

Testimony Regarding the Adoption of Proposed Connecticut High Performance Building Standards

Public Hearing: April 11, 2008

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My name is Joellen Lawson and I am accompanied here today by two other board members of the CT Foundation for Environmentally Safe Schools (ConnFESS), Diane Ethier and Martin Mador. For nearly six years, ConnFESS has been a non-profit organization dedicated to promoting policies, practices and resources that protect school occupants from environmental health hazards such as mold, lead, pesticides, volatile organic compounds (VOCs), radon and asbestos. Our members are committed to improving how schools are sited, designed, built, remediated, renovated and maintained. In 2003, ConnFESS played a pivotal role in shaping and passing PA03-220: An Act Concerning Indoor Air Quality in Schools. Since then we have continued to track and provide input regarding legislative initiatives that involve environmental health issues in schools such as indoor air quality, bus idling, pesticides, green cleaning and healthy, high performance schools.

I speak to you today as the founder and honorary president of ConnFESS and as a board member of the Healthy Schools Network, Inc., a national 501(c)(3) research, information, education and advocacy organization located in Albany, NY. ConnFESS is a member of the national Coalition for Healthier Schools which consists of sixteen national and ten statewide or metrowide organizations coordinated by the Healthy Schools Network. ConnFESS helped to write and continues to promote the National Coalition Position Statement. This position statement has called upon national, state and local officials to adopt, fund and implement healthy, high performance school facility design, construction and maintenance protocols since 2004.

In 2002, representatives of ConnFESS and other coalition members attended and provided testimony for the first ever US Senate hearing on High Performance Buildings. As part of the national coalition, we have learned from activists from California, Massachusetts, New Hampshire, New York and Washington about the great strides toward adopting and implementing High Performance School standards that are occurring in these states.

In Connecticut, ConnFESS was among the stakeholders who were asked to determine the mandatory elements of a high performance school during the Connecticut Green Building Council's High Performance School Initiative in 2005. Six elements were identified:

1. Indoor air quality (IAQ) requirements that exceed current standards
2. A building commissioning required before occupancy
3. A 20% more energy-efficient standard than prevailing building code
4. An integrated design process
5. A minimum, mandatory day-lighting contribution
6. Operations and Maintenance manuals and training for building operators

To varying degrees each of these elements is addressed in the proposed CT High Performance Building Standards.

While reviewing these proposed CT High Performance Building Standards the following questions needed to be answered:

1. Are the six essential elements identified by Connecticut stakeholders during the High Performance School Initiative adequately represented?
2. Do these regulations facilitate the achievement of benefits associated with high performance schools? (They were rated in order of priority as: 1) cost-effectiveness, 2) health of occupants, 3) student performance, 4) concern for the environment by the same CT stakeholders.)
3. Are these regulations embedded with best practices that science has established are cost effective, prevent sick building syndrome and building-related illnesses and enhance student performance and teacher productivity?
- 4) How do these high performance building standards compare with high performance school standards in other states?
- 5) How do these high performance building standards compare with Silver Ratings for LEED for New Construction and LEED for Schools?
- 6) Do these standards include regulations that are inappropriate for schools or leave out others essential for school settings?
- 7) What type of oversight will be in place to ensure compliance with the CT High Performance Building Standards?

After reviewing the proposed CT standards, ConnFESS is concerned that:

- 1) The mandatory requirement to develop and implement an indoor air quality management plan essentially reiterates standards previously established when PA 03-220: An Act Concerning Indoor Air Quality in Schools was enacted in 2003. Some of the more specific language found on page 17 in the CT Compliance Manual is a step in the right direction, but is not thorough enough to ensure the effective implementation of an IAQ management plan. We recommend that all steps found on pages 89-94 in the NY CHPS model be incorporated.
- 2) Some optional standards should be mandatory. Other essential standards are missing.
- 3) Standards for energy efficiency and environmental sustainability are given far more weight than those promoting healthy indoor environments and the use of environmentally preferable products (i.e. safer, less toxic alternatives).

- 4) Preventative maintenance can only be addressed during commissioning. As far as we know, CT is the only state in the country that will set high performance building standards without long-term maintenance procedures.
- 5) CT regulations do not meet Silver Ratings for LEED for New Construction or LEED for Schools requirements.
- 6) These regulations lack essential procedures specifically targeted for schools and school occupants. In its current form, building standards also include some regulations that are not appropriate for school settings.
- 7) The draft regulations contain no mechanism for assuring that regulations are actually implemented by the project owner, design team and construction teams. It is critically important that third party certification be included.

We will elaborate further on the significance of these concerns and suggest ways to remedy them.

When Connecticut stakeholders were asked to rate in order of priority the benefits generated by designing and building High Performance Schools, cost-effectiveness was named the top priority. Ideally, taxpayer savings will be derived from improvements in energy efficiency, building longevity and durability along with long-term life cycle maintenance costs.

Decreased liability was also noted as a reason that money would be saved. Liability issues arise from worker's compensation, disability and civil rights claims filed against school districts when school employees and/or children are diagnosed with health problems attributed to exposure to pollutants in contaminated schools.

If the CT High Performance Building Standards are to be truly cost-effective and reduce liability concerns, they will have to adequately protect building occupants from sick building syndrome and building-related illnesses. Symptoms of sick building syndrome such as eye, nose and throat irritation and fatigue are temporary and only occur when one is in an unhealthy building. Building-related illnesses are more serious, long-term medical conditions such as asthma or hypersensitivity pneumonitis that are caused or exacerbated by indoor pollutants. Sick building syndrome and building-related illnesses diminish both teacher productivity and student performance. Both cost taxpayers money by increasing absenteeism. When teachers are absent, more money is needed to pay for substitutes. When students are absent, funding based on daily attendance records is reduced.

The US EPA's IAQ Design Tools for Schools cites increases in Average Daily Attendance (ADA) as a primary benefit of high performance schools with superior indoor air quality. This EPA guide points out that "The majority of a school's operating budget is directly dependent on ADA, so even a small increase can significantly boost the

operating budget”. Conversely, even small decreases in average daily attendance records can significantly reduce school operating budgets.

In order for CT High Performance Building Standards to protect school occupant health, be cost effective and reduce liability claims, they will need to mandate best practices advocated by the most up to date scientific literature on school buildings, indoor air quality, health and learning. The cost-effectiveness of building high performance or “green schools” was analyzed by Gregory Kats in Greening America’s Schools: Costs and Benefits. This 2006 report was sponsored by the American Federation of Teachers, American Institute of Architects, American Lung Association, Federation of American Scientists and the US Green Building Council. Data for this report was drawn from 30 green schools built from 2001 to 2006 in ten states including Oregon, Massachusetts, Pennsylvania, Ohio, Washington, Illinois, Hawaii, North Carolina, New Jersey and Georgia. All thirty of these schools incorporated at least half of the available points for indoor air quality, comfort and lighting found in LEED or Collaborative for High Performance Schools protocols.

A number of school specific studies included in this report demonstrate improved attendance, health and test scores (See page 12.) For example, in Illinois an analysis of two school districts found that student attendance rose by 5% after incorporating indoor air quality improvements. A study done in a LEED Silver elementary school in Pennsylvania found teachers experienced a 12% decrease in missed workdays compared to a traditional school that did not have indoor air quality, comfort and lighting features found in the LEED Silver school.

Another report on the impact of green schools in Washington State estimated a 5% reduction in teacher turnover. According to Kats, the average salary and benefits received by public school teachers nationally are worth at least \$65,000 nationally. The inherent costs of teacher turnover that are associated with termination, hiring and staff training cost between 25% and 200% of a teacher’s salary and benefits.

In 2006, The National Academy of Sciences published a report titled Green Schools: Attributes for Health and Learning. The charge of this report was to “Review, assess and synthesize the results of available studies on green schools and determine the theoretical and methodological basis for the effects of green schools on student learning and productivity” as well as student and teacher health. This sentinel report was sponsored by the Mass. Tech. Collaborative, Barr Foundation, Kendall Foundation, US Green Building Council and the CT Clean Energy Fund. (We are pleased that the CT Clean Energy Fund, which was created by the CT General Assembly and is funded by electric rate payers, was among these sponsors.)

The primary conclusions of this report were that the following school building attributes have been proven to support student and teacher health, learning and productivity:

1. Dryness: Excessive moisture is associated with asthma and other respiratory diseases. The building is mold/moisture resistant.
2. Good indoor air quality and thermal comfort: Ventilation rates, air pollution, humidity levels and temperature are effectively controlled.
3. Quietness: Acoustical quality affects student learning and development of language skills.
4. Well maintained: Building systems are commissioned to ensure they perform as intended. Routine preventive maintenance is implemented.
5. Cleanliness: Measures are implemented to help control indoor pollutants associated with asthma and other respiratory diseases.

The Connecticut Alliance for Healthy and Safe School Buildings (CAHSSB), coordinated by ConnFESS, is a coalition of individuals and organizations united in a campaign to improve the implementation and enforcement of school environmental health laws. In 2008, this coalition produced a position statement whose overall premise is that quality ventilation is key to healthy indoor air. In 2000, the Connecticut Academy of Science and Engineering (CASE) report on Indoor Air Quality in Connecticut Schools found that “The most important direct cause of poor air quality is inadequate ventilation regardless of what other factors contribute to this condition”. Many new cases of sick building syndrome and building-related illnesses that have been documented in the last year in Connecticut occurred in schools that had poorly designed, operated and maintained HVAC (heating, ventilation and air conditioning) systems. Optimal ventilation systems have rarely been installed in schools due to pressures to reduce design and construction costs as well as a lack of awareness regarding the essential role ventilation systems play in diluting the concentration of indoor pollutants.

The key role HVAC systems play in protecting the health of school occupants is highlighted in the National Academy of Sciences report on “green schools” when it states: “The reduction of pollutant loads through increased ventilation and effective filtration has been shown to reduce the occurrence of building-associated symptoms (eye, nose and throat irritations; headaches; fatigue; difficulty breathing; itching and dry irritated skin) and to improve the health and comfort of building occupants.”

Based on our review of the proposed CT High Performance Building Standards, current high performance school models in other states and numerous scientific studies (with special attention given to the National Academy of Sciences report previously mentioned) we are submitting for your consideration a list of priority recommendations.

The title of this list is **Priority Recommendations to Ensure Connecticut High Performance Building Standards Protect School Children and Personnel Health through the Design, Commissioning, Renovation and Construction of Environmentally Safe Schools.**

The purpose of this list is to assist you in revising these standards so that at minimum they will:

- 1) Embed best practices that science has proven are cost-effective as well as improve the productivity and well being of school occupants and/or building – users.
- 2) Make the protection of human health (ie. prevention of sick building syndrome and building–related illnesses) the top priority when determining which indoor air regulations must be mandatory from those that can remain optional.
- 3) Ensure factors contributing to healthy indoor environments receive proper attention and that those regulations use language that is explicit and thorough enough to encourage effective implementation.
- 4) Reflect an awareness of the special needs and additional protections children must be afforded while attending school.
- 5) Incorporate more school specific procedures into integrated design, commissioning and the implementation of IAQ management plans that are crucial for schools, but not necessary or even appropriate for office buildings.

These priority recommendations emphasize the protection of school occupants from sick building syndrome and building-related illnesses. We are promoting a stronger public health component for these regulations because:

1. The importance of healthy indoor environments cannot be overstated. The US EPA estimates that half of our schools have indoor air problems which can be 5-100 times more polluted than outside air. Indoor air pollution is a major contributor to asthma, the leading cause of school absenteeism and the leading cause of occupational lung disease among teachers.
2. The Greening America's Schools: Costs and Benefits report cites five separate studies that found an average asthma reduction of 38.5% in buildings with improved air quality.
3. In states that track occupational asthma, teachers and teacher's aides are among the leading occupations developing work related asthma. Through long-term tracking, UConn Health Center has determined that teachers in CT are the most commonly reported group of workers to have new onset occupational asthma.
4. In recent years, CT students and teachers have been diagnosed with hypersensitivity pneumonitis after exposure to damp and moldy conditions in schools. Hypersensitivity pneumonitis impairs the ability of the lungs to absorb

oxygen and eliminate carbon dioxide. This is a potentially progressive and fatal lung disease.

5. In the last year alone, indoor air quality problems have been documented in CT schools in New Britain, Hartford, Westport, Greenwich, Meriden, Manchester, Winchester and Oxford. As there is no effective tracking mechanism assessing how many CT schools have IAQ problems or their degree of severity, contaminated schools in these eight school districts only represent the tip of the iceberg. Students and staff have had symptoms and illnesses such as adult-onset asthma, rashes, shortness of breath, sinus infections, vertigo/balance problems, visual impairment and immune suppression linked to the poor conditions in schools by physicians.
6. The Center for Building Performance at Carnegie Mellon University has identified seventeen substantial studies that document the relationship between improved air quality and health. By increasing the circulation of outside air and improving moisture and pollution source controls, the prevalence of asthma, flu, sick building syndrome, respiratory problems and headaches were reduced by 13.5% to 87%, with an average improvement of 41%

Another major concern we have with the proposed CT High Performance Building Standards is that they do not adequately reflect the differences between office buildings and school facilities. Unlike an office building, a public school is the center of one's community and neighborhood. Even with the best curriculum, class sizes and qualified teachers, a school cannot offer its children a quality education if the building does not have excellent indoor air quality. The term "in loco parentis" reminds us of the profound responsibility school officials have as the legal guardians of CT's children as they spend approximately thirty-five hours a week in school facilities. As legal guardians, teachers, administrators, superintendents and boards of education have a legal and moral responsibility to protect school children from the physical and psychological harm exposure to indoor air pollutants can cause. The compliance manual and regulations must guide school officials, architects, construction workers and commissioning agents to make choices with regard to the design, renovation and construction of schools that take into account that children:

1. Are the majority of school occupants
2. Are more susceptible to harmful exposures
3. Lack OSHA-like standards to safeguard them.

In July 2006, Claire Barnett, Executive Director for the Healthy Schools Network, presented "Designing for Children: Healthy and High Performance Schools by Design" at a congressional briefing held in Washington, DC. The premise of this presentation is that "Children are not just little adults." and "Schools are not just little offices." Some other key points included that:

1. Children cannot identify and protect themselves from environmental health hazards.
2. Children cannot send in a substitute when they are sick.
3. Unless they are home schooled (legally), children are required to attend school regardless of hazards or conditions.
4. There is no tracking or reporting system for illnesses or injuries in school.
5. Facility codes and maintenance are often ignored due to a lack of oversight and funding.
6. Schools are more densely occupied and heavily used than office buildings.
7. School environments have numerous biological and chemical agents contributing to indoor pollution.

The effects of indoor air pollution can take a harder toll on children than adults. Dr. Philip Landrigan, Professor of Pediatrics at the Mount Sinai School of Medicine gives three reasons children are more vulnerable to harmful exposures:

1. "First, children's airways are smaller in diameter meaning a pollutant that only slightly irritates an adult's airway can significantly irritate and narrow the airway of a child. This can produce wheezing, reactive airway disease (hypersensitivity to allergens), or asthma."
2. "Second, because children are more active and have much more active metabolisms than adults, they take in more air relative to their size than adults do. They breathe more rapidly and inhale more pollutants per pound of body weight."
3. "And third, children's lungs are still growing (their lungs don't reach maturity until about age 20). Repeated exposure to air pollution and repeated bouts of asthma can limit the growth of a child's lungs and predispose them to chronic lung disease."

Stakeholders participating in the 2005 CT GBC High Performance Schools Initiative agreed all future construction and "gut" renovations should use an integrated design process that would include "... all the essential elements of high performance, energy efficient design that are most appropriate to the building site". Healthy indoor air quality must be treated as an essential element of high performance design.

The CT High Performance Building Standards set out to establish minimum standards for:

- energy and renewable energy
- water efficiency
- indoor environments
- recycling, reuse and sustainability
- site selection and development
- operations and procedures

An integrated design process implies that a balanced emphasis will be assigned to those elements that protect human health, the environment and taxpayers' pocketbooks. The CT standards for energy renewal, water efficiency and recycling, reuse and sustainability are very thorough and have the potential to improve some of the ways state funded buildings are designed, renovated and constructed. There does remain substantial room for improvement when it comes to standards for indoor environments, site selection and development as well as operations and procedures.

When I first read the explanation for state and municipal impacts for these new regulations, I was struck by the statement "... adding requirements to enhance indoor air quality will reduce potential for occupant health problems and may minimize future mitigation costs associated with poorly designed and constructed buildings." In its current form, the CT High Performance Building Standards have only one mandatory indoor air quality requirement which is to develop an IAQ management plan during construction. Twenty-six out of fifty-seven Building Options must be implemented. Thirteen strategies to improve indoor environments are optional. This makes it possible to be in compliance with these standards without implementing any options listed under indoor environments.

Of these thirteen strategies for indoor environments, ten promote better air quality (to varying degrees of effectiveness) and three enhance daylighting. The National Academy of Sciences report has determined that there is a greater preponderance of scientific evidence to justify requirements that keep buildings dry, reduce sources of pollution and include acoustic design and commissioning than currently exists for daylighting.

ConnFESS is not suggesting that these daylighting options be changed or removed. However, we do wish to point out that the National Academy of Sciences report does specifically say that:

1. "... Currently, there is insufficient scientific evidence to determine whether or not an association exists between daylight and student achievement."
2. "... Guidance for lighting design that supports the visual performance of children and adults based on task, school room configurations, layout, and surface finishes, is not provided."
3. "Future green school guidelines should seek to support the visual performance of students, teachers, and other adults by encouraging the design of lighting systems based on task, school room configurations, layout and surface finishes."

ConnFESS is strongly urging the committee to mandate requirements for schools that will:

1. Prevent the unnecessary introduction of harmful pollutants into schools by:
 - a) Selecting the least toxic, lowest VOC emitting products possible
 - b) Insisting air intakes be placed at least 25 feet (not 10 feet) from noxious or

hazardous contaminants and away from parking lots, bus idling and exhausts.

2. More effectively dilute concentrations of harmful pollutants by:

- a) Increasing ventilation rates as written in Section 16a-38k-4b (2) that exceed current state code by 30%
- b) Conducting building flush outs prior to occupancy and removing language that permits air quality testing to replace a building flush out.

Insufficient emphasis on indoor environments and human health is evident in these regulations because many basic design and construction practices used to keep buildings from getting wet are missing. For example, the NY CHPS High Performance protocols mandate the use of mold/moisture resistant materials for interior/exterior walls, roofing and flooring and stresses: ‘Prevention of moisture migration through walls is critically important to a high performance building. Moisture in wall cavities can render insulation ineffective and promote mold growth, leading to increased maintenance and utility costs as well as poor indoor air quality’.

Given the extensive scientific data (See ConnFESS fact sheet.) that confirms the serious, negative outcomes associated with damp and moldy buildings, it is difficult to find a rationale for not including regulations that adequately address this issue. Some of this compelling research has been done right here in Connecticut. In January 2005, the abstract Work-Related Asthma in Teachers in Connecticut: Association with Chronic Water Damage in Schools was published in the journal Connecticut Medicine. Its authors, Dangman, Bracker and Storey wrote: “Workplace exposures in water damaged schools are risk factors for the development of work related lower respiratory disease in school teachers and staff.” The lower respiratory diseases to which they refer include asthma, hypersensitivity pneumonitis and sarcoidosis. In their study, patients diagnosed with “interstitial lung disease” worked in schools with documented water intrusion problems. These authors also noted that the symptoms of school staff in their study “varied according to the workplace environment, with more patients from water damaged (vs. dry) workplaces having upper respiratory symptoms (76% vs. 45%) and asthma (45% vs. 23%)”. Upper respiratory symptoms include sinusitis and rhinitis. This study was done with adults only.

Site selection requirements do not adequately address public health risks (outdoor air pollution, building on marshes and wetlands or near landfills) or classroom performance (e.g. noise pollution when located near airports). It is a matter of public record that the majority of CT teachers suffering building-related illnesses caused by exposure to mold and damp conditions who testified at public hearings before the CT General Assembly from 2001 to 2003 had worked in schools built on wetlands and marshes. In these cases, moisture incursion had occurred from the bottom up.

Quietness and acoustical quality are among the five primary attributes identified in the 2006 National Academy of Sciences report Green Schools: Attributes for Health

and Learning because they directly impact student performance and teacher productivity. For young children, a quiet/acoustically sensitive environment is imperative for the acquisition of basic language skills. This report asserts that sufficient evidence demonstrates an inverse relationship between excessive noise in schools and learning. Chronic noise exposure is associated with reading deficits. One study found a higher percentage of students in noisy schools reading one to two years below grade level.

The same National Academy of Sciences report cited evidence that suggests "...teachers may be subject to voice impairment as a result of prolonged talking in noisy environments." Other studies named in the textbook Safe and Healthy School Environments (Oxford Press, 2006) have shown that:

1. Teachers are more likely to report voice disorders than non-teachers.
2. More than one in five teachers have missed workdays due to voice problems.
3. Teaching is a high risk occupation for voice disorders because of the following factors: noise created by loud HVAC systems, poorly designed acoustics in classrooms, overcrowding, as well as poor air quality from low humidity and contaminants.

The proposed CT High Performance Building Standards do not mention optional or mandatory requirements for acoustics even though acoustic standards are required in LEED for Schools and by CT state law. Section 20(a) of PA05-6: An Act Concerning Authorizations for State Grant Commitments for School Building Projects and Other Miscellaneous established that on or after July 1, 2005 school projects authorized by the CT General Assembly would be required to construct or alter classrooms or libraries in accordance with the American National Standard, Acoustical Performance Criteria, Design Requirements for Schools, ANSI 12, 60-2002. This provision does not apply when such modifications "...cannot be made without compromising health and safety, or the educational purpose or function of a specific classroom or library." In light of these acoustical requirements for schools and the compelling research that underscores their importance, ConnFESS is recommending that acoustics in schools be evaluated during the commissioning process and via post occupancy surveys to be completed by school employees.

Promulgating regulations that are restricted to design, renovation, commissioning and construction without addressing long-term preventive maintenance is also extremely problematic. All the other high performance school models we are familiar with include specific guidance for long-term maintenance so as not to create poorly maintained, unhealthy schools in the future. At some point, CT must establish and enforce effective long-term preventive maintenance protocols for schools. Remember, two of the five attributes research shows leads to positive health and learning outcomes deal with cleanliness and routine, long-term preventive maintenance.

Finally, it is our goal to help you bring the benefits of designing, renovating and constructing healthy, high performance schools to Connecticut's school children and personnel. Again, we hope our priority recommendations will assist you in formulating regulations that will:

- 1) Embed best practices that science has proven are cost-effective as well as improve the productivity and well being of school occupants and/or building users.
- 2) Make the protection of human health (ie. prevention of sick building syndrome and building-related illnesses) the top priority when determining which indoor air regulations must be mandatory from those that can remain optional.
- 3) Ensure factors contributing to healthy indoor environments receive proper attention and those regulations use language that is explicit and thorough enough to encourage effective implementation.
- 4) Reflect an awareness of the special needs and additional protections children must be afforded while attending school.
- 5) Incorporate more school specific procedures into integrated design, commissioning and the implementation of IAQ management plans that are crucial for schools, but not necessary or even appropriate for office buildings.

ConnFESS members pledge to assist you in any way we can and request that you inform us in writing of any changes made to the CT High Performance Building Standards. Thank you for this opportunity to provide input for this complex and very important process.