to 50 percent less energy to operate than do conventional schools. Heating, cooling, ventilation and lighting systems, insulation and construction materials are all designed to conserve energy. If all new and renovated U.S. schools went green, energy savings would total more than \$20 billion in 10 years.
- **Renewable energy sources:** Installation of solar, wind or geothermal systems reduces the largest item in any school’s operating budget—electricity. Three schools on Long Island, N.Y., for example, saved \$180,000 on electricity the first year after

installing solar panels. The district financed the \$2.5 million solar installation entirely through an 18-year loan from the solar company, which will be paid back out of future savings in electricity. Likewise, 23 percent of the average school's energy bill goes to heat water. Solar water-heating systems virtually eliminate that expense.

- **Maximizing daylight:** Lighting accounts for more than one-fifth of most schools' energy bills. Daylighting not only improves student performance, it also reduces the need for electric lights. One North Carolina school district compared the energy costs of daylit middle schools with those of conventional middle schools. The daylit schools had energy costs 22 percent to 64 percent lower than the conventional schools. The average 125,000 square-foot middle school with effective daylighting, energy-efficient electrical fixtures with dimming controls, and occupancy sensors that turn lights off when classrooms are vacant, could save as much as \$550,000 over 10 years—enough to hire eight new teachers.
- **Conserving water:** In many communities, water and sewer utility costs are increasing rapidly. Green schools reduce average water use by about 32 percent compared with conventional schools, and cut wastewater production by 38 percent by using water-conserving toilets, urinals and commercial dishwashers. Rainwater collection and use for toilet flushing, cooling and landscaping also reduce wastewater production. Vegetation on green roofs catches rainwater, cooling the roof and diverting runoff to a rainwater storage cistern. In Massachusetts, the town of Dedham recognized that rainwater storage cisterns at a local green school saved the municipality an estimated \$400,000—the cost of enlarging a local storm-water retention facility.



PHOTO: LEE BALGEMANN

Over and above these utility savings, green schools offer other financial benefits:

- **Better health:** Improved indoor air quality in an average 900-student new school is projected to result in a 25 percent drop in asthma incidence. This translates into 20 fewer students with asthma, and a savings of \$33,000 per year. Studies show that better ventilation can mean a 9 percent to 20 percent decline in colds and flu.
- **Reduced student absenteeism:** A healthier indoor environment leads to an estimated 15 percent drop in student absenteeism. Where revenue is based on average daily attendance, lower rates of absenteeism can have a significant, positive impact on school funding.
- **Higher teacher retention rates:** Keeping teachers in the classroom is a high priority for most school districts; replacing teachers is costly. Studies show that general satisfaction with a school's air quality, comfort, lighting and noise level plays a major

“Building a green school five years ago may have been risky. But today, *not* building a green school is risky.”

**GREGORY KATS**  
**GOOD ENERGIES**

role in teachers’ decisions to stay at a school or district. A 2005 report to the Washington Legislature showed that when schools in the state went green, teacher retention improved by 5 percent.

- **Future Earnings:** Many studies project that a healthier indoor environment results in about a 5 percent increase in student test scores. Higher academic achievement translates into greater future earnings, estimated to be nearly \$7,000 over the working life of a green school graduate.
- **Recycling:** About three-quarters of green construction and demolition waste is diverted to recycling, which saves about 35 percent on disposal costs. Once a school is operating, a schoolwide recycling program saves more money and creates jobs.

When all of these numbers are crunched—the energy, medical and labor savings, and the increases in future earnings and job creation—green schools return about 230 percent on the initial investment a state or district makes in construction. Financing expert Gregory Kats calculates that a district which spends \$3 more per square foot to build a green school will realize \$71 per square foot in economic benefits (see chart below).

<b>Financial Benefits of Green Schools (\$/square foot)</b>	
Energy	\$ 9
Emissions	\$ 1
Water and Wastewater	\$ 1
Increased Earnings	\$49
Asthma Reduction	\$ 3
Cold and Flu Reduction	\$ 5
Teacher Retention	\$ 4
Employment Impact	\$ 2
<b>Total</b>	<b>\$74</b>
<b>Cost of Greening</b>	<b>(\$3)</b>
<b>Net Financial Benefits</b>	<b>\$71</b>
Source: “Greening America’s Schools: Costs and Benefits” by Gregory Kats, October 2006	

“Building a green school five years ago may have been risky,” Kats says. But today, *not* building a green school is risky.” He cites three main reasons: “First are the rapidly rising energy costs.” Gas, oil and electricity prices have escalated dramatically and keep going up. “By designing a green school,” he says, “you are designing in energy savings for the long term. So, it is too great an economic risk *not* to go green.

“Second,” Kats says, “are the health considerations and liability.” A large percentage of children have asthma and allergies that are made worse by indoor school environments, Kats argues. The school environment also affects staff. “I think there is a lot of liabil-



ity for school districts,” he adds. “When you have a cost-effective choice to design and build a healthy school, there is real risk around designing a school that is known to be *un*healthy. It is only a matter of time before people begin to sue, because there is a cost-effective, healthy alternative available.”

“And finally, the third risk is obsolescence,” says Kats. “A school is an asset that is going to last 50 years. So do you use a design approach that is rapidly becoming outdated? No. Our studies show that a lot of states and other local entities are realizing these risks, and requiring green design of schools.”

In addition to the Los Angeles Unified School District, many other local jurisdictions in California are mandating standards set by the state’s Collaborative for High Performance Schools. Likewise, the city of Chicago, Palm Beach County in Florida, a number of counties in North Carolina, and the states of Ohio and Maryland, among others, have mandated that new school construction must meet standards for LEED certification.

Although the first green school a state or district builds may cost more, the third and fourth schools will cost less. “If a state opts to build all green schools,” adds Kats, “you may get to a point rather quickly where there is no greater initial cost in building green, and only savings during operation.” And this is exactly where Los Angeles Unified finds itself now.

LAUSD started by building two “showcase” high-performance schools—Maywood Academy (see page 14), a 1,500-student high school in southeast Los Angeles, and Charles H. Kim Elementary, an 800-student elementary school in a section of the city known as “Koreatown.” Both opened in 2006, and state and school district officials were impressed.

Over the last few years, LAUSD’s Guy Mehula, like Ohio’s Franklin Brown, has become a powerful, national advocate in favor of building only green schools. His team has built enough of them now to realize the economies of scale a district sees by going all green. LAUSD will finish the last 60 of its 132-school construction program in 2012, completing more than one green school a month.

Mehula says he expects “utility costs will be reduced by 30 percent to 40 percent per year. Beyond energy, we achieve savings through water efficiency and a reduced waste stream. Also by building schools that allow children to go to school in their own neighborhoods, we’re saving transportation costs associated with busing them an hour or more away from their homes to go to school.” At this point, Mehula says, the cost of building green schools is nearly equal to the cost of constructing schools without green elements. “So the choice to go green is obvious from a financial, education and environmental perspective.”

Building 132 green schools in 11 years is “a monumental task,” Mehula acknowledges. “But when I see how students and teachers excel in green schools, I know it’s worth the extra effort.”



PHOTO: THOMAS GIRIOR



## Barnard Environmental Studies Magnet School, New Haven, Conn.

**A**s a middle school teacher in North Haven, Conn., Marjorie Drucker first piloted a program to raise salmon in her classroom about 13 years ago. At the time, she worked out of a conventional classroom in a conventional school, and students in the few classes she taught benefited from the experience.

But those days are over. "They've created a school here where environmental studies are the focus," says Drucker, now the magnet theme content coordinator at the Barnard Environmental Studies Magnet School in New Haven. Barnard is the city's first school to earn LEED Gold certification, and only the second building in Connecticut to achieve this high level of "greenness."

The school, which serves 400 students

in kindergarten through seventh grade, is filled with natural light. Heating and cooling systems cycle down when the classrooms are vacant or the windows are open, and lights in classrooms turn off automatically to conserve electricity. Walls, carpets, windows and ceiling tiles are made from recycled materials. Nearly 200 solar panels—the largest solar panel display in the state—line the roof, providing 16 percent of the school's energy use. There is a greenhouse and gardens where students learn to raise tomatoes and other plants from seedlings, and a WeatherBug station for climate study. Barnard is connected to the West River Nature Center by means of a pedestrian bridge, affording students a variety of ways to explore the center and the adjacent West River Memorial Park.

When Barnard School became a magnet school under a federal grant, Drucker was hired to develop the school's environmental theme: a new, hands-on science curriculum that would reflect the school's unique assets and enormous potential. "I have a room called the discovery room where we hatch and raise the salmon," Drucker says. "If we didn't have this building, I wouldn't have a room like this," she explains. And what a difference it's made. "Having the room allows this salmon raising project to become a schoolwide event."

The school receives salmon eggs from the Connecticut River Salmon Association, a group dedicated to teaching school children and citizens about the Atlantic salmon, now virtually extinct, but once abundant in the cold,

fast rivers of the Northeastern United States. "Kids are learning about global warming, and pollution," Drucker says, "because the Atlantic salmon don't come back to spawn in many rivers in Connecticut anymore."

Each year, about 200 fertilized eggs are placed in a refrigerated water tank in the discovery room; third- and fourth-graders shoulder the primary responsibility for the salmon. In their next stage of life, the salmon become alevin, requiring no food and living off of their own yolk sacks. As spring approaches, students slowly raise the temperature in the tank as the salmon grow into small fish called fry.

In April, the fry are released in a tributary of the Connecticut River, which is about a 45-minute bus ride from the school, says Drucker.

"We take the children to release the salmon. It's a very big event for them." If the fish survive, they will make their way to the Atlantic Ocean and eventually return to the state's rivers to spawn.

Even after the salmon's spring release, the discovery room is teeming with life. One of the school's overarching themes is "taking care of living things and their habitats," says Drucker. "So students come to the discovery room to look at hissing cockroaches, Chinese box turtles, koi fish, hamsters, a fire-bellied toad."

Drucker started an offshoot of the salmon project this year: the life cycle of the salamander. "We raised them in three different environments," she says. Children observed hatching and growth in the warm environment in the greenhouse, in the cool envi-



ronment of the refrigerator, and at room temperature. They hatched quickly in the greenhouse and slowly in the refrigerator. "Students learned about the impact of temperature on life," explains Drucker. "Kids here really develop an understanding of stewardship," Drucker adds. The school devotes a full week each year to its Earth Week festival. This past year, one day focused on solar energy; others focused on birds, the weather or cultivation and gardens. On solar day, the kids made solar cookers and conducted an experiment showing how sunscreen works. They also made sunprints. "The kids loved it."

The building itself along with Barnard's focus on environmental studies has made

the school a lightning rod for the New Haven community. "Partnerships are easier to build than at past schools," Drucker says. She finds that companies, nonprofit groups and museums want to work with the school. "There's always something happening, a grant to apply for

or something new. It's because of the nature of the school; it's a different kind of school, one that provides many opportunities and experiences for children, but it requires more investment on the part of the teachers."

Drucker has been eager to make that investment in the school. She was named "2008 Middle School Teacher of the Year" by the Connecticut Science Teachers Association. And, she says, her colleagues are just as committed as she is to making Barnard a national model for environmental studies. "We've retained pretty much all of our teachers," she says. "When we became an environmental magnet school, people started calling me. There is a lot of interest in a school like this, and that's very exciting for teachers."



# Tarkington School of Excellence, Chicago, Ill.



**N**atasha Schaefer taught fifth grade at an older, urban elementary school in Chicago before moving to Tarkington School of Excellence, the first LEED-certified school in the nation's third-largest school district. Schaefer says her teaching experiences before Tarkington were like those of many of her colleagues. "The school I taught at before didn't even have a playground," she says. "Everything at the school was indoors. It was an old Chicago building; it had water damage, and it didn't have air conditioning. It was a very traditional school experience."

When Schaefer moved to Tarkington the year it opened in 2005, the physical contrast alone between her old school building and the new green school was startling and dramatic. The city acquired nearly 10 acres of Marquette Park to provide a site for Tarkington, the first new school built on Chicago's South Side in decades. Towering,

two-story windows bring the sylvan setting indoors, and provide maximum daylighting in hallways. "At Tarkington, it's very bright," Schaefer says. "There are big windows in the school, and the air quality is better. There's air conditioning. The school is very open, and we can sit outside easily."

The school's blue-green tile floors are made from recycled glass. The wood used in the atrium lobby ceiling, library and gym floor comes from forests managed under sustainability principles. Vegetation on the school's "green roof" captures rainwater, lowering the roof temperature to conserve energy and returning moisture to the atmosphere. Low toxic-emitting paints, carpets, wood and sealants are used throughout the school. Solar panels projected for roof installation in the future will contribute sustainable energy, and further reduce utility bills.

The school is open to the public at night,

offering classes in yoga, fitness and dance. Community support and parent and neighborhood involvement in Tarkington's events have been enormous. "Everybody feels very well cared for at our school," Schaefer says. "And the kids know they are part of something special."

Indeed, engendering feelings of specialness and self-worth in Tarkington students is part of the grand design for the school, says founding principal Vincent Iturralde. "Our school totally looks like a suburban school," he says. "And we—the teachers, the staff, me, all of us—do everything we can to make these children feel special."

A 12-year veteran of the Chicago Public Schools, and a former science teacher, Iturralde believes that green schools, like Tarkington, can play a key role in improving academic achievement. Daylighting, better indoor air quality, less disturbing noise and high



PHOTO: LEE BALGEMANN

acoustical standards have all been shown to enhance student and teacher productivity, improve health and reduce absenteeism. Iturralde hopes that these benefits—combined with a strong focus on academics, teacher collaboration and an innovative curriculum—will allow Tarkington students to achieve the same level of academic excellence as those attending better-funded suburban or private schools in Illinois.

Ninety percent of Tarkington students are minority, largely African-American and Hispanic, and 90 percent live in families with incomes at or below the poverty level. Iturralde has set out to make Tarkington Chicago's first 90/90/90 school, where 90 percent of the students meet or exceed state education standards for each grade level.

"It's a really ambitious goal," the principal concedes, "and we're not there yet." Tarkington was built to relieve overcrowd-

ing in two South Side schools, one to the east, which is largely African-American, and one to the west, predominantly Hispanic. "We're in the middle," says Iturralde, "so our demographics are split." After the first year of operation, testing showed that on average 59.4 percent of Tarkington's students met or exceeded state standards for their grade level. The second year, their scores had risen, to 66 percent. "At the school to the east, 24 percent of the students are meeting or exceeding state standards," Iturralde says. "In the school to the west, 50 percent are meeting or exceeding state standards." Tarkington does not yet have scores for the 2007-08 school year, but he expects them to be even higher.

High expectations for students bring high expectations for teachers as well, and new models of teaching. "At Tarkington, we work in grade-level teams," says Schaefer. "We

write units of study, and we have streamlined curriculum. Curriculum is developed together as a grade, so it's consistent. I think that really helps with teaching, and helps the students. I didn't have that experience at my other school. It was isolated, so every classroom within grade was different," she adds. "That's not our school. Now, there is also greater exposure to the material across grade levels. It's a great way to keep everybody informed, and to hear what other grade levels are doing."

Achievement takes many forms, and some of those involve students learning to take initiative and become leaders. Lessons in these life skills often first require teachers and staff to take initiative themselves. Eight teachers, along with an assistant principal, came together in 2007 to form Tarkington's first green committee. The committee created pilot lesson plans focused on environmental

sustainability, the repercussions of technology and how citizens can be more aware of sustaining the earth. The group also spearheaded a school recycling program, initiated plans for an Earth Day celebration and a Green Family Night, and wrote a grant proposal for a greenhouse.

"Here's how the greenhouse came about," says Schaefer, who is a member of the committee. Another member of the green committee was taking a course in grant writing. For her class, she wrote to Home Depot proposing a greenhouse for Tarkington. "Well, Home Depot decided to fund it," Schaefer says. And the company also donated a rain barrel. "We worked through Home Depot and an engineer on the site for the greenhouse and putting it together." The timing was just right. "We unveiled it at Green Night," Schaefer says. Commonwealth Edison came to Green Night and gave energy-

efficient light bulbs to families. Greenpeace came, and so did Chicago's Healthy Schools Campaign. Green Night turned into a pretty big event, Schaefer recalls.

But what also came out of the green committee was the Green Club, a group of about 35 students in grades 3-5, whose first task was to learn what it meant that their school was green. "I took 10 kids, and we went over the green elements of the school," says Principal Iturralde. "They became our tour guides. Now we've had at least 10 groups come out from the district, the state, national groups—and the kids led the tours." The Green Club helped in planning Green Family Night, sponsored a cleanup of Marquette Park, and took over much of the recycling program.

Last spring, the green committee began planning for the 2008-09 academic year. Teachers want to help students start a Botany Club and to increase the recycling program.

Together, they are looking to improve recycling in the cafeteria. "So, we're learning what that means from an operational perspective," says Schaefer. Plans already are under way for expanding this year's Green Family Night. But the focus of the green committee this year, says Schaefer, will shift from simply teaching the students what "green" means to incorporating the green aspects of the school into a larger perspective that will help students understand why green is important to the environment.

"I saw this in the Green Club, when they would run their tours," says Schaefer. How knowledgeable the kids are about the recycled glass in the floor, and the windows, the wood used. But now, I think our role is to help them see why. Why was our school built this way? Why are schools going green? We've talked about the kids seeing their role in the larger scheme of things. We do this or that at Tarkington—but what is our human impact on the Earth?"

Another aspect of greening that the committee and the school administration are taking on this year is the impact society has not only on the Earth itself, but on Earth's creatures—namely, the students themselves. Encouraging healthy student behavior, specifically in terms of exercise and eating, are a sometimes overlooked benefit of green schools.

"At Tarkington, we have recess," says Principal Iturralde. "Only a handful of schools in Chicago have recess, and many use instructional time for it. But here, the administration and the Chicago Teachers Union worked together to make this recess happen."

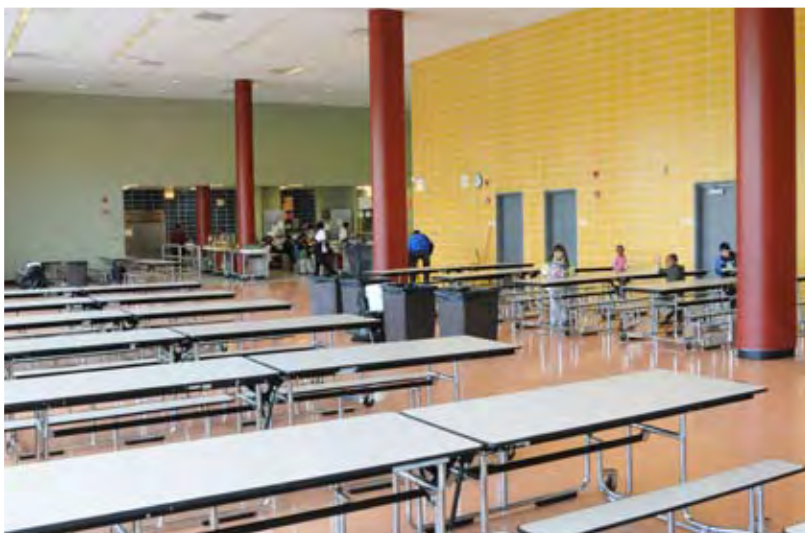


PHOTOS: LEE BALGEMANN



Tarkington's park setting and green fields made recess a must in the minds of the teachers, staff and administration, who know only too well how little exercise many schoolchildren get these days. Even harder, this year they are tackling the food issue that most confounds parents: getting their kids to eat vegetables.

"Kids aren't used to seeing certain types of green vegetables," explains



Iturralde. "I didn't have asparagus myself until I was in my 20s. It just wasn't part of the Mexican-American diet." The school is working with Chicago's Healthy Schools Campaign to partner classrooms with nearby farms. Students will tour the farms, and during harvests, the farm will send the classroom a variety of fruits and vegetables for kids to taste.

tests to give students a chance to try greener and healthier food selections. The food staff jumped at the opportunity, Iturralde says. "They're really excited about the taste tests, and we're beginning them very soon."

The green committee is building relationships with many outside partners now: friends of the Chicago River, the city's park service,

Studies show that many children will eat most of the vegetables served to them once they know what they are. Iturralde also asked the food service staff to set up some taste

the nature museum and local environmental organizations. "These extend opportunities for a teacher," says Schaefer.

Like some of the other teachers, Schaefer has a list of grants she wants to apply for this year. "I'd like to have some more tools to use in addition to the greenhouse," she says. But somehow, these tasks don't seem as daunting to her as they once did. "At my other school, you saw the same needs, but it would take a lot more energy and more time to seek out resources. The odds were stacked against you. There was a sense of negativity and isolation," Schaefer says.

"At this school, something might be one teacher's idea, but you get a group of teachers together, and it's easier to get it done. At Tarkington, we are a really positive group, who put a lot of effort into what we do. I think you work hard, and enjoy a place, when you feel you have room to grow."

## AFT's Commitment

### 2008 AFT Resolution on Green Schools and Colleges

**WHEREAS**, public education institutions are experiencing a historic decline in the condition of buildings, structures and equipment with significant health and safety implications for faculty, staff and students; and

**WHEREAS**, the U.S. Government Accountability Office (GAO) reports that K-12 schools need at a minimum \$112 billion to bring existing buildings to meet minimum building standards. This estimate does not cover the cost of new construction needed to accommodate a growing student population, which is not expected to plateau until 2009. The GAO has established that 25,000 schools nationally are in need of extensive repair or replacement and also reports that 67 percent of central city schools report at least one building feature in need of repair or replacement; and

**WHEREAS**, asthma prevalence is high among both students and staff. The National Institute for Occupational Safety and Health (NIOSH) has established that education employees in K-12 schools have higher rates of asthma compared to the general working population. The prevalence of asthma among children in urban areas is at an all-time high. Nearly one in 13 school-age children has asthma; and

**WHEREAS**, correlation studies show a strong positive relationship between overall building conditions and student achievement. Researchers have repeatedly found a difference of 5-17 percentile points between achievement of students in poor buildings and those in environmentally adequate buildings, when the socioeconomic status of students is controlled; and

**WHEREAS**, schools and colleges currently spend more money every year on energy and utility costs exceeding the combined cost of supplies and books; and

**WHEREAS**, building construction and operation are responsible for 48 percent of the energy used in the United States; and

**WHEREAS**, green and sustainable schools are new or renovated schools that create a healthy environment that is conducive to learning while saving energy resources and money. Green schools focus on improvements in site selection, daylighting, indoor air quality, thermal comfort, acoustics and classroom design—all of which have an important impact on a child's ability to learn and a teacher's ability to teach; and

**WHEREAS**, the benefits of superior indoor air quality—a key principle of green school design—have been linked to lower asthma exacerbations, increased teacher and staff retention and reduced absenteeism. Seventeen studies have reported significant improvement in occupant health when ventilation increased; and

**WHEREAS**, green schools use an average of 30 percent to 50 percent less energy compared to conventional schools; the average green school saves \$100,000 a year in energy costs—enough to hire two new teachers or staff, or buy 5,000 textbooks; and

**WHEREAS**, a green school building itself becomes an interactive teaching tool. Green schools create opportunities for curriculum innovation and hands-on, project-based learning; and

**WHEREAS**, the education sector should lead the nation in assuring a quality learning environment suitable for training future climate leaders, engineers, scientists and business people who will help society overcome the challenges before us:

**RESOLVED**, that the American Federation of Teachers urge state federations to advocate for

their legislatures to adopt green school legislation that will appropriate the 1 percent to 2 percent premium to school districts when they design, build, renovate and operate schools that meet the U.S. Green Building Council, LEED (Leadership in Energy and Environmental Design) for Schools certification, or criteria comparable to the Collaborative for High Performance Schools (CHPS) standards; and

**RESOLVED**, that the American Federation of Teachers advocate for federal legislation and regulation, like the 21st Century High-Performing Public School Facilities Act of 2006, that will accelerate the building and renovation of schools to meet LEED or CHPS standards; and

**RESOLVED**, that the American Federation of Teachers work with locals to create local sustainability programs and help them to be actively involved in the building design/maintenance process on their campuses and in their districts; and

**RESOLVED**, that the American Federation of Teachers work with its locals and environmental advocacy organizations to advocate for the creation of curriculum for environmental education at all levels and the creation of demonstration projects at schools and colleges for teaching and researching environmental sustainability; and

**RESOLVED**, that the American Federation of Teachers work with labor unions to advocate for unionized trades to build green; and

**RESOLVED**, that the American Federation of Teachers advocate for LEED certification for new building construction as a means of achieving green and sustainable schools.

(ADOPTED BY AFT EXECUTIVE COUNCIL IN JULY 2008)

## Resolution on Sustainability and the Design and Construction of High-Performance Schools

\_\_\_\_\_ School District/  
Board of Education

Adopted by \_\_\_\_\_  
Date \_\_\_\_\_

**WHEREAS**, students and staff are entitled to a safe and healthy school environment that consistently controls moisture intrusion and ensures recommended humidity, temperature and ventilation ranges. Studies have indicated that student achievement is greater and attendance higher, and teacher and staff retention is improved, when the learning environment is naturally lit, comfortable and well maintained;

**WHEREAS**, schools should employ design, construction and operation strategies that minimize operating costs, in particular for energy and water use, as studies show that energy costs for new facilities, for example, can be reduced by 25 percent or more;

**WHEREAS**, schools that follow sustainable design have the potential to improve the environment and health of students, faculty and staff. Studies have demonstrated that sustainable design can limit exposure to volatile organic compounds and other toxic chemicals, and improve indoor air quality and acoustical conditions;

**WHEREAS**, schools that follow sustainable design principles can contribute to our community's environment by minimizing waste, air and water pollution, and gases that contribute to climate change;

**WHEREAS**, the School District's program to build new schools and renovate existing ones provides a unique opportunity to move beyond standard designs and improve the health and well-being of the buildings' users, save money and improve the environment;

**WHEREAS**, the Collaborative for High Performance Schools (CHPS) National and the U.S. Green Building Council (USGBC), among others, have developed comprehensive design criteria based on the latest available information on sustainable school design, construction and operation; and

**WHEREAS**, schools designed to meet these national and regional criteria incorporate environmental features that provide a context for learning now, therefore, be it

**RESOLVED**, that the \_\_\_\_\_ School District Board of Education recognizes the progress already made by the district's staff and design teams to incorporate sustainable design criteria into the district's school construction program, including measures to minimize and manage uncontrolled moisture intrusion throughout structures; and

**RESOLVED**, that the Board directs staff to expand this effort to ensure that every new school, new building and modernization project, from the beginning of the design process, incorporate nationally recognized criteria such as USGBC LEED for Schools or CHPS—national and best practices to the extent feasible; that the next round of construction projects preferably achieve

at least \_\_\_\_\_ points in indoor environmental quality that maximize the potential for improved student and staff health and performance through measures such as improved ventilation rates, daylighting, the use of non-toxic-emitting materials, and sound insulation or isolation to minimize noise and enhance classroom acoustical quality.

**RESOLVED**, that the design process should include in its earliest stages a design charrette that includes all the stakeholders including teachers, parents, staff union representation, finance, site purchasing, design management, specification development, construction management, maintenance and operation, and occupational and environmental health and safety. These stakeholders should continue to be involved in the entire school building process from design and site selection through completion and occupancy.

**RESOLVED**, that the Board of Education direct staff to form a building committee [or directs the existing health and safety committee] to support the development and management of the program. The committee should include teachers, parents, staff union representation, finance, site purchasing, design management, specification development, construction management, maintenance and operation, and occupational and environmental health and safety.

**RESOLVED**, that all school construction and remodeling processes include an independent commissioning process to ensure that all elements and systems in the building



perform as expected and work together properly. Commissioning requires testing and training of building users and staff.

**RESOLVED**, that all new and/or renovated buildings be monitored and recommissioned on a regular basis to ensure that they continue to perform as designed. This process should include routine testing, balancing, and calibration of equipment and systems according to manufacturer and design recommendations.

**RESOLVED**, that the Board of Education direct staff to create and follow a performance-tracking system to ensure the effective implementation of the criteria throughout design, construction and operation; and

**RESOLVED**, that the Board of Education endorse District participation in and direct staff to pursue partnerships that further the goal of high-performance schools, including federal, state and utility programs that provide sustainable-design financial incentives, and;

**RESOLVED**, that the Board of Education ensure that education on the functioning, operation and sustainable functions of new and remodeled buildings be provided for the entire school community including administration, faculty, staff and students to ensure understanding of and buy-in to the concept, usefulness and meaning of a high-performance building. At a minimum, the designer should be directed to prepare an easy-to-use “owners’ manual” for all stakeholders; and

**RESOLVED**, that all custodial and maintenance staff responsible for routine operations and maintenance receive training as recommended by the designers (architects and engineers) and manufacturers of system equipment; and

**RESOLVED**, that the Board of Education encourage and facilitate the use of high-performance schools as educational tools for teaching science, social science and concepts of sustainability by providing faculty and others with the necessary tools and information; and

**RESOLVED**, that the Board of Education direct staff to report to the Board, within \_\_\_\_ days of the passage of this resolution, on the District’s plan to comply with this resolution; and

**RESOLVED**, that the Board of Education direct staff to report to the Board annually on the progress of this program, and provide quarterly summary statistics on the number of new schools and modernization projects designed and the percentage that have incorporated sustainable design criteria, the number of schools that continue to meet high-performance criteria and other statistics useful in assessing the progress of this effort.

**RESOLVED**, that the Board of Education direct staff to develop and implement systems for monitoring energy and water use and other monitoring programs to track whether schools continue to meet high-performance criteria.

# Contract Language on School Staff Participation in Construction Projects

## **Boston Teachers Union, Local 66** (Massachusetts)

Article VII, Section D. School Construction and Repair

1. The School Committee or its representatives and representatives of the Union shall exchange views concerning design and equipment of proposed new construction, alteration and repair of existing facilities.
2. Every effort will be made to insure that repairs which are disruptive to the education process are not done during class time. The administrative head should be notified as to when such work will be performed. Complaints shall be filed with the Chief Structural Engineer.

## **Cleveland Teachers Union, Local 279** (Ohio)

Article 2, Section 15. Design of Buildings/CTU Input. The officers of the CTU shall be invited to participate in the planning of the construction of new buildings when architects are appointed by the District. At this point, the CEO will invite the Union to appoint a representative to serve on the building planning committees.

## **Kankakee Council Federation of Teachers, Local 604** (Illinois)

Article XXI, Section 21. When new construction programs or major revisions and

renovations of present buildings are to be undertaken, the Union shall be given an opportunity to voice their opinions on said matters prior to adoption of the final design.

## **Hayfield Education Association, Local 7108** (Minnesota)

Article V, Section 6. Board-Association Consultation: The board shall consult with the Association on construction programs, renovation of classroom facilities, or major revisions of education policy, which are proposed or under consideration and the Association may be given opportunity to advise the board with respect to said matters prior to their adoption and/or general publication.

## **Osceola Classroom Teachers Association, Local 7450** (Florida)

Article 4.41. Teachers appointed by the Association shall serve on a building committee to recommend remodeling and future building construction. The principal shall determine the number to serve on the committee.

## **Belgrade Education Association, Local 7508** (Minnesota)

Subd. 2. Budget Participation. The Association shall be given the opportunity to advise the Board with respect to mill levy proposals and construction programs, prior to their adoption by the Board.



PHOTO: LEE BALGEMANN

# School Design that Matters

## Charrettes and Beyond

“A charrette is an intensive workshop in which various stakeholders and experts are brought together to address a particular design project. It is the mechanism that starts the communication process among the project team members, building users and project management staff. A facilitated discussion allows the team to brainstorm solutions to meeting the building user’s requests and the sustainability vision for the building design.”

WIKIPEDIA

AFT members rarely have the opportunity to participate in the design of a new school. Design and construction decisions are generally left to the administrators in charge of a project and the design professionals (architects, engineers, contractors). The green and sustainable schools movement promises to change that approach to one that is more inclusive. Why? Most sustainable building architects and design professionals believe that those who work and learn in a space have unique expertise to contribute to the design process. The designers understand that there is much to learn from the community that uses the school day to day. They see the process as collaborative instead of top-down. This practice has resulted in far better design—buildings that support the academic goals of the community.

Designers of green schools typically bring the school community together—staff, students, parents and community members—early on to brainstorm on design. These gatherings are called “charrettes,” a fancy word for an interactive workshop. Charrettes can be a one-time event or may be a series of meetings.

As part of the collaborative charrette process, the designers will describe sustainable building design. They will show in a highly visual way that the process is multidisciplinary and strives to integrate all parts of the building and site through “whole building” design. Models may be displayed that show the importance of site selection and the orientation of the building to protect the environment and energy efficiency. Participants will see how all parts of the building must be integrated to ensure superior construction and occupant comfort and productivity as well as building efficiency.

An integrated design can save money in energy and operating costs, cut down on expensive repairs over the lifetime of the building, and reduce tenant turnover.

Sustainable design is most effective when applied at the earliest stages of a design. This philosophy of creating a good building must be maintained throughout design and construction. The early steps for a sustainable and high-performance building design are:

- Creating a vision for the project and setting design performance goals;
- Forming a strong, all-inclusive project team. It is very important for the success of the



project and for the success of the school building that teachers, paraprofessionals and other union members be included in the project team;

- Outlining important first steps to take in achieving a sustainable design.

A well-planned charrette not only educates the stakeholders, it starts the communication process among the project team members, building users and project management staff. A facilitated discussion allows the team to brainstorm solutions to meeting the building users' requests and the sustainability vision for the building design. By the time the charrette concludes, the participants should have identified performance goals in the context of validating the program needs. They should have a good idea of what a green building is, why it is desirable and the kind of input each team member needs to contribute.

Project team members who are school staff will continue to be an integral part of the design and construction process. They should be consulted throughout to ensure that the building design adheres to the sustainability principles and enhances the teaching and learning environment. The project team for such a design should, therefore, possess the expertise to analyze the interactive effects of various design strategies on the building's overall energy efficiency and environmental impact and on its ability to serve and enhance teaching and learning.

Stakeholders who sit on the design team should have training on how to be an effective team member. They should be able to understand computer simulation tools that are capable of modeling building performance because these are invaluable resources for understanding the tradeoffs associated with all design decisions. Continuing to use these tools after the building is constructed can give insight into how well the building is actually performing compared with how it should perform.

Following the design phase, the project team will account for how design decisions influence construction and long-term building operation. Writing effective construction documents and safeguarding design goals will result in projects that are built as the original design intended. In addition, protecting the project site during construction will minimize the site impacts both during and after construction and ensure a safe working environment during construction.

Third-party building commissioning completed before occupation as well as continuous commissioning activities conducted throughout the life of the building ensure that the building always performs as originally intended. Commissioning agents inspect the building and systems to make sure that the building was constructed as designed and that systems (heating, ventilation and electrical) operate properly.

When all works well, teachers will have the opportunity to use the building as a learning tool as part of the standard curriculum. They also will be able to promote the environmental stewardship essential for ensuring quality of life in the school and in the community.



PHOTO: BRUCE CRIPPEN

## Resources, Initiatives and Advocacy Groups

There are many excellent resources that provide in-depth information on green and sustainable schools as well as improving the indoor environmental quality in schools.

Here is a representative (but not all-inclusive) list:

### Green and Sustainable Design

**American Architectural Foundation (AAF)—*Great Schools by Design*.** The AAF has worked with the U.S. Green Building Council (USGBC) and other established leaders in green schools to bring together education and community stakeholders into an ongoing conversation with designers to effectively improve the environmental quality as well as the academic setting. *Great Schools by Design* describes the program as a “national initiative of the American Architectural Foundation that seeks to improve the quality of America’s schools and the communities they serve by promoting collaboration, excellence and innovation in school design. Design institute reports and videos can be found at [www.archfoundation.org/aa/gsbid/index.htm](http://www.archfoundation.org/aa/gsbid/index.htm).

**Collaborative for High Performance Schools.** The Collaborative for High Performance Schools (CHPS) was the first national rating system designed exclusively for K-12 schools. CHPS criteria were first established in California but its environmental benchmarks have been adapted by Massachusetts, New York and Texas. CHPS National was launched in 2008 to provide networking opportunities for communities

across the country. CHPS’s core mission is to “facilitate the design, construction and operation of high-performance schools: environments that are not only energy and resource efficient, but also healthy, comfortable, well lit, and containing the amenities for a quality education.” CHPS lists “increasing school performance with better-designed facilities” as its first goal. The CHPS rating system along with excellent guidance documents on important issues such as school operations and maintenance and criteria for relocatable (portable) buildings are available at [www.chps.net](http://www.chps.net).

### Green Globes Design and ANSI

Green Globes Design provides an assessment system for buildings in North America. Initially operating only in Canada, the organization has expanded its operation throughout North America. In the United States, the Green Building Initiative (GBI) owns the license to promote and develop Green Globes. It has been accredited by the American National Standards Institute (ANSI) as a standards developer. GBI has been the lead organization in drafting the ANSI standard 01-200XP: Green Building Assessment Protocol for Commercial Buildings. GBI provides “both a guide for integrating green design principles and an assessment protocol. Using confidential questionnaires for each stage of project delivery, the program generates comprehensive online assessment and guidance reports.” You can view the assessment protocol, drafts of the ANSI standard and other guidance documents at [www.thegbi.org](http://www.thegbi.org).

**U.S. Green Building Council – Leadership in Energy and Environmental Design (LEED) for Schools.** The U.S. Green Building Council (USGBC) has been the recognized national leader in sustainable commercial building design for several decades. The organization has developed a highly regarded rating and criteria system, called the Leadership in Energy and Environmental Design (LEED) for new design and LEED for Existing Buildings (LEED-EB). These criteria encompass energy efficiency, resource conservation and indoor environmental quality. Building designers and builders who document that they have met these criteria can receive certification based on the number of accumulated points. Visit [www.usgbc.org](http://www.usgbc.org).

Most recently, USGBC has designed a LEED for Schools. According to the USBGC, “the LEED for Schools rating system recognizes the unique nature of the design and construction of K-12 schools. Based on the LEED for New Construction rating system, it addresses areas such as classroom acoustics, master planning, mold prevention and environmental site assessment.”

The USGBC new school Web site graphically describes the benefits of building and renovating schools to LEED standards. The site has profiles and pictures of LEED-certified schools: [www.buildgreenschools.org](http://www.buildgreenschools.org).

## Federal Government Initiatives

**National Clearinghouse for Educational Facilities.** NCEF was created in 1997 by the U.S. Department of Education and provides perhaps the most comprehensive compilation of documents “on planning, designing, funding, building, improving and maintaining safe, healthy,

high-performance schools.” Go to [www.edfacilities.org/an/index.cfm](http://www.edfacilities.org/an/index.cfm).

**U.S. Department of Energy (DOE)—Energy Smart Schools.** The DOE provides comprehensive strategies for saving energy in schools. It also has developed a good guide for operations and maintenance (O&M) of school systems that takes into account not only energy savings but also maintaining adequate environmental quality in the schools. Every district should have a copy of the O&M guide, “School Operations and Maintenance: Best Practices for Controlling Energy Costs,” which can be downloaded at [www1.eere.energy.gov/buildings/energysmartschools/maintain.html](http://www1.eere.energy.gov/buildings/energysmartschools/maintain.html).

**U.S. Environmental Protection Agency and CEFPI.** For more than 20 years, the U.S. EPA Division of Indoor Air Quality has provided comprehensive guidance on operating and maintaining environmentally sound schools in its Tools for Schools program. Visit [www.epa.gov](http://www.epa.gov).

## Local and Legislative Initiatives

**Environmental Law Institute.** The Environmental Law Institute has tracked green school construction mandates and incentives since 2003 when it published “Building Healthy, High Performance Schools: A Review of Selected State and Local Initiatives.” For an up-to-date review of the latest state laws and initiatives, visit [www.eli.org/Program\\_Areas/healthy\\_schools](http://www.eli.org/Program_Areas/healthy_schools).

## Advocacy Groups

Several national advocacy organizations are taking up the cause of green and sustainable school buildings and programs. They can refer

AFT affiliates to good local and state organizations that are working on the issue. Here are just a few:

**The Center for Health and Environmental Justice (CHEJ).** CHEJ is a pre-eminent environmental justice organization that has assisted many community groups with critical environmental exposures that threaten the community’s health. The center has helped communities with issues concerning where schools are located, including those placed near major polluters and toxic waste dumps. CHEJ has taken up other school issues including air quality and sustainability. Visit [www.chej.org](http://www.chej.org).

**Healthy Schools Campaign (HSC).** HSC works on a broad array of school health and environmental issues including sustainable schools, good nutrition, physical exercise and green cleaning. HSC describes its mission as advocating for “policies and practices that allow all students, teachers and staff to learn and work in a healthy school environment.” Visit [www.healthyschoolscampaign.org](http://www.healthyschoolscampaign.org).

**Healthy Schools Network Inc.** Healthy Schools Network is devoted to guaranteeing that every child has a safe and healthful learning environment. HSN conducts research, maintains a database, publishes documents and advocates at the state and local levels. Visit [www.healthyschools.org](http://www.healthyschools.org).

For further information and guidance, contact the **AFT health and safety program**, 800/238-1133, ext., 5677.



## Endnotes

1. American Federation of Teachers (AFT), “Green Schools and Colleges,” AFT resolution adopted by the AFT executive council, July 2008.
2. A. M. Nequette and R. B. Jeffery. *A Guide to Tucson Architecture*. (Tucson, Ariz., University of Arizona Press, 2002). “Arthur Brown, a Midwesterner who’d been influenced by Frank Lloyd Wright in Chicago, gave Tucson—and the nation—its first passive-solar designed school. His 1948 Rose School had north-facing windows, heavy overhangs on the south and a unique channeled roof that vented the heat out.”
3. Government Accountability Office, *America’s Schools Report Differing Conditions* (GAO/HEHS-96-03) June 1996 and *School Facilities: Condition of America’s Schools* (GAO/HEHS-95-61) February 1995.
4. J. M. Mazurek et al., “Work-related asthma in the educational services industry: California, Massachusetts, Michigan, and New Jersey, 1993-2000,” *American Journal of Industrial Medicine*. 51, no. 1 (January 2008): 47-59.
5. National Institute for Occupational Safety and Health (NIOSH), *Worker Health Chartbook 2004: Chapter 2, “Fatal and Non-fatal Injuries and Selected Conditions, Respiratory Diseases, Work-Related Asthma.”* DHHS (NIOSH) Publication No. 2004-146.
6. National Academy of Sciences, National Research Council, *Green Schools: Attributes for Health and Learning*. Committee to Review and Assess the Health and Productivity Benefits of Green Schools, 2006.
7. Ohio School Facilities Commission, Minutes, Sept. 27, 2007, LEED approval, presented by Steve Lutz.
8. R. Shaughnessy et al. “A preliminary study on the association between ventilation rates in classrooms and student performance,” *Indoor Air* 16, no. 6 (May 2006): 465-468.
9. D.G. Shendell et al. “Associations between classroom CO<sub>2</sub> concentrations and student attendance in Washington and Idaho,” *Indoor Air* 14, no. 5 (October 2004) 333-341.
10. P. Wargocki and D.P. Wyon, “The effect of moderately raised classroom temperatures and classroom ventilation rate on the performance of schoolwork by children,” *HVAC&R Research* 13, no. 2 (2007): 193-220.
11. W. Hathaway et al. *A Study into the Effects of Light on Children of Elementary School-age—A Case of Daylight Robbery*. (Edmonton, Alberta: Alberta Department of Education, Planning and Information Services, 1992).
12. Heschong Mahone Group Inc., *Windows and Classrooms: A Study of Student Performance and the Indoor Environment*, for the California Energy Commission, October 2003.
13. Government Accountability Office, *America’s Schools Report Differing Conditions* (GAO.HEHS-96-103) June 1996.



Tarkington School



*A Union of Professionals*

American Federation of Teachers, AFL-CIO  
555 New Jersey Ave. N.W.  
Washington, DC 20001  
202/879-4400  
[www.aft.org](http://www.aft.org)

Item number: 68-08001

12/2008