

HEALTHIER, WEALTHIER AND WISER:

GLOBAL GREEN USA'S GREEN SCHOOLS REPORT



Healthier, Wealthier and Wiser: Global Green USA's Green Schools Report



Our children deserve to learn in green schools that:

- are healthy
- enhance their learning potential
- are cost-effective
- minimize the impacts on the environment

School districts in California and across the nation are currently making historic investments in school infrastructure, creating a once in a generation opportunity to incorporate green building standards. In California alone, there is over \$25 billion in new construction. This is a unique opportunity to create healthy, high performance classrooms that students and teachers will use for the next thirty years or more.

This report outlines the quantitative benefits of green schools, including:

- **Improved Learning.** A study covering more than 2000 classrooms in three school districts indicated that students with the most classroom daylight progressed 20% faster in one year on math tests and 26% faster on reading tests, compared to students in classrooms that received the least amount of natural light.
- **Lower Operating Costs.** School districts can save 20-40% on annual utility costs for new schools and 20-30% for renovated schools if green school design criteria are incorporated. For example,

energy use in green schools can be reduced by up to 40% and water use by up to 30% compared to conventional school buildings.

- **Increased Attendance.** One half of our nation's schools have problems linked to poor indoor air quality. Poor indoor air quality contributes to respiratory infections and can trigger asthma attacks, which leads to absences. Increased absences result in less funding from the state for average daily attendance (ADA). Global Green USA determined that LAUSD could gain \$94,000-\$188,000 per school per year in ADA. Given that LAUSD is planning to build approximately 150 new green schools, this could yield an additional \$14 million-\$28 million annually to the district.
- **Better Public Investment.** A 2003 report to California's Sustainable Building Task Force concluded a 2% initial investment in green construction would yield ten times the initial savings of that investment over the life of the school.

Global Green USA urges:

- The California state legislature and the Governor of California to pass and sign AB 315 into law. Assembly Bill 315, introduced by Assembly Member Loni Hancock, would require all new school construction in California to meet specified environmental, health, and energy design standards-thus making green schools the standard across the state.
- California lawmakers, the Governor of California, local governments, and municipal utilities to support incentives for schools to install solar and other appropriate distributed renewable energy sources. Given the thousands of school rooftops, the energy generated could help significantly reduce peak demands during hot summer months.
- Lawmakers across the country to establish green building standards for all new school construction. Several states are implementing green building standards, either by law or by executive order, including: New Jersey, New York, Pennsylvania, Washington, and Maryland.
- The federal government- via Congress and/or administrative action- to direct EPA, Department of Education, Department of Energy and other relevant agencies to support the creation of green schools across the country, via research, support grants, and technical assistance.



Do Green Schools improve a student's academic performance?

The quality of the school building has a direct impact on student performance -- students perform better academically in better buildings.

Given that the average public school was built 42 years ago, according to the National Center for Education Statistics, maintaining school infrastructure is important not only to protect the district's capital investment, but also to ensure high student performance. In fourteen studies comparing building age with student achievement, researchers found that students in old buildings scored 5-7 percentage points lower than students in new buildings. Poor facilities may also effect the career decisions of teachers. Among teachers who rated their facilities C or below, over 40% said that these poor conditions have led them to consider leaving their school.

When building new schools, it is essential to incorporate the best design practices available. This is particularly relevant as numerous studies show that the central features of high performance schools -- including ventilation, daylighting, and acoustics -- have a direct impact on academic outcomes.

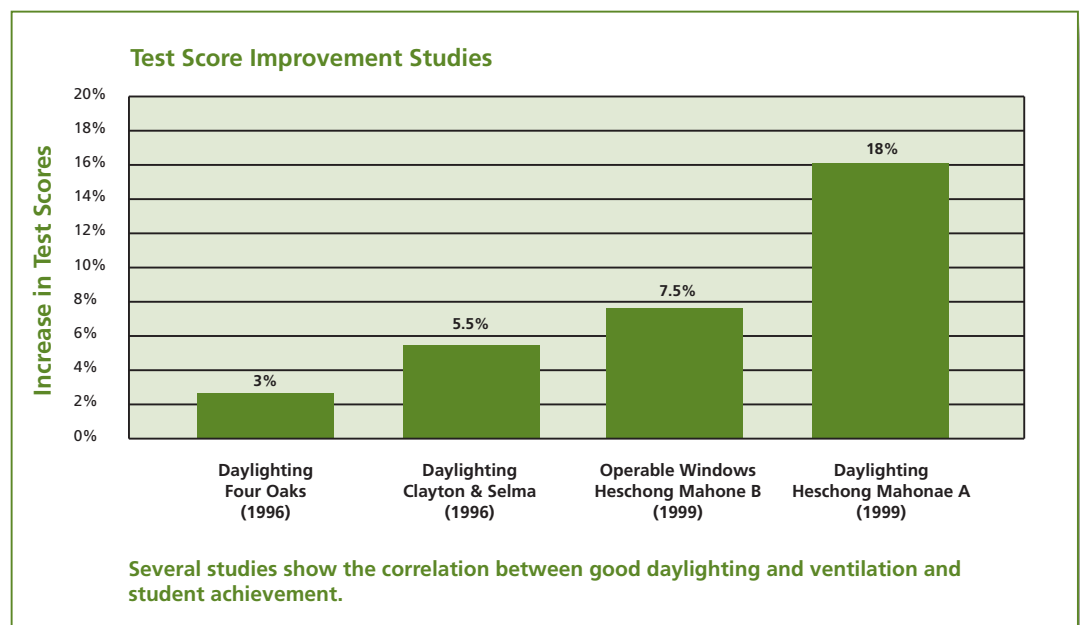
Facts:

- Each year since the 1997 restoration of Charles Young Elementary School, standardized test scores have risen at the school. Prior to the restoration, nearly half of all students scored in the bottom quartile of the national test scores. Since the restoration, well over half of the poorly performing students rose to national average attainment levels.
- A number of studies have found a significant positive correlation between student achievement and temperatures falling within the human comfort zone. Students in non air-conditioned buildings performed 3-12 percentile rank points lower on various measures than students in air-conditioned buildings.
- A study by the Heschong Mahone Group, covering more than 2,000 classrooms in three school districts, indicated that students with the most

classroom daylight progressed 20% faster in one year on math tests and 26% faster on reading tests than those students who learned in environments that received the least amount of natural light.

Daylighting is a central component of high performance design. Providing natural daylight provides biological stimulation for hormones that regulate body systems and moods, provides opportunities for natural ventilation, and reduces the need for artificial light, thereby reducing energy costs.

- A number of studies have demonstrated a positive correlation between appropriate acoustical conditions and student achievement. A California study found that 3rd grade students in noisy buildings were .4 years behind in reading and .2 years behind in math of students in quiet buildings.
- Green features can also be incorporated into school design as teaching tools. Students often learn better when abstract concepts are demonstrated to them visually. For instance, some schools have placed utility meters in visible location in the classrooms, others have incorporated stormwater management into the landscape design. There are also many innovative programs, such as the Center for Ecoliteracy, where teachers incorporate aspects of the classroom or school facilities as part of the curriculum.



Are Green Schools cost-effective?

Green schools are smart economic investments for our communities, our children, and our planet. Over the life of a building, costs related to operations are more than three times higher than initial construction cost. The potential small increase in construction costs for a green school is paid back multiple times over the life of the building. Furthermore, as more high performance schools are built, design and construction costs will decrease while energy and water savings will increase.

Context: State budgets are tight, with school districts receiving less money and being told to do more with it. As a result, the central debate about high performance schools is whether any additional costs translate into real long-term savings.

There is a growing body of research showing that while there is the possibility of increased up-front costs to construct high performance schools, there is demonstrated savings in operation and maintenance costs since less water and energy are used in these schools. Because schools built today will be in operation for the next thirty to fifty years at least, it is imperative to consider the life-cycle costs of the building (costs and benefits over the economic life of the building).

Facts:

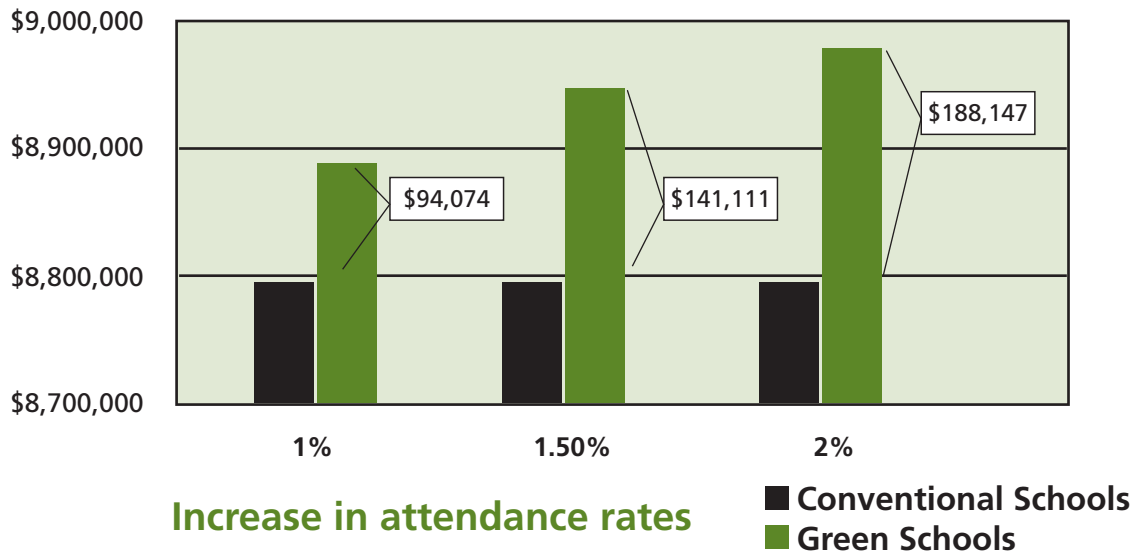
- A 2003 report to California's Sustainable Building Task Force concluded a 2% initial investment for construction costs would yield ten times the initial savings of that investment. For instance, if a building costs \$10 million to construct, it may cost about \$200,000 more up-front to incorporate green building features. But, over the life of the building, which is assumed conservatively to be 20 years, the green building features will yield savings totaling \$2 million.

- A report published in July 2004 by Davis Langdon, an international construction consultancy, was a comprehensive analysis of construction costs for many different kinds of green buildings, including schools. The report surveyed LEED buildings. LEED is the most popular standard for commercial green building, and some high performance school standards have used LEED as a template. The report concluded "there was no significant difference in the construction costs for LEED-seeking versus non-LEED buildings in any of these categories."
- According to the Collaborative for High Performance Schools (CHPS), school districts can save 20-40% on annual utility costs for new schools and 20-30% for renovated schools if high performance design and criteria are incorporated. CHPS estimates green building practices may increase hard construction costs by approximately \$1 per square foot (.4-.6% of total construction) and increase soft costs by \$1.10-\$1.40 per square foot (4% increase in total soft costs).
- In a 2003 report to the Los Angeles Unified School District about implementing high performance standards, LAUSD's consultant said the actual construction costs of the school facilities will be comparable to the costs of building a school using traditional design criteria.



Average Total ADA \$/school

\$ Benefit from Average Daily Attendance to School



The figure above illustrates the additional money each school would earn if the attendance rate increased by 1%, 1.5%, and 2% above the LAUSD average.

Based on 2004 data from the Los Angeles Unified School District (LAUSD), an average school could earn an additional \$94,000-\$188,000 from the state by increasing average daily attendance (ADA) through green schools which are projected to significantly reduce the number of student sick days. For the district as a whole, this would translate into \$14 million to \$28 million additional dollars based on the 150 new schools

projected to be complete by 2012.¹

Research shows there are fewer absences in green schools because the indoor air quality reduces asthma triggers and sources for respiratory infections.² Fewer asthma attacks and respiratory infections mean fewer missed school days, which translates into more money to the school district. Global Green USA conservatively estimates a range of increased attendance rates ranging from 1-2%.

¹In 2004, LAUSD is eligible for \$7,912 per student, based on average daily attendance. There are 1,189 seats per school (average), meaning LAUSD could earn \$9.4 million per school. However, the current attendance rate is 93.5%, resulting in a loss of \$611,479 per school per year.

²"The Healthy and High Performance School," Derek G. Shendell. (2004) www.healthyschools.org



Are Green Schools better for the environment?



photo courtesy of TreePeople

Stormwater Management Open Charter School, Los Angeles--Before

Green schools are better for the environment because they use less energy, less water, incorporate non-toxic materials and can make positive contributions to local ecosystems. Not only is this beneficial for the planet, but school districts can benefit too, as they typically use large amounts of their budgets to light, heat, and cool school facilities. High performance schools can be used for teacher salaries, supplies, and other educational needs.

Facts

- Energy use in green schools can be reduced by up to 40% compared to conventional school buildings.

Energy consumption can be reduced by employing smart practices and design for the lighting, cooling, and heating systems. There is a range of practices to reduce energy consumption including: using energy-efficient lamps and fixtures with occupancy and daylight sensors, using trees to shade buildings to reduce air conditioning demand, using natural ventilation where possible, using Energy Star appliances, using programmable thermostats to eliminate the need to shut off heating and cooling systems in a room when there are no occupants, etc.

- Basic efficiency measures can reduce a school's water use by at least 30%.

Green schools reduce water consumption by using efficient technology and fixtures both inside and outside the school building. To reduce water for landscaping green schools include native and drought tolerant landscaping. When irrigation is needed, it is critical to use high-efficiency irrigation



photo courtesy of TreePeople

systems and use reclaimed water or captured rainwater as much as possible. In addition to water efficient landscaping, green schools can employ water saving fixtures and equipment such as: low-flow or waterless toilets, automatic faucet shut-off controls in the bathrooms, low-flow showerheads in locker rooms, and high efficiency dishwashers in school cafeterias.

- Building construction accounts for the use of 40% of many materials, such as steel and concrete, and 25% of virgin wood harvested.

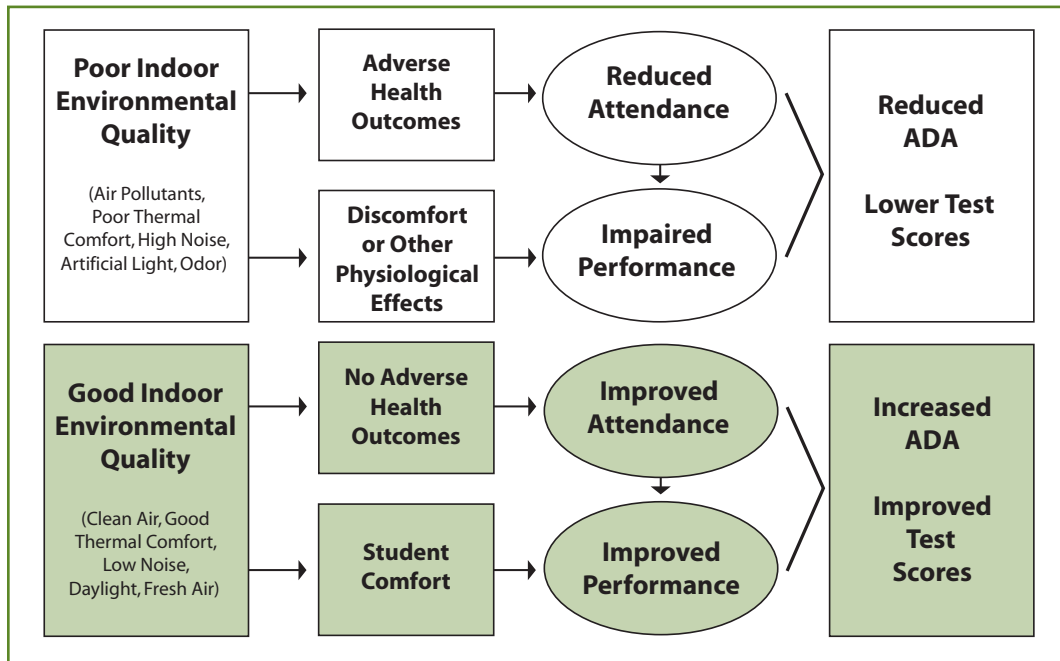
Green schools use materials based on their efficiency and effect on indoor air quality. Designers are encouraged to use durable materials that are easy to maintain and clean, materials that are easy to recycle, and materials that contain recycled content. It is also critical not to use toxic materials because they may contribute to poor indoor air quality.

- 4% of the entire municipal waste stream comes from schools- primarily food and paper.

Green schools encourage recycling by ensuring that there is enough space on campus for trash separation, and by purchasing recycled products for both construction and operations. Simple recycling practices can save the school district money and is a great teaching tool.

Stormwater Management Open Charter Schools, Los Angeles--After

Why are Green Schools healthier?



respiratory and immune systems are not fully developed. Furthermore, children under the age of 12 spend about 86% of their time indoors—with 21% of the time being spend in schools.

The primary factors that cause children to stay home from school due to illness are high concentrations of indoor and outdoor air pollutants. Critical indoor pollutants are nitrogen dioxide, mold, and other microbial organisms. These pollutants can cause respiratory infections and trigger asthma attacks. When children are forced to stay home the average

People spend more time indoors than outdoors. This means children spend most of the time either in a school building or inside a home. Thus, it is critical to ensure these buildings are not harmful to their health. Most parents are aware of the dangers of outdoor air pollutants, like smog, but few realize the dangers of indoor air pollutants.

One half of our nation's 115,000 schools have problems linked to indoor air quality. The EPA states indoor levels of air pollutants can be two to five times higher than outdoor levels. Poor indoor air quality contributes to respiratory infections and can trigger asthma attacks in susceptible kids. More asthma attacks and respiratory infections mean more absences from school. More absences from school means smaller operating budgets for the school districts. This is why good indoor air quality is so important, and why a green school's adequate air ventilation, use of materials with little or no toxic substances, and sound maintenance practices are so valuable.

Overall, green schools are built with the precautionary principle in mind. This principle states materials known to be free of toxic substances are preferable to materials that may have such substances. This ensures there are no harmful sources in the building that may one day be found to be harmful to a child's health.

Context for Schools: The way a school is built and the materials used are critical to a student's health. Children are particularly vulnerable to illness because their

daily attendance (ADA) of the school decreases. Because the ADA is a key factor in determining the operating budget for a school, these student absences have long-term effects for school district budgets as a whole.

Facts:

- The U.S. EPA estimates that asthma accounts for 1.2 million missed school days per year in California—the leading cause of school absenteeism due to a chronic illness.

Good indoor air quality can minimize the environmental triggers for asthma. Green schools offer good indoor air quality by providing adequate ventilation, eliminating/controlling sources of contamination, and incorporating good maintenance practices to prevent moisture and dust accumulation and exposure to harmful chemicals and pesticides.

In green schools, materials are selected carefully to prevent the introduction of environmental toxins. This includes using paint and adhesives and flooring with low or no volatile organic compounds (VOCs), and avoiding composite wood products that have added urea- formaldehyde.

- Of the 48 pesticides most commonly used in schools, the U.S EPA classifies 22 as possible or probable carcinogens.

Green schools incorporate integrated pest management and utilize janitorial practices that minimize use of harmful chemicals.



Global Green has been a leader on green building and improving our urban environment for more than a decade and has begun a three year initiative to help LAUSD green \$14 billion in new school construction. This report and Global Green's school initiative is made possible in part by a grant from the Annenberg Foundation.

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