Using CHPS to Produce Desired Outcomes in School Buildings

John Balfe V
Northern New England Facilities Masters Conference
February 24, 2016
Agenda

1. Background
2. NE-CHPS Overview
3. Operations and Metrics
4. Indoor Environmental Quality
5. Relevant Statistics
6. The Operations Report Card
7. Case Studies and Exemplars
8. Resources & Events
9. Questions?
About ME

• High Performance Buildings Associate at NEEP
• Prior to NEEP, Southern NH Planning Commission in Manchester, NH
• UNH Graduate

My Vision: All students have access to healthy, high performance school facilities and schools become centers of the community again
About NEEP

Mission

Accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system

Approach

Overcome barriers and transform markets via *Collaboration, Education and Enterprise*

Vision

Region embraces **next generation energy efficiency** as a core strategy to meet energy needs in a carbon-constrained world

*One of six regional energy efficiency organizations (REEOs) funded by the US Department of Energy (US DOE) to link regions to US DOE guidance, products and programs*
Overview of NE – CHPS 3.1

• What is NE – CHPS?
  – A complete building criteria that provides students with premium educational environments

  – Considerations for:
    • Indoor environmental quality
    • Efficient use of energy
    • Occupant comfort – thermal, acoustical and visual
    • Ease of O & M
NE – CHPS Overview

• How does it work?
  – Point based system
  – New construction projects, renovations, or phased approach
  – 41 prerequisites
  – For all schools from pre-K to community colleges
  – Upfront costs are quickly offset by energy efficiency operational savings

Freeman Kennedy School – Norfolk, MA
## What’s in the Criteria?

<table>
<thead>
<tr>
<th>Seven Basic Metrics</th>
<th>Related Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Integrated Design Process</td>
<td>Engineers consult with teachers &amp; students</td>
</tr>
<tr>
<td>2. Indoor Environmental Quality</td>
<td>Walk-off mats keep pollutants outside</td>
</tr>
<tr>
<td>3. Energy Usage</td>
<td>Motion sensor activated lighting</td>
</tr>
<tr>
<td>4. Water Usage</td>
<td>Low-flow toilets &amp; waterless urinals</td>
</tr>
<tr>
<td>5. Site Selection/Development</td>
<td>Facility located near public transportation</td>
</tr>
<tr>
<td>6. Materials &amp; Waste Management</td>
<td>Locally produced materials</td>
</tr>
<tr>
<td>7. Operations &amp; Metrics</td>
<td>Occupant behavior seminars</td>
</tr>
</tbody>
</table>
Let’s Take a Closer Look at...

Operations and Metrics

Points awarded for:

- Facility staff and occupant training
- Performance benchmarking
- Development of a systems maintenance plan
- Use of green cleaning products
- Development of Integrated Pest management plan

Proper facilities maintenance:

- Decreases need to replace equipment
- Decreases overhead costs
Let’s Take a Closer Look at... 
Indoor Environmental Quality (IEQ)

NE-CHPS offers a comprehensive set of guidelines to improve indoor environmental quality

- **Air** quality, **thermal** quality, **lighting** quality, **sound** quality,

Points awarded for:
- Properly designed and commissioned HVAC systems that provide outdoor air
- Walk off mats to reduce contaminants from entering the school
- Availability of natural daylighting
- Optimal acoustical performance in classrooms
- And much more!

“Asthma accounts for a total of 14 million lost school days each year.”

-American Lung Association
NE – CHPS Outcomes

• Improved student and staff health
• Increased operational savings
  – Lower energy and water consumption
• Reduced environmental degradation
• Enhanced resiliency

*High Performance Design Concepts can save schools 20-40% annually on utility costs (EPA)*
Students exposed to **natural daylight in classrooms** progress as much as **20 percent** faster on math tests and as much as **26 percent** faster on reading tests than students with no daylight exposure *(EPA, K-12 Guide)*

**Green building** measures in school designs **improves indoor air quality** and can **reduce absenteeism** rates by as much as **15 percent** *(EPA, K-12 Guide)*
The Operations Report Card

• Tool that helps make data-driven solutions for school improvement plans

• Evaluates seven metrics:
  1. Indoor air quality
  2. Energy efficiency
  3. Visual quality
  4. Acoustics
  5. Thermal comfort
  6. Water conservation
  7. Waste reduction
## Existing NE-CHPS Schools in NH

<table>
<thead>
<tr>
<th>School Name</th>
<th>Location</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keene Middle School</td>
<td>Keene</td>
<td>Completed</td>
</tr>
<tr>
<td>Merrimack Valley High School</td>
<td>Penacoock</td>
<td>Completed</td>
</tr>
<tr>
<td>Profile School</td>
<td>Bethlehem</td>
<td>Completed</td>
</tr>
<tr>
<td>Mason Elementary School</td>
<td>Mason</td>
<td>Completed</td>
</tr>
<tr>
<td>TNT Alternative School</td>
<td>Keene</td>
<td>Completed</td>
</tr>
<tr>
<td>Idelhurst Elementary School</td>
<td>Somersworth</td>
<td>Completed</td>
</tr>
<tr>
<td>Lebanon Middle School</td>
<td>Lebanon</td>
<td>Completed</td>
</tr>
<tr>
<td>Portsmouth Middle School</td>
<td>Portsmouth</td>
<td>Completed</td>
</tr>
<tr>
<td>Kingswood High School</td>
<td>Wolfeboro</td>
<td>Completed</td>
</tr>
<tr>
<td>Abbot-Downing Elementary School</td>
<td>Concord</td>
<td>Completed</td>
</tr>
<tr>
<td>Christa McAuliffe Elementary School</td>
<td>Concord</td>
<td>Completed</td>
</tr>
<tr>
<td>Mill Brook Primary School</td>
<td>Concord</td>
<td>Completed</td>
</tr>
<tr>
<td>Laconia Middle School</td>
<td>Laconia</td>
<td>Completed</td>
</tr>
</tbody>
</table>
Three NH Case Studies

1. Abbot – Downing Elementary School
   Concord, NH (2012)

2. Keene Middle School
   Keene, NH (2011)

3. Merrimack Valley High School
   Penacook, NH (2008)
Abbot – Downing Elementary School
NE – CHPS Verified (New Construction)

High Performance Features:

• HVAC, lighting and structural components are visible
• Mechanical systems surpass ASHRAE 90.1 standards
• Constructed with locally sourced materials that contain little to no VOCs
• Low flow fixtures reduce potable water usage by 52%

Abbot – Downing Elementary School
Concord, NH (2012)

$50,032
Estimated energy cost savings per year
Inside Look at Abbot – Downing Elementary

Photo Credit: Ed Wonsek / HMFH Architects
Keene Middle School
NE – CHPS Verified (New Construction)

High Performance Features:
• Wood-Chip heating plant
• Extensive daylighting features
• Low-flow fixtures
• Rainwater harvesting system
• Reflective roof surface
• High efficiency heat recovery system
• Energy Efficient Lighting

34.5% Energy Costs Savings
Merrimack Valley High School
NE – CHPS Verified (Major Renovation)

High Performance Features:

- Wood chip-fired boiler
- New air exchange / ventilation system
- Electrical improvements (lighting, pumps, motors, occupant controls, remote sensing, etc.)
- Building envelope sealing

61% Energy Cost Savings
Resources

• Regional Operations & Maintenance Guide
• LED Street Lighting Report
• Roadmap to Zero Energy Public Buildings
• School Exemplars
• NE-CHPS V3.1

Additional Resources: http://neep.org/resources
High Performance Schools Training
Free Training April 21, 2016
Maynard High School in Massachusetts
Register on the NEEP Website Today!
2016 NEEP Summit

June 13-14, 2016
Omni Mt. Washington Resort
Next Generation Energy Efficiency

Information on registration, sponsorship opportunities, and program: http://neep.org/events/2016-summit or contact Lucie Carriou at lcarriou@neep.org
Thank you!

• Questions?

• Contact Information:
  – John Balfe, NEEP
  – jbalf@neep.org
  – (781) – 860 – 9177 x109