



NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

SCHOOL FACILITY OPERATION AND MAINTENANCE

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High Performance Buildings Associate

November 7, 2014

PRESENTATION SUMMARY



1. About NEEP
2. Regional Operation and Maintenance Guide for Schools and Public Buildings Overview
 - Energy Efficiency
 - Indoor Air Quality
 - Financing
3. Northeast Collaborative for High Performance Schools Overview
 - Deep Dive: Indoor Environmental Quality
 - Case Studies
4. Resources



Photocredit: Tessy Engineers & Enterprises



Photo Credit: Ed Wonssek/HMFH



1. ABOUT NEEP

NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS

“Accelerating Energy Efficiency”

MISSION

Accelerate the efficient use of energy in the Northeast and Mid-Atlantic Regions

APPROACH

Overcome barriers to efficiency through
Collaboration, Education & Advocacy

VISION

Transform the way we think about
and use energy in the world around us.

One of six Regional Energy Efficiency Organizations (REEOs) designated by U.S. Dept. of Energy to work collaboratively with them in linking regions to DOE guidance, products





2. NEEP'S SCHOOL AND PUBLIC BUILDING OPERATION AND MAINTENANCE GUIDE

(FREE @ [NEEP.ORG/PUBLICBUILDINGS](https://www.neep.org/publicbuildings))

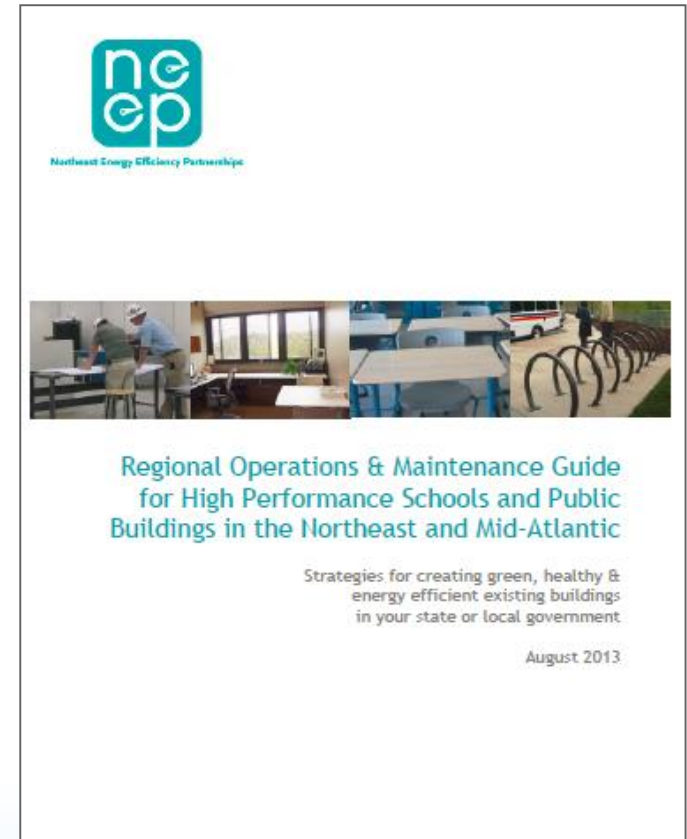
REGIONAL OPERATIONS & MAINTENANCE GUIDE

Strategies for creating green, healthy & energy efficient *existing buildings* in your school or municipal building



WHAT IS IT?

- A pathway for existing Schools and Public Building to adopt high performance operation and maintenance strategies
- Many low cost ideas
- Regionally developed
- 15 sections
 - Indoor Environmental Quality
 - Renewable Energy
 - Commissioning/Retro-Commissioning
 - Financing
 - Recycling
 - Etc.

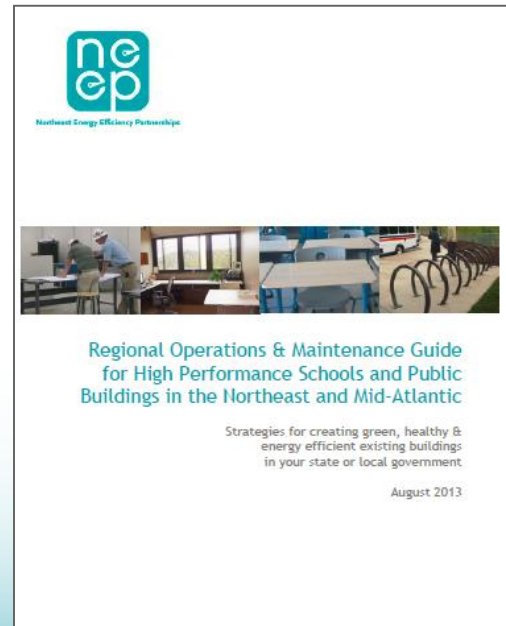


COVERING...

- Establishing Operations and Maintenance Policies
- Occupant Engagement
- Indoor Environmental Quality
- Integrated Pest Management
- Energy Efficiency
- Alternative and Renewable Energy Systems
- Commissioning and Retro-Commissioning
- Water Efficiency
- Materials Selection and Specification
- Recycling
- Landscaping to Reduce "Heat Island Effect"
- Transportation
- Innovative Financing Options
- Cafeteria Practices
- Zero Net Energy Buildings
- Specialized Building Types

O & M GUIDE: ENERGY EFFICIENCY

1. Overview
2. 'No Cost' Measures
3. New Technologies and Hot Topics





ENERGY EFFICIENCY ISSUES COVERED:

- Benchmarking
- Lighting Retrofits
- Energy Management Systems
- Boilers
- Building Envelope Improvements
- Renewables

Heads Up - PCBs in Lighting Ballasts:
PCBs are suspected carcinogens and may still be in older schools

Congress banned the manufacture of a potentially harmful chemical, polychlorinated biphenyl (PCBs) in the United States in 1977. However, recent EPA inspections in New York City public schools found that many light ballasts in these schools contained PCBs and had also failed, causing the PCBs to leak.

The EPA presents a [detailed explanation for PCBs in schools](#), as well as [inspection results](#) from NYC schools on its website. According to the EPA, any building built before 1979 likely has PCB-containing ballasts that should be removed in order to avoid potential degradation and exposure to PCBs from these older fixtures. Guidance from the EPA, along with several frequently asked questions concerning retrofitting PCB containing ballasts, can be found [here](#). By taking advantage of these resources, school districts may overcome the lack of awareness concerning the associated risks and mishandling of PCB materials, ensuring responsible action is being taken to avoid exposing students and staff to a potentially hazardous pollutant.

ENERGY STAR[®] Statement of Energy Performance

86
 ENERGY STAR[®] Score¹

Sample Property
 Primary Property Function: Office
 Gross Floor Area (ft²): 200,000
 Built: 1980
 For Year Ending: April 30, 2013
 Date Generated: June 28, 2013

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and building activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Sample Property 123 Main Street Arlington, Virginia 22030	Wellington Commercial Property Managers 1 Washington Blvd Arlington, VA 22030	Jane Smith 1 Washington Blvd Arlington, VA 22030 jsmith@wcp.com

Property ID: 5000023

Energy Consumption and Energy Use Intensity (EUI)

Site EUI	Annual Energy by Fuel	National Median Comparison
75 kBtu/ft ²	Electric - Grid: 13,202,160 (88%) Natural Gas: 1,853,000 (12%)	National Median Site EUI (kBtu/ft ²): 122 National Median Source EUI (kBtu/ft ²): 352 % Diff from National Median Source EUI: -38%
Source EUI 217 kBtu/ft ²		Annual Emissions Greenhouse Gas Emissions (MtCO ₂ e/year): 1,927

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct in the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

Donald Brown
 1 Washington Blvd
 Arlington, VA 22030
 202-333-4444
 donaldbrown@wcp.com

Professional Engineer Stamp
 (if applicable)

THE CHALLENGE

Energy

- Average school building is **42 yrs. old**
- **Not designed** to meet demands of today's energy loads (technology)
- Space heating, cooling, and lighting together account **70% of school energy use.**
- Per pupil energy expenditure have risen 19% while inflation was only 4%.

The cost of energy is one of the few things that can be reduced without negatively affecting classroom instruction.

'NO COST' ENERGY EFFICIENCY MEASURES

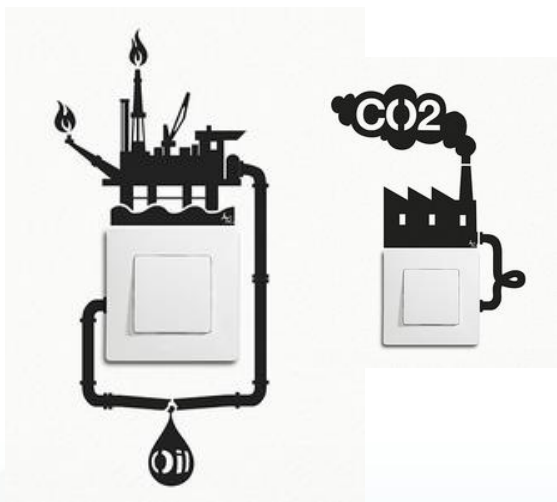
1. Occupant Engagement
2. Equipment Scheduling
3. Maintenance Policies and Planning

OCCUPANT ENGAGEMENT



Eco

Reminders



OCCUPANT ENGAGEMENT

- Green Teams
- Shutting lights off
- Open / closing windows

See it in Action:

Energy Behavior Program in the Workplace: An Energy and Cost Savings Initiative from New Hampshire State Government

According to ACEEE 2012 report, "[Greening Work Styles: An Analysis of Energy Behavior Programs in the Workplaces](#)," government and institutional buildings are the best candidates to take the lead in promoting and set an example for energy behavior programs. An analysis of the reviewed case studies reports energy savings between 4% and 75% from standalone behavior program to comprehensive project with behavior component. Notable shared strategy among successful behavior programs is the use of [community-based social marketing](#) techniques and effective communication tools to engage building occupants.

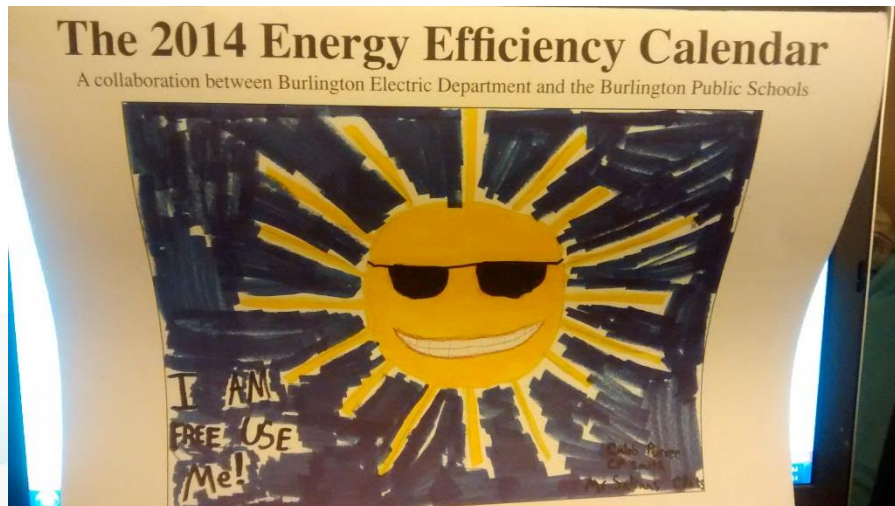
As part of the interagency effort to encourage energy-savings behavior among state employees both at work and at home, New Hampshire recently launched an initiative that uses personal pledge forms asking employees to commit to various energy-saving actions, such as shutting off lights or unplugging appliances when not in use. The initiative accompanied with the use of prompt signs as action cue throughout state agency further increases the visibility of the program. The ACEEE 2012 study notes that personal pledge forms made in public often lead to a higher rate of actual action.

OCCUPANT ENGAGEMENT

DCSEU and Anacostia High School

Energy Efficiency Curriculum

- Energy audit walkthrough
- Carbon footprint assessment
- Poster campaign
- Energy Patrol
- “Random Acts of Greenness Day”

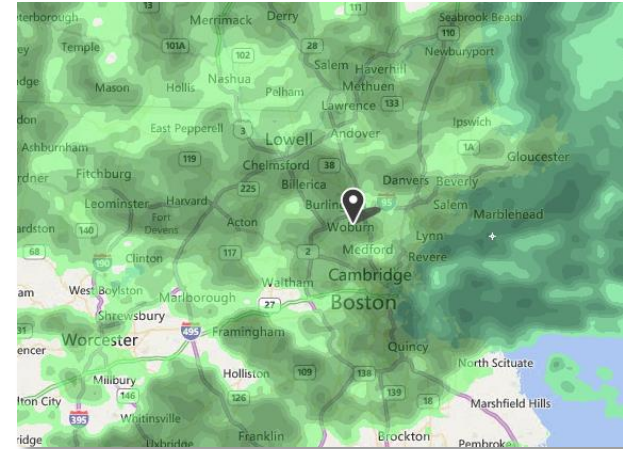


EQUIPMENT SCHEDULING



- Conduct an occupant survey regarding times of use
- Take a nighttime field trip through your facilities

EQUIPMENT SCHEDULING



- Metal Halide Lamps: 5 Minute Warm up, 10 Minute Cool Down
- Football Field: 4 towers x 18 lamps each= 72 lamps
- Wattage: 72 lamps x 400W= 28.8kW/h

MAINTENANCE POLICIES AND PLANNING



Saves Money, Decreasing:

- Equipment replacement costs over time
- Renovation costs because fewer large-scale repair jobs are needed
- Overhead costs (such as utility bills) because of increased system efficiency
- Consider a computerized maintenance management system

Maintenance Policies Should Incorporate Benchmarking

- Municipalities should BENCHMARK ALL BUILDINGS annually
- Benchmarking identifies opportunities for strategic investment.
- Green Button provides portal for utility data access
- Portfolio Manager compares your building to similar buildings
 - Identify energy hogs, and investigate



SYSTEMS MAINTENANCE PLAN



- Putting our fires
- Plan ahead, set aside time, money
- Document maintenance intervals



HOT TOPICS AND NEW TECHNOLOGIES



- Plug Loads
- LED Lighting
- NEMA Premium Motors
- Photovoltaic Generation
- Lighting Controls
- Building Envelope Imaging Options



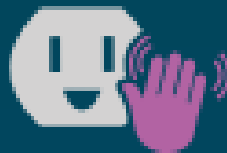
PLUG LOADS AND OCCUPANT ENGAGEMENT



PLUG LOADS AND ADVANCED POWER STRIPS



Timer Power Strip



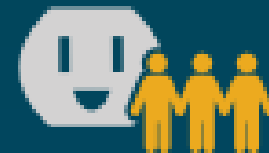
Activity Monitor Power Strip



Remote Switch Power Strip



Master-Controlled Power Strip



Masterless Power Strip

COST



FEATURES

Power strip automatically turns off outlets based on a pre-set schedule.

Power strip looks for signs of activity in the room, and turns off outlets if none is detected.

Power strip can be turned off by the user via a remote switch.

When a primary device (such as a computer or TV) is turned off by the user, the power strip automatically turns off the controlled outlets where the peripheral devices (such as the printer or game console) are plugged in.

When all of the controlled devices are turned off, the power strip turns off power to those outlets completely, eliminating all of the vampire loads.

POSSIBLE DRAWBACKS

You have to set up the timer and stick to your schedule for maximum energy savings.

Motion sensors don't always work perfectly.

To save any energy, you have to remember to turn off the power strip each time.

It can be tricky to select which appliance should be your "master" device.

Turning off one high-powered appliance could turn off the entire power strip.

WHAT TO LOOK FOR

Digital or dial timer.

Motion sensor or an infrared "eye" that detects remote control use around the TV or stereo.

A tethered switch or a remote switch.

One outlet is labeled as the "master."

No "master" outlet. Description may include "automatic switching" or "power detection."

PLUG LOADS AND THE VENDING MISER



- Vending Machine Average Annual Energy Cost: **\$380**
- Vending Miser Cost: **\$170**
- Average Annual Savings: **\$192 (@ \$0.11/kWh)**
- Payback Period: **less than one year**
- Resource: Tufts University- [Vending Misers Handout](#)

Photo credits: Tufts, USA Technologies Corp, and Harvard

STOP!
**Do Not Plug Beverage Machines
Directly Into Outlet!**

The logo of Tufts University, featuring a purple circular emblem with a white eagle with spread wings, an open book, and the year 1852. The Latin motto 'SCILLUM UNIVERSITATIS TUFTENSIS PAX ET LUX' is written around the perimeter.

Per Order of Tufts University,
**All Beverage Machines
Have to Be Plugged Into a
Vending Miser!**

If You Have Questions,
Call Patti Klos, Director of Dining Services
n. 617-427-xxxx

LED LIGHTING



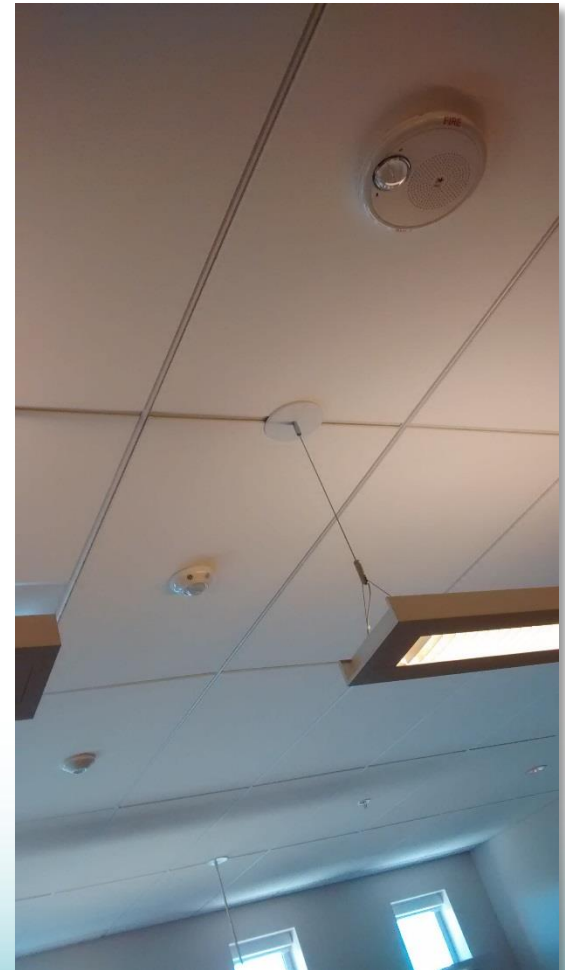
Linear LED T8 Fluorescent replacement:

- Stopgap measure
- Costs 3x as much before incentives, but lasts twice as long and uses 30% less energy
- No ballast change necessary



New Construction?

LED now a no-brainer



NEMA PREMIUM MOTORS

- National Electrical Manufacturer's Association
 - Efficiency program incentives tied to NEMA rating
 - 2-4 year payback period, without incentives (baseline dependent)
 - As simple as copying down manufacturer's tag numbers and googling a replacement



Photo Credit: Alan Mulak

PHOTOVOLTAIC GENERATION



Rhode Island Distributed Generation Standard Contract:

- Installations 50kW+ (otherwise, net metering)
- Third party turn-key project developers around the country: Solar City, SunRun, Sungevity, Vidaris, Real Goods Solar
- Who offers in Rhode Island?



PHOTOVOLTAIC GENERATION



First 2014 RI DG Enrollment Report

Pursuant to the provisions of the Distributed Generation (“DG”) Standard Contracts Act, R.I.G.L. §39-26.2-8(a), National Grid is submitting the attached report of the aggregate amount of project nameplate capacity that was the subject of the standard contracts entered into during the DG Standard Contract enrollment that occurred during April/May 2014 and the prices under each of the standard contracts that was executed. National Grid awarded three Standard Contracts in the First 2014 Enrollment, totaling 1.860 MW of project nameplate capacity. Although the Company received applications for almost 9 MW of projects, the target of 5.650 MW was not satisfied. The shortfall for this enrollment period was associated with specified technology/technology classes being under represented (i.e., Small and Medium Solar) or not being represented under the current class target allocations (e.g., no Wind, Hydropower or Anaerobic Digestion technology class proposals).

Counterparty	Project & Location	Nameplate Capacity (kW)	Class	Price (cents/kWh)
60 Valley Street Solar, LLC 127 Dorrance Street, 5th Floor Providence, RI 02903	<i>60 Valley Street Solar</i> 60 Valley Street Providence, RI 02909	110	Small Solar-PV (50 - 200 kW DC)	25.068
Megawatt Energy Solutions, LLC 105 Tamara Circle Avon, CT 06001	<i>48 Bank Street Solar</i> 48 Bank Street Hopkinton, RI 02832	500	Medium Solar-PV (201 - 500 kW DC)	19.333
Foster Solar, LLC 4 Liberty Square Boston, MA 02109	<i>Foster Solar - 23 Theodore Foster Drive</i> 23 Theodore Foster Drive Foster, RI 02857	1,250	Large Solar-PV (501 - 3,000 kW DC)	14.988
		1,860		

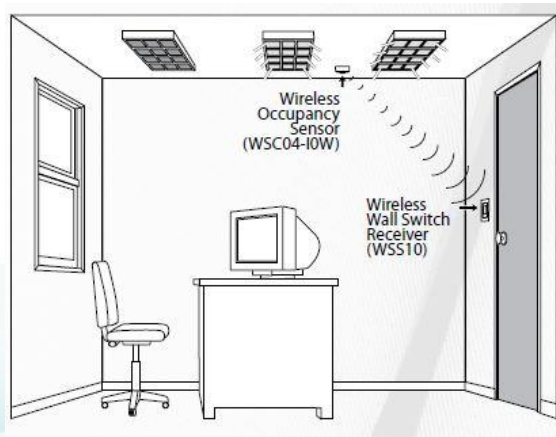
BUILDING LIGHTING CONTROLS



Types (to name a few):

- Photosensor-based (reactive to daylighting)
- Scheduled (on a timer)
- Motion sensitive (Ceiling or wall mount- ceiling preferred)
- Wireless controls are cost-competitive in many applications

WIRED VS. WIRELESS COSTS



- Parts
- Re-Paint
- Labor
- Drywall Patching

BUILDING ENVELOPE IMPROVEMENTS AND THERMAL IMAGING OPTIONS



When justifying efficiency investments to budget-makers, sometimes a picture is worth a thousand words.

- Traditional Equipment is expensive (thousands of dollars)
- Efficiency program administrator may loan thermal imaging equipment to municipalities
- Several manufacturers now offer phone-based thermal imaging cameras, some for as little as \$350
- A thermal image+ portfolio manager benchmarking charts= great argument for investing in efficiency



Photo Credit: Abby Allain



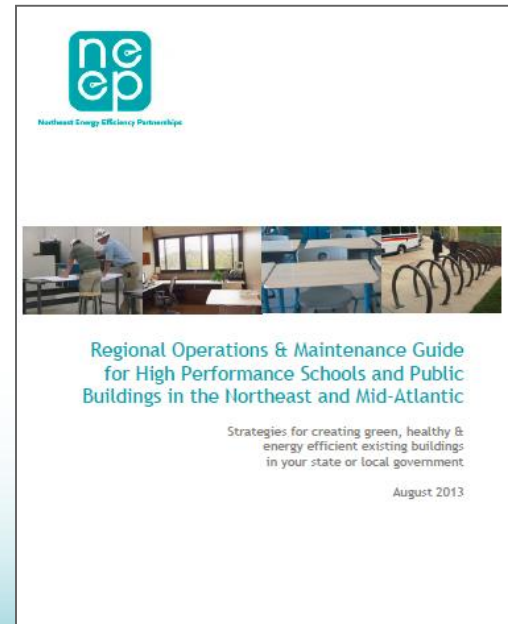
Photo Credit: Abby Allain



Photo Credit: Alan Mulak

O & M GUIDE: INDOOR AIR QUALITY

1. Overview
2. Tools for Schools
3. Group Procurement



REGIONAL OPERATIONS & MAINTENANCE GUIDE

Organizes Indoor Environmental Quality Best Practices



For Example:

- No Irrigation System-Building Overspray
- Walk-off Mat Systems
- Obstruction-free Intakes
- Filter Replacement
- Replacing Pilot Lights with Electric Ignition
- Eliminating Use of Fossil Fuel Powered Machinery within the building
- Minimizing mercury exposure
- Integrated Pest Management

See it in Action:

“Stomp Day” at Lamprey Elementary School (Raymond, NH)

Being one of the very first schools in the state to receive the [Healthy Schools grant](#) by New Hampshire Partners for Healthy Schools, [Lamprey River Elementary School](#) aims to implement strategies to improve indoor air quality (IAQ) in its school environment. One of the approaches that school officials have taken is the purchase of additional walk-off mats for building areas with higher foot traffic. Particular on “Stomp Days” the students are asked to stomp their feet from the buses until the end of the walk-off mats.

See it in Action:

Keefe Regional Technical School (Framingham, MA) - HVAC filter upgrade

Looking to improve indoor air quality (IAQ) for its students, teachers, and staff, Keefe Technical School worked with [National Air Filtration Association \(NAFA\)](#) to upgrade its HVAC filter. The school also wanted to upgrade the filtration efficiency to meet or exceed the filter efficiency required by [ASHRAE Standard 62.1](#). The decision to upgrade the filter to 4-inch MERV 11 pleated filter from the 8-inch cartridge type MERV 6 helps school officials to realize the cost savings associated with reduced and labor and disposal costs. The higher efficiency filters also keep the ductwork clean and optimize HVAC system operating efficiency and ultimately improve IAQ.



Walk off system at New Hampshire school

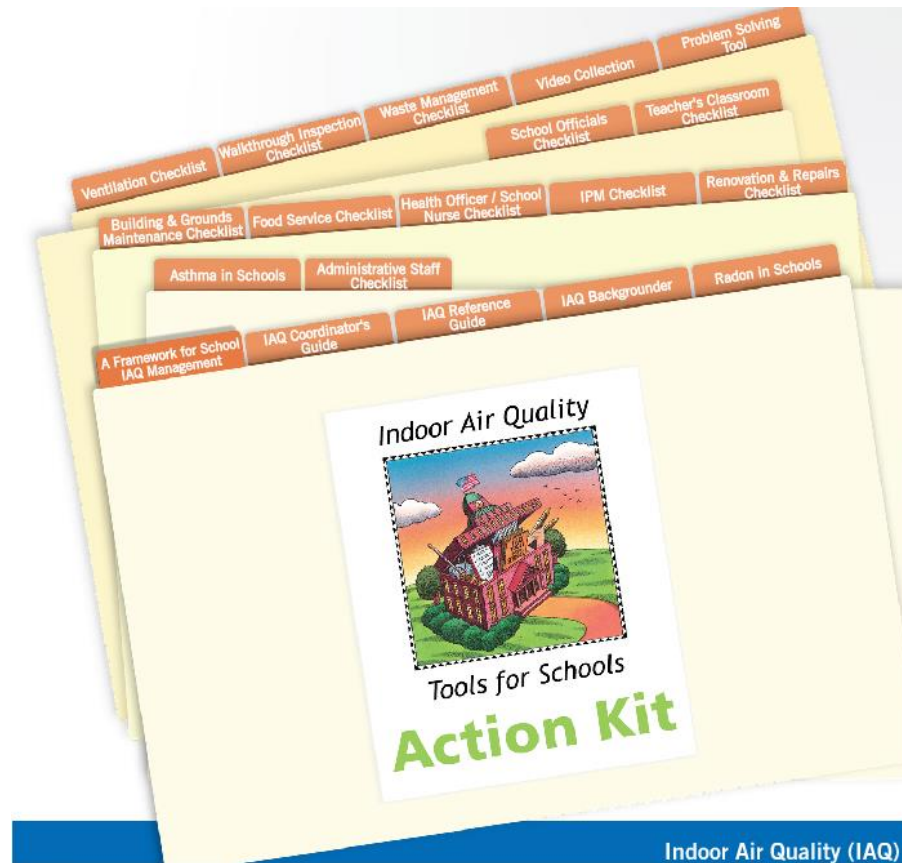
THE ENERGY EFFICIENCY/IAQ NEXUS



- Leaky building envelope allows heat/cool to escape occupied areas AND allows allergens, contaminants, and mold to enter building
- A dirt air filter takes more energy to move air through
- In many cases, a dirty air filter will also reduce perceived efficacy of lighting



INDOOR AIR QUALITY AND US EPA'S TOOLS FOR SCHOOLS



Download Tools for Schools [here](#)

GROUP PROCUREMENT AND ENVIRONMENTALLY PREFERABLE PRODUCTS



FAC59- Massachusetts' Environmental Purchasing Policy

- Multi-state Group Procurement Contract,
Available to: MA, RI, CT, NH, NY, RI, ME (possibly others)
- Third Party Certified Products (GreenSeal, etc.)
- Resource: State of Massachusetts- [Operational Services Division Handout](#)
- Covering:



Cleaning Chemicals- all purpose, restroom, glass, carpet, floor care, appliance, degreasers, urinal blocks, odor control, and laundry detergent

Hand Soap/Hand Sanitizers- alcohol and non-alcohol

Janitorial Paper Products- wide range of brands and types

Trash Can Liners- plastic/recycled content & biodegradable

Equipment- vacuums, scrubbers, extractors, sweepers, etc.

Entryway Mats- many brands and sizes

Disinfectants/Sanitizers- performance based selection

Supplies- microfiber, energy efficient hand dryers, non-chemical scrubbing pads, mops, buckets, etc.

Vendor Services at No Charge- FREE facility assessment, standard operating procedures, training on disinfection, tracking and recording your cleaning, communication strategy

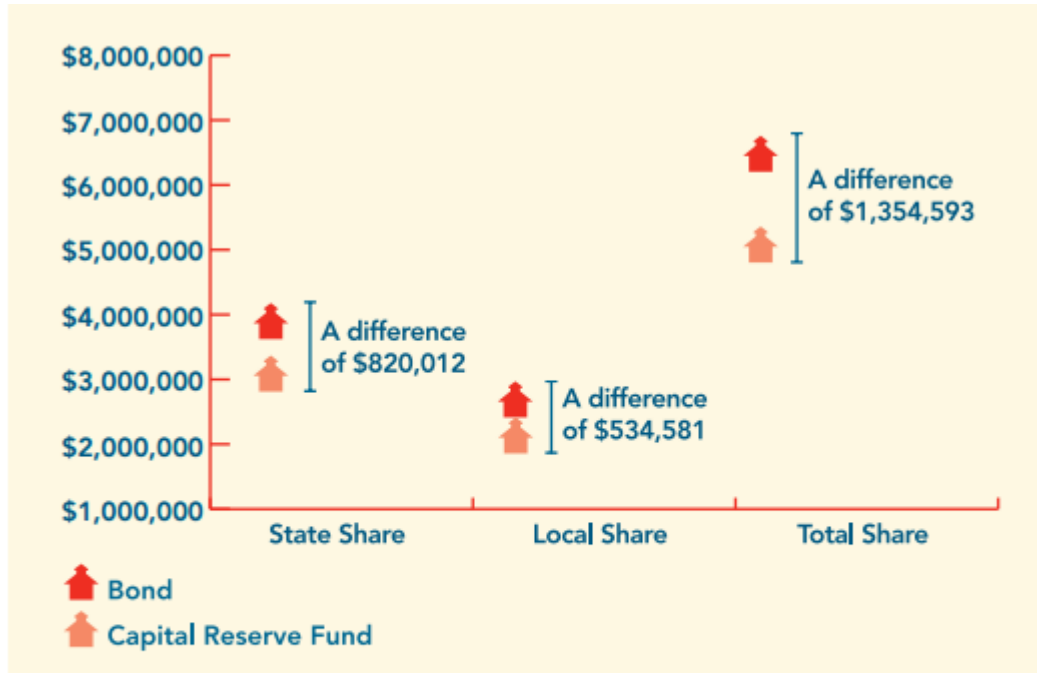
Innovative Technologies- energy efficient clean air system, steam vapor cleaning (non-chemical)

Financing Strategies

- Capital Reserve Fund
- Efficiency Program Incentives
- Revolving Loan Fund
- Performance Contracting



CAPITAL RESERVE FUNDS



- Saves money for municipalities and the state by avoiding costly long term interest payments
- But where does it come from??

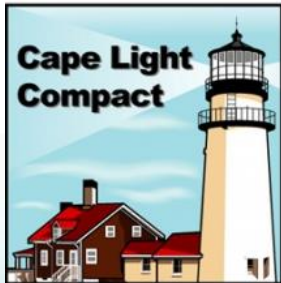
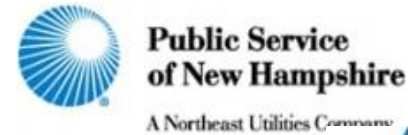
Figure 17b. Capital Reserve Fund Supply: 60 Percent Share Ratio

Using a 10-year GO bond to pay for \$4.97 million of asset protection would cost the district and state an additional \$1.35 million.

Efficiency Program Incentives



Check Before Purchase!!



Revolving Loan Funds

- Ensure cost-savings can be re-invested in more energy efficiency projects
- Bridges the operating budget/capital budget divide
- Start with low-hanging fruit (lighting, fuel switching, insulation) and move toward deeper retrofits
- Vermont \$8 million revolving loan fund for public building energy efficiency (March 2014)
- Also applicable in smaller communities (ex. Thetford, VT)

A co-publication of the Sustainable Endowments Institute & the Association for the Advancement of Sustainability in Higher Education

Green Revolving Funds: A Guide to Implementation & Management

Joe Indvik, ICF International
Robert Foley, Sustainable Endowments Institute
Mark Orlovski, Sustainable Endowments Institute



University of British Columbia, Earth Science Building, Perkins and W&E

Performance Contracting



- Energy Service Company (ESCO) delivers turn-key energy retrofits for municipalities
- Often using off-balance sheet tax exempt lease purchase agreement
- Contracts for \$1 million or more

BUT

- Can aggregate municipalities
 - Connecticut Conference of Municipalities RFQ
 - Metropolitan Area Planning Council

RFQ#S2014: STREETLIGHT LED RETROFIT, MANAGEMENT & MAINTENANCE SERVICES

The Connecticut Conference of Municipalities (CCM) invites proposals for the services described herein. The proposer must complete this proposal in its entirety. Only written proposals will be accepted.

Acceptance Date: On or before June 26, 2014 by 2:00 p.m.
Acceptance Place: CCM, 900 Chapel Street, 9th Floor, New Haven, CT 06510-2807
Attention: Andy Merola

1. GENERAL INFORMATION

About CCM

CCM is Connecticut's association of towns and cities. CCM represents municipalities at the General Assembly, before the state executive branch and regulatory agencies, and in the courts. CCM's membership includes 153 towns and cities representing more than 93% of the state's population. CCM provides its members with a wide array of services, including management assistance, individualized inquiry service, assistance in municipal labor relations, technical assistance and training, policy development, research and analysis, publications, information programs, and service programs such as workers' compensation and liability-automobile-property insurance, risk management, and energy cost containment. Federal representation is provided by CCM in conjunction with the National League of Cities. CCM was founded in 1966.

CCM is governed by a Board of Directors, elected by the member municipalities, with due consideration given to geographical representation, municipalities of different sizes, and a balance of political parties. Numerous committees of municipal officials participate in the development of CCM policy and programs. CCM has offices in New Haven (the headquarters) and Hartford.

Project Background

Connecticut's municipalities incur significant annual costs related to street lighting. Most Connecticut municipalities do not own their streetlights. Through this RFQ, CCM is interested in pre-qualifying a group of service providers to assist its member towns and cities in reducing streetlight costs through the purchase of streetlight systems from Connecticut Light & Power (electric utility), retrofitting those systems to LED technology, and as requested, maintaining those streetlights. CCM anticipates that participating towns and cities also might be interested in including decorative streetlights, parking facility lighting, lighting controls, etc., in the LED retrofit process.

BUT (2)

Beware: Not all energy performance contracts/ESCOs are equal

3. NORTHEAST COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS (NE-CHPS)



BACKGROUND: WHAT IS NE-CHPS?



- NE-CHPS criteria is a **points based new construction/renovation roadmap** toward healthier, more efficient, and more productive schools
- For all schools from pre-K through community colleges.
- Stresses an integrated design process, indoor environmental quality, energy efficiency and building operation and maintenance practices that enable high performance without high costs



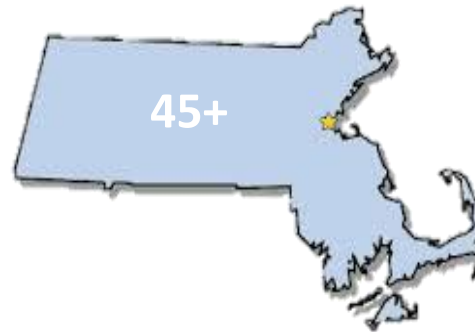
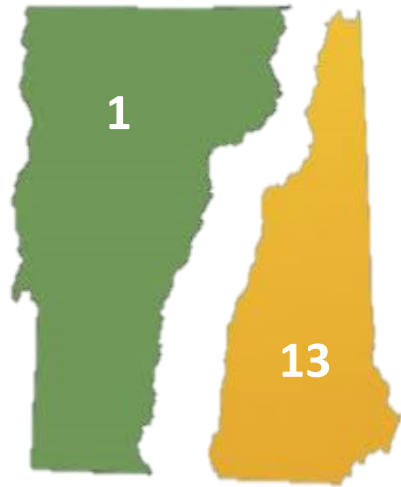
BACKGROUND: HISTORY OF CHPS CRITERIA



- First version released in California in 2002
- CHPS Criteria versions cover 13 states
- CHPS National Core Criteria developed 2009-2013
- US CHPS released last week for districts looking to adopt CHPS



BACKGROUND: CHPS IN THE REGION



RHODE ISLAND AND NE-CHPS



RIDE 1.12: HOUSING AID REIMBURSEMENT AND INCENTIVE

1.12-1 General

RIDE shall annually award school housing aid within the amounts and at such times as authorized by R.I.G.L. 16-7-35 through 16-7-47. State funding shall be awarded to completed projects according to statutes and regulations governing school housing aid. No payment of school housing aid for an Approved Project shall be made before the completion of the project and submission of the forms as prescribed by the Regents. School housing aid will be paid on interest only for bonds issued through the RIHEBC.

1.12-2 Energy and Water Efficiency Incentive

Additional reimbursement funds are available to approved new construction projects that demonstrate energy and water efficiency cost reduction beyond the minimum school construction threshold requirements as defined in the Northeast-CHPS.

Districts are eligible for 2% additional reimbursement funds for projects that achieve energy efficiency 30% above the RI Building Energy Code; 3% additional reimbursement for energy efficiency 40% above the RI Building Energy Code; and 4% additional reimbursement for energy efficiency 50% above the RI Building Energy Code.

BACKGROUND: WHY IS NE-CHPS DIFFERENT?



1. Developed with input from regional stakeholders

- Working group of state actors and industry professionals

2. Reflects the climate, building codes, and educational priorities of the Northeast

- Adopted and adapted throughout the Northeast

3. Emphasizes best practices for ongoing building operation and maintenance

- Includes companion Operation and Maintenance guide

4. Stresses Indoor Environmental Quality and Energy Efficient Design

- 40+ pages discussing energy efficient design
- 70+ pages discussing indoor environmental quality and

THE CRITERIA: THE LATEST UPDATE, VERSION 3.0



New to NE-CHPS 3.0:



- Improved Acoustics Requirements
- Electric Vehicles
- zEPI Energy Scale
- Benchmarking Emphasis
- Greater Occupant Engagement Focus
- Enhanced Commissioning of Building Systems
- District Level Commitment to Sustainability
- Crime Prevention through Environmental Design

THE CRITERIA: THE LATEST UPDATE, VERSION 3.0



New to NE-CHPS 3.0:

- Electric Vehicles



THE CRITERIA: METRICS AND EXAMPLES



Seven Basic Metrics	Related Example
1. Integrated Design Process	Engineers consult with teachers & students
2. Indoor Environmental Quality	Walk-off mats keep pollutants outside
3. Energy Usage	Photosensor activated lighting
4. Water Usage	Low-flow toilets & waterless urinals
5. Site Selection/Development	Facility located near public transportation
6. Materials & Waste Management	Locally produced materials
7. Operations & Metrics	Occupant behavior seminars

THE CRITERIA: PREREQUISITES



Integration and Innovation

- Integrated Design
- Educational Display
- Crime Prevention through Environmental Design

Materials and Waste Management

- Storage and Collection of Recyclables
- Minimum Construction Site Waste Management

Indoor Environmental Quality

- HVAC Designed to ASHRAE 62.1
- Outdoor Moisture Management
- Low Emitting Materials
- Daylighting: Glare Protection
- Views
- Acoustic Performance (35 dBA)
- Pollutant and Chemical Source Control

Energy

- Energy Performance (IECC 2012+10%/ NBI)
- Commissioning
- Environmentally Preferable Refrigerants
- Local Energy Efficiency Incentive & Assistance

Operations and Metrics

- Facility, Staff, and Occupant Training
- Performance Benchmarking
- Indoor Environmental Management Plan
- Integrated Pest Management
- Anti-Idling Measures
- ENERGY STAR Equipment and Appliances
- System Maintenance Plan

Sites

- Site Selection
- Site and Building Best Practices



THE CRITERIA: POINTS AND EMPHASIS



Project Type	Required Points
Major Renovations	85
New Construction	110

Criteria	Prerequisite Points	Total Points Possible
Integration and Innovation	6	21
Operations and Metrics	12	23
Indoor Environmental Quality	27	76
Energy	13	68
Water	6	21
Sites	4	22
Materials & Waste Management	4	19
TOTALS	72	250

4. DEEP DIVE: INDOOR ENVIRONMENTAL QUALITY

NE-CHPS 3.0 (Pages 69-149)

INDOOR ENVIRONMENTAL QUALITY

NE-CHPS 3.0 (Pages 69-149)



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

-American Lung Association

- NE-CHPS provides a detailed roadmap toward improved environmental health
- Points awarded for:
 - Effectively designed and commissioned Heating, Ventilation and Air Conditioning systems and HEPA filters
 - Paints, sealants, wood, and carpets that contain low **volatile organic compound (VOC)** counts.
 - Dedicated mechanical exhausts in areas of chemical use such as copy or print rooms
 - Many more...

INDOOR ENVIRONMENTAL QUALITY



Required:

- HVAC Design - ASHRAE 62.1, MERV filter 11 or higher
- Direct exhaust of indoor pollutant sources (copier, printing rooms)
- Background noise limited to 35 dBA
- Outdoor moisture management keeps water away from building
- 90% of building materials meet stringent VOC requirements
- Glare protection limits direct sunlight to teaching area
- 70% of floor area has direct line of sight to outdoor views

Recommended:

- MERV Filtration of 13 or better
- Dedicated outdoor air system
- Pollutant and chemical source control
 - Walk off mats
 - No indoor burning of fossil fuels
 - Dedicated mechanical exhaust
- Ducted returns (no plenums allowed)
- More Stringent VOC emission rules
- Construction moisture/air quality management
- Radon testing and mitigation
- Thermal comfort standards
- Operable windows and
- Individually controllable thermostats
- Daylighting
- LEDs
- Enhanced acoustic performance
- Low EMF wiring
- Limited router exposure
- High intensity fluorescent fixtures

INDOOR AIR QUALITY



Walk Off Mats:

- Improving Indoor Air Quality AND Limiting Operational Costs by Keeping Out:
 - Dirt
 - Heavy Metals
 - Pesticides



High Efficiency Particulate Air (HEPA) Filters:

- HEPA filter with Minimum efficiency reporting value (MERV) of 11 required
- HEPA filter with MERV value of 13 satisfies enhanced filtration requirement

ACOUSTICS



Children are especially vulnerable to missed instruction due to background noise or reverberation

- Background noise with all operable windows open less than 35 dBA
- Maximum reverberation time limitations



OUTDOOR VIEWS



Courtesy Flansburg Architects

Direct Line of Sight to Outdoor Views required on 70% of combined floor area in student/administrative rooms

- A child's growing eyes requires distance viewing throughout the day for proper development

5. NE-CHPS RI CASE STUDIES

EAST BAY MET (ZNE DESIGNED)

Newport, RI



General Information

Location: 115 Girard Ave., Newport, RI 02840
Scope: 16,800 square feet, new construction
5,000 sqft of sheltered exterior program space
Cost: \$8.8 million (including land purchase)
Completion: January 2014
Enrollment: 180 high school students
Project Team
Architect: Robinson Green Beretta Co.
Engineering: Odeh Engineers/ Stantec, Inc.
Construction: Gilbane, Inc.



“The greatest aspect of this school is the incredible indoor air quality“

-Taylor Rocc

Teacher, East Bay Met School

Net Zero Facility:

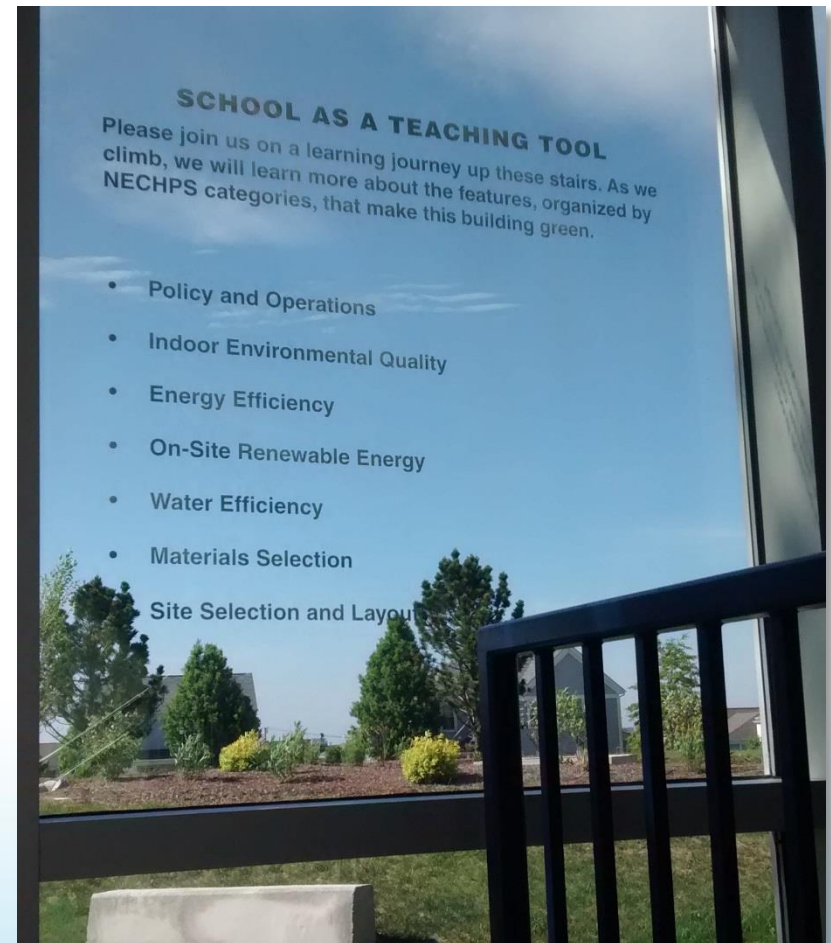
- Maximize natural day lighting through building orientation.
- 150kW Photovoltaic system
- Air tight building enclosure
- Super insulated shell
- “Cool roof”
- Innovative ventilation system
- Geo-thermal heat pump
- LED Lighting/ Day Lighting Control
- Water efficient fixtures
- Rainwater Harvesting

School as a Teaching Tool:

- Recycling Program
- Energy Tracking w/ EPA Portfolio Manager
- Drinking water sampling program
- School/Community Garden
- Green Team
- Indoor Environmental Management Plan
- Integrated Pest Management Plan

EAST BAY MET - SCHOOL AS A TEACHING TOOL

Newport, RI



SCHOOL AS A TEACHING TOOL

Please join us on a learning journey up these stairs. As we climb, we will learn more about the features, organized by NECHPS categories, that make this building green.

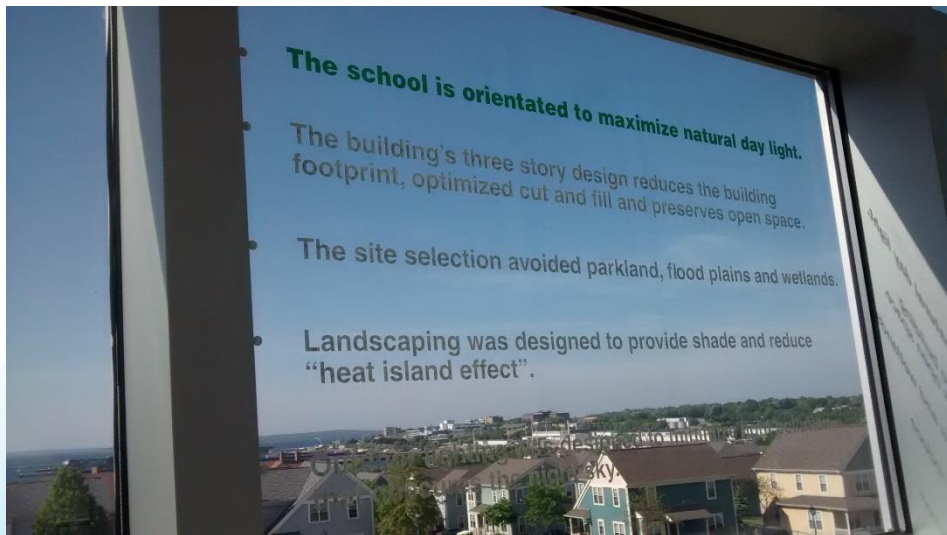
- Policy and Operations
- Indoor Environmental Quality
- Energy Efficiency
- On-Site Renewable Energy
- Water Efficiency
- Materials Selection
- Site Selection and Layout

The school is orientated to maximize natural day light.

The building's three story design reduces the building footprint, optimized cut and fill and preserves open space.

The site selection avoided parkland, flood plains and wetlands.

Landscaping was designed to provide shade and reduce "heat island effect".



CLAIBORNE PELL ELEMENTARY (ZNE CAPABLE)

Newport, RI



- Energy Use Intensity of 35.35 kBtu/s.f./yr
- Energy Performance 50 percent above code (ASHRAE 2009)
- Energy efficient construction projected to save \$116,855 annually
- 80%+ construction waste was recycled
- 40% reduction in potable water use through low flow/dual flush fixtures and drought resistant plantings
- 77% of classrooms utilize daylighting and photosensors/occupancy sensors to maintain adequate lighting while conserving energy

General Information

Location: 35 Dexter Street Newport, RI 02840

Scope: 105,565 gross square feet of new construction

Cost: \$28 million

Completion: 2013

Enrollment: 865 PK-4th graders

Architect: HMFH Architects, Inc.

Engineer: Garcia Galuska Desousa Engineers Inc.

Certification: NE-CHPS Verified;

US Department of Education Green Ribbon School



Photo Credit: Newport Public Schools

CLAIBORNE PELL ELEMENTARY COMMUNITY ENGAGEMENT

Newport, RI



Photo Credit: Newport Public Schools

NATHAN BISHOP MIDDLE SCHOOL (HISTORIC RENOVATION)

Providence, RI



Energy Efficiency

- 40% energy savings (as measured in energy) over a comparable baseline building that meets the requirement of ASHRAE standards
- Projecting a savings of over \$90,000 in annual operating costs.



Photo Credit: Ai3 Architects

Indoor Environmental Quality

- 100% classrooms have access to views
- 100% classroom include day lighting strategies
- Low-glare lighting systems throughout
- Permanently installed entryway walk-off system (15 feet in length)
- 100% classrooms comply with the enhanced acoustical requirements (ANSI 12.60-2002)

Water Efficiency

- Single temperature fittings for student toilet rooms and locker rooms.
- Low flow toilet fixtures
- NO irrigation for landscaping
- Use of 20,000 gallon rainwater collection system for toilet flushing.

ARCHIE R. COLE MIDDLE SCHOOL

East Greenwich, RI



General Information

Location: 100 Cedar Ave. East Greenwich, RI

Scope: 110,000 square feet of new construction

Cost: \$32 million

Completion: August 2011

Enrollment: 573 students grades 6th to 8th

Architect & Engineer: SMMA

Funding/Grant: National Grid Design 2000plus rebates for lighting, VFDs and ECM motors

Award: AIA RI Chapter Honor Award 2012

Certification: NE-CHPS



Photo Credit: Symmes Maini & McKee Associates (SMMA)

Sustainable Design Elements

Site

- Design integrated with the residential community by locating the highest point of the building central to the site
- Project sited to preserve wetlands, protect greenfields, and avoid floodplains
- Light pollution reduction

Materials

- 14 percent of materials were recycled content
- 35 percent of materials are locally produced
- 88 percent of wood came from FSC sources

Water

- Efficient interior fixtures reduced total water use by 40 percent combined with rainwater harvesting for 67 percent annual water savings

Energy

- East-west orientation optimizes solar orientation
- High performance glazing systems and fenestration designed to optimized daylight harvesting; Occupancy sensors
- Operable windows in classrooms
- High performance lighting; 30 percent above code
- Super insulated, cool roof
- Control-demand ventilation minimizes air-conditioning need
- Computerized maintenance management and energy management system
- Dedicated exhaust and premium filtration
- 50 kW solar photovoltaic system

5. NEXT STEPS

RI NE-CHPS EVENT DEC. 5th



nationalgrid

HERE WITH YOU. HERE FOR YOU.



Northeast Energy Efficiency Partnerships



NORTHEAST
COLLABORATIVE FOR
HIGH PERFORMANCE
SCHOOLS.



On behalf of the Rhode Island Schools Working Group
NEEP and the Rhode Island Department of Education invite you to

ENVISIONING THE FUTURE OF RHODE ISLAND SCHOOL HOUSES: NE-CHPS 3.0 UPDATE

December 5, 2014 - The East Bay Met School - Newport, RI

Did you know that Rhode Island's school construction and renovation criteria—NE-CHPS—was recently updated? Come learn about the latest updates and more at this December workshop. Wrap up the day with an optional tour of the nearby Pell Elementary School.

What: A forum for school construction stakeholders to come together to shape ideas and projects

Who Should Attend: Architects, contractors, school superintendents, business managers, and others with an interest in Rhode Island School Construction

Visit www.neep.org/events/ri_chps to register

NEXT STEPS: US DOE RESOURCES

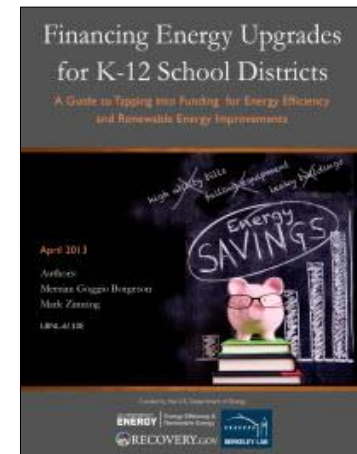


1. Recent Energy-Focused [TedEd](#)

- Joshua Sneideman's "A Guide to the Energy of the Earth"

2. [Guide to financing Energy Upgrades for K-12 School Districts](#)

- Tax Exempt Lease Purchasing
- Energy Performance Contracting
- On-Bill Financing
- Power Purchase Agreements
- Grants/Internal Cash
- Bonding

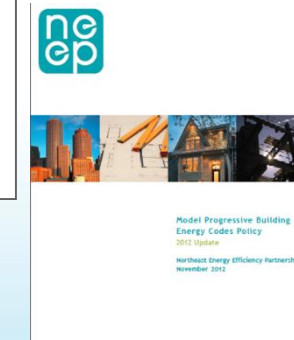
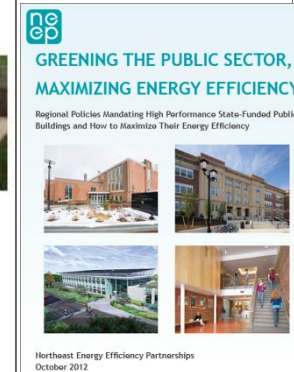
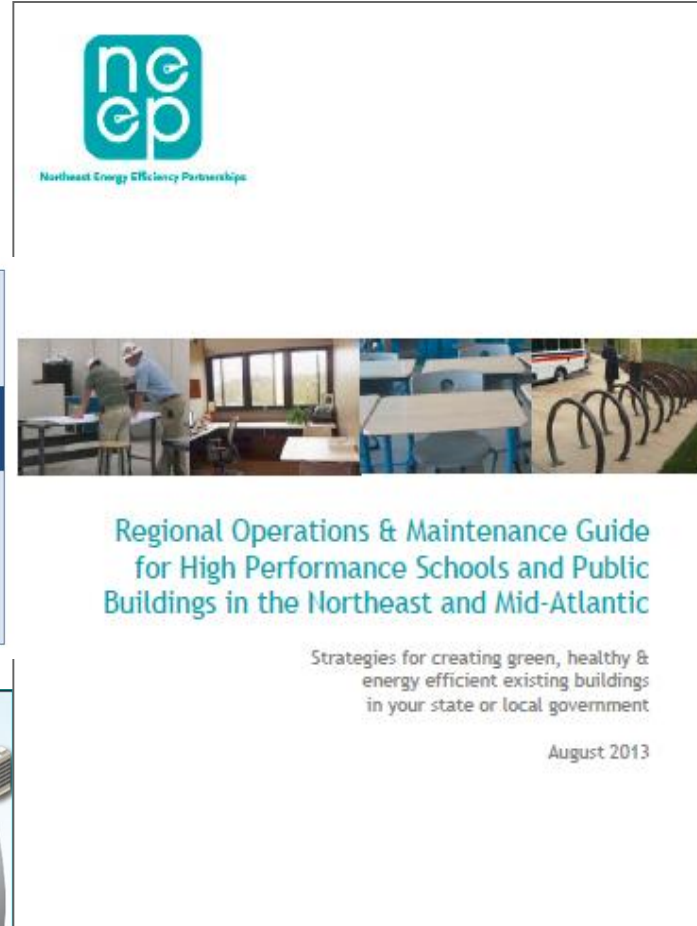
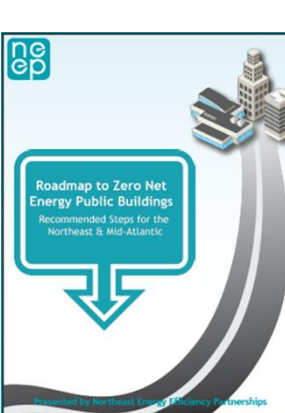
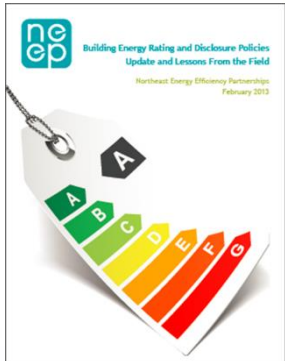
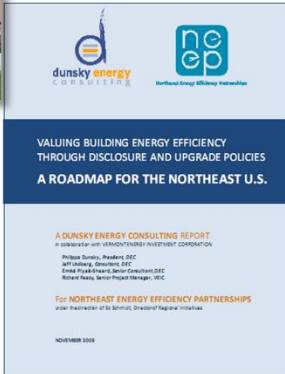
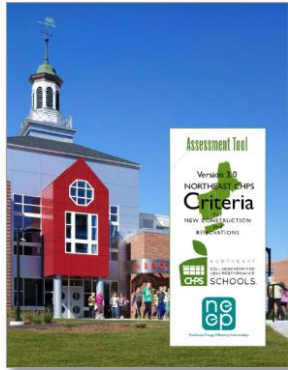


3. Better Buildings Challenge

- Education [Partners](#)
 - Ex. NY's Indian River Central School District
- Summit May 27-29, 2015
 - K-12 Track



RESOURCES AVAILABLE AT WWW.NEEP.ORG





THANK YOU!

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May 28, 2014

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DISCUSSION

