



Setting the Stage

NASEO: Improving Energy Efficiency, Indoor Air Quality, and Educational Outcomes in School Facilities

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Mission

We aspire to make every school an ideal place to learn.

For 20 years, CHPS has developed and maintained the nation's only third-party building standard explicitly designed by K12 schools and focused on improving student performance.

Priorities:

- Increase student performance and health of students & staff
- Reduce operating costs through better design
- Enhance environmental stewardship



Abbott Downing, Concord NH (NE-CHPS)



Existing Programs

Third-Party building standards only address new construction or major renovations.

LEED for Building Design and Construction (BD+C)

This rating system is for buildings that are new construction or major renovations.

LEED for Interior Design and Construction (ID+C)

This rating system is for interior spaces that are a complete interior fit-out

US CHPS Criteria 2.0

Criteria & Implementation Guide for New Construction & Major Renovation of School Buildings

- A major renovation is defined by a substantial improvement to a building of at least two of the following systems: lighting, HVAC, building envelope, interior surfaces, and/or site.

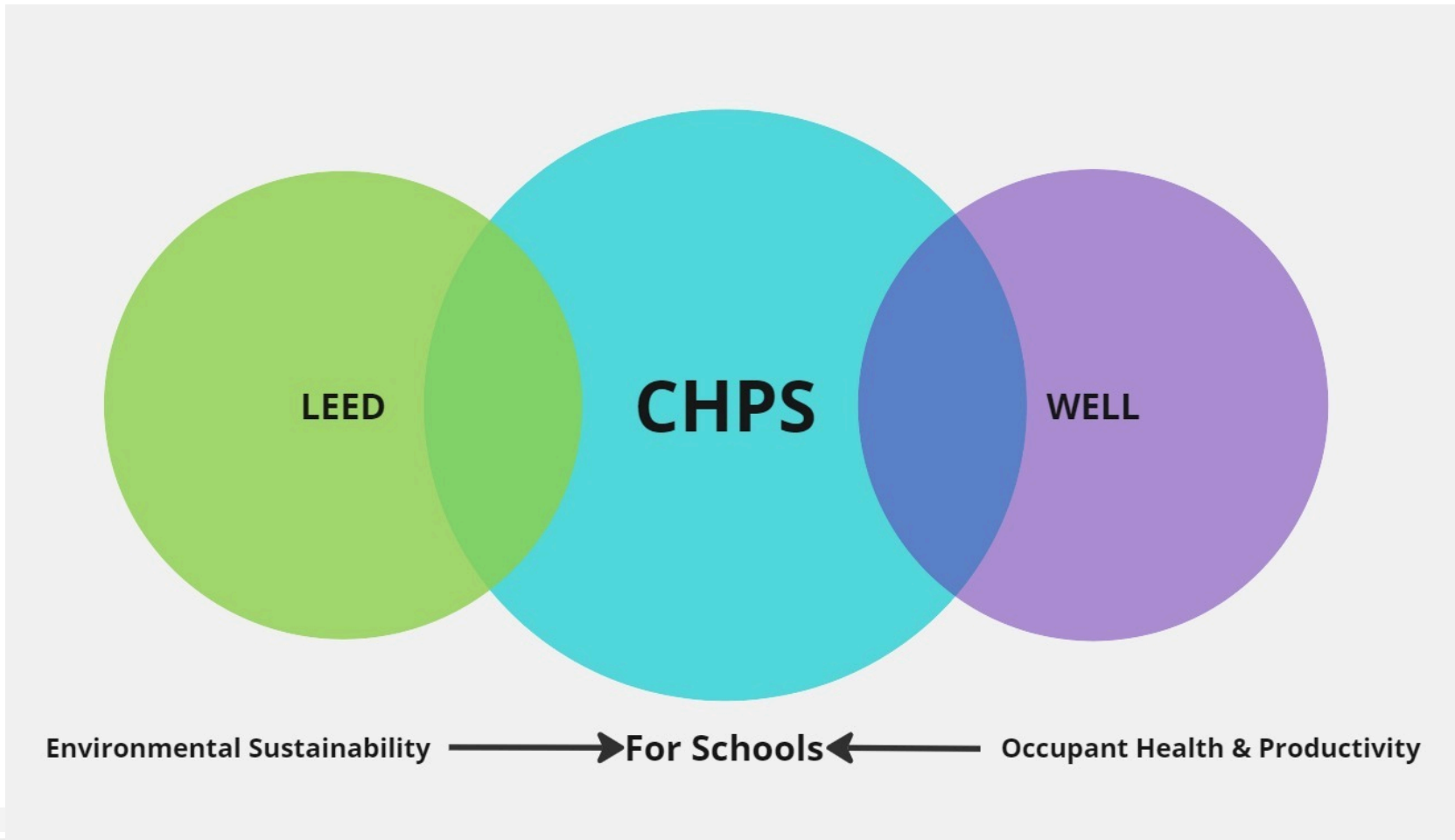


LIVING
BUILDING
CHALLENGESM





CHPS is K-12 School-Specific





school facilities received a **D+** on the 2021 Report Card for America's Infrastructure

4/10 public schools do not have a long-term facility plan



school facilities represent the **second largest** sector of public infrastructure spending, after highways



53% of public school districts report the need to update or replace systems such as HVAC



Public schools serve as **emergency shelters** and **community resource** during a man-made or national disaster



THE FACTS

Reference: 2021 Report Card for America's Infrastructure

National Statistics

- 1/6 people in the U.S. are in school every day
- 14 million schoold days a year are missed due to asthma
- 36,000 of the 100,000 schools need HVAC replacements or upgrades

2021 STATE OF OUR SCHOOLS

AMERICA'S PK-12 PUBLIC SCHOOL FACILITIES





National Statistics

- Average School Age = 44-56
- K12 is the highest consumer of natural gas
- K12 is the second highest consumer of electricity







1978 Oldsmobile Cutlass







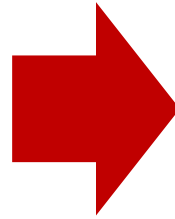
2023 Tesla Model Y



- Which one **safer**?
- Which has **lower operating cost**?
- Which is **healthier** for the driver? For the community?
- Which is more **sustainable**?
- Which is more **equitable**?



How do we accelerate this transition?





2022 JAMES D. MacCONNELL AWARD

DEARBORN 6-12 STEM / EARLY COLLEGE ACADEMY

The City of Boston, MA



Sandy Hook Elementary School, Newton, Conn. Robert Benson Photography



Sandy Hook Elementary School, Newton, Conn. Robert Benson Photography

How Classrooms Impact Learning

Understanding how the environmental factors in our schools and the design of our spaces impact students' educational development



Students with optimal daylight advance 20% faster on math tests and 26% faster on reading.

Daylight boosts cognitive processing speeds, concentration, and focus.

Promotes balanced circadian rhythm and healthy sleep.

Reduces stress, improves mood and mental health.

Recommendation: Provide contrast ratios of 7-11:1, no glare, and higher correlated color temperature, along with daylight exposure, open blinds, breaks outside and views to nature.



Students are 12.3% more likely to fail a test on a 90 degree day compared to a 75 degree day.

Student performance on tests decrease

High humidity exacerbates respiratory symptoms while low humidity increases the spread of illness.

Recommendation: Upgrade HVAC systems, ensure cooler classrooms with moderate humidity through temp control and use a mix of mechanical and natural ventilation.



Optimal IAQ can increase student cognitive speed and accuracy by up to 15%.

Improves focus.

Reduces spread of illness which reduces absenteeism.

Helps prevent development of chronic diseases like Asthma.

Recommendation: Ventilate classrooms at rate of 5-8 L/s/person to reach 1000 PPM of CO₂ and renovate HVAC systems, install purifiers, use natural ventilation.



Higher ambient and background noise is associated with lower performance and increased stress / blood pressure.

Clear teacher voice critical for language development.

Quieter HVAC systems linked to better test scores.

Children are more sensitive to chronic noise exposure.

Recommendation: Create buffer zones (trees and embankments between roads), pad furniture/walls, and install porous materials on walls to reduce reverberation.



Students in a biophilic learning space showed triple the progress in math.

Exposure to nature reduces stress and mental fatigue and provides Attention Restoration

Engaging colors & appropriate complexity of displays stimulate creativity.

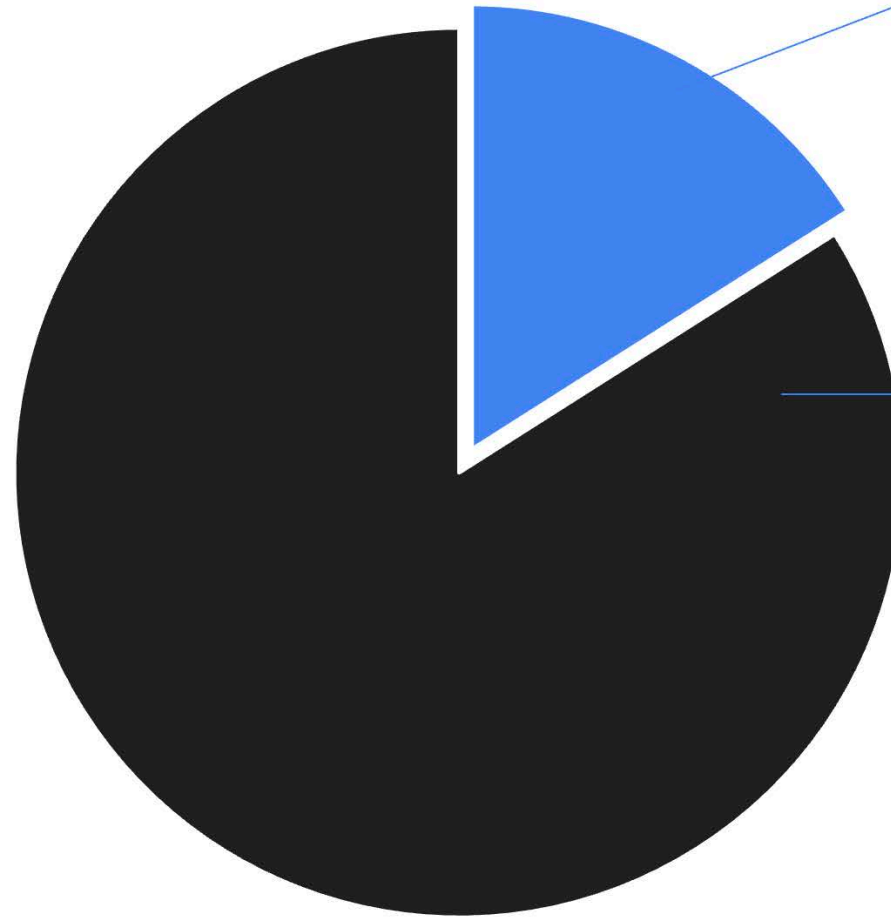
Provide opportunities for prospect and refuge

Recommendation: Bring plants, nature, and natural imagery/forms into the classroom. Paint walls with light biophilic colors adding an accent color to boost creativity.

16%

0.65

Impact, in grade levels, of moving an average child from the worst classroom to the best



16% Quality of the Classroom Environment

84% All other Factors

- Socioeconomic
- Teacher quality
- Family Support
- Nutrition
- Sleep
- Etc.

Academic Achievement

Factors affecting the gap between the highest and lowest achieving students.





Freemont HS, Quattrocchi Kwok Architects



Freemont HS, Quattrocchi Kwok Architects



Classrooms

Environmental Strategies in Action

C.11

Offer indirect access to the outdoors through windows with views of nature

C.12

Optimize Daylight for Student Alertness

C.13

Incorporate Operable Windows for Greater Thermal Control and Increased Natural Ventilation

C.18

Increase acoustical performance

Classrooms

Healthy Schools by Design
2022

Perkins&Will







“Project-based learning was never intended for students of color. We intercepted that dream and now our entire school system is a project-based learning experience.”

– Anthony G. Smith
Superintendent
Winton Woods High School





"Our young people are worth it...the dream, the vision and the effort to deliver this unbelievable learning space. It gives me goose bumps!"

- Eric Martin, Principal
Winton Woods High School



"These new buildings represent our shared value of education and the shared vision of our communities."

- Katrina Rugless, Former Board of Education Member Winton Woods High School

LEARNING STAIR

16%



Minor Renovation Process & Involvement





2020

US-CHPS Criteria 2.0

Criteria & Implementation Guide for New Construction &
Major Renovation of School Buildings

Republished June 2022

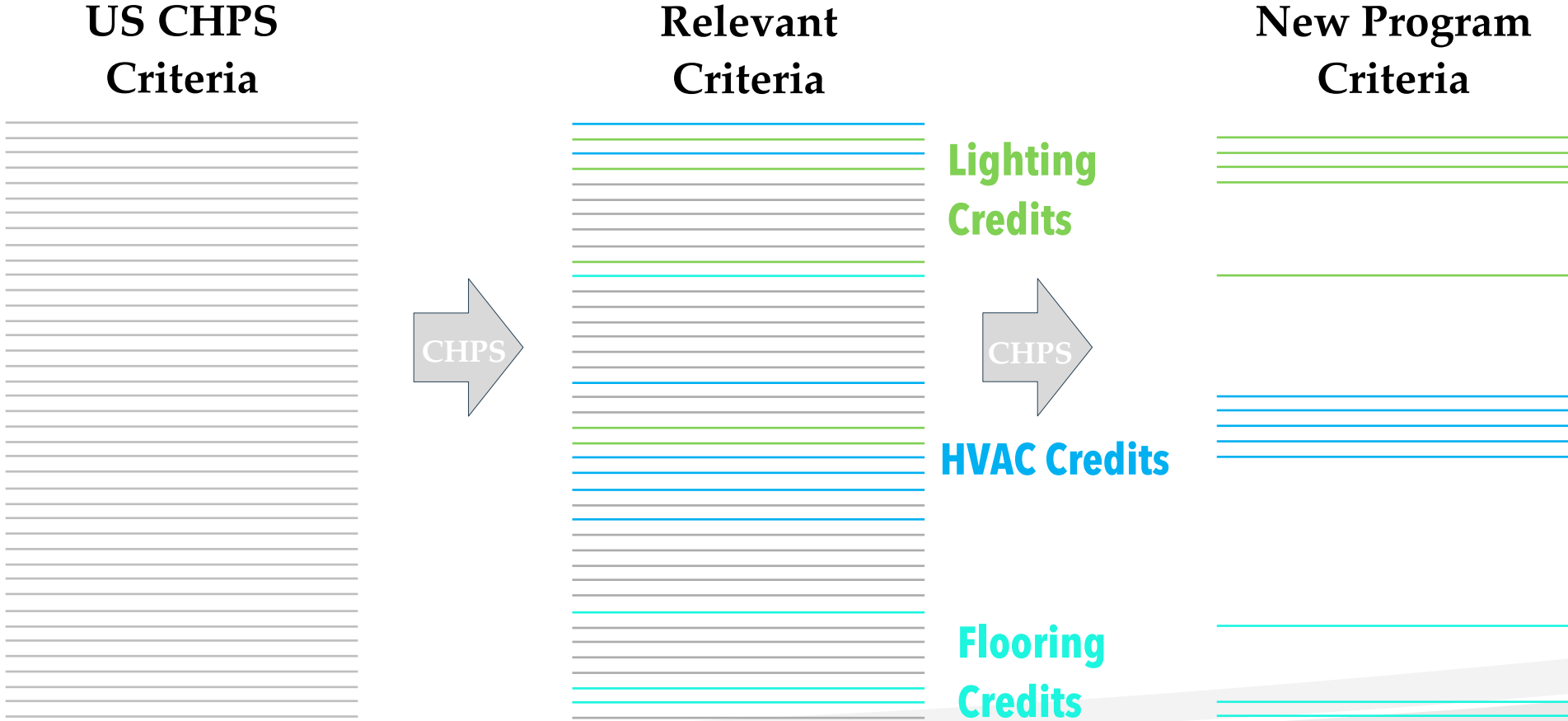
Example Flooring-related Credits

Selection from Existing US-CHPS Criteria:

- II C8.1 – Biophilic and Responsive Design
- EQ C2.1 – Pollutant & Chemical Source Control
- EQ C2.1.1 – Walk Off Mats
- EQ C5.1 – Post Construction Indoor Air Quality
- EQ P6.0 – Low Emitting Materials
- EQ C6.1.1 – Adhesives & Sealants
- EQ C7.1 – Material Health Disclosures
- **EQ C15.0 – Acoustical Performance**



Minor Renovation Process





Thank You to Our Partners

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School Districts



Partners



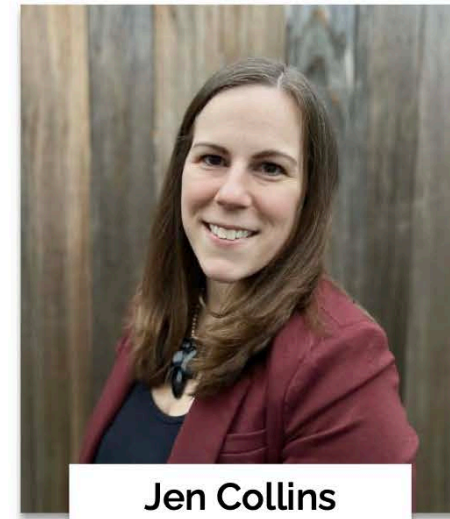
U.S. DEPARTMENT OF
ENERGY

CONNECT WITH US!

Whether you want to get involved, learn more about what CHPS is doing or want to meet for a virtual (or in-person) coffee chat, we would love to hear from you!



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