# ENERGY EFFICIENCY POTENTIAL IN OUR PUBLIC FACILITIES

Presented to: New Hampshire Local Energy Solutions Group and NEEP Public Buildings Working Group

September 10, 2014

# Agenda:

1. Brian Buckley

- NEEP's High Performance Buildings Associate
- Covering:
  - "No-cost" Efficiency Measures
  - Cost-Saving Technologies
  - Financing Strategies
  - NEEP/DOE Resources

2. Ian Houseal

- Assistant to the City Manager and Sustainability Coordinator, City of Portland, Maine
- Covering:
  - Portland's efforts to reduce energy usage

# 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

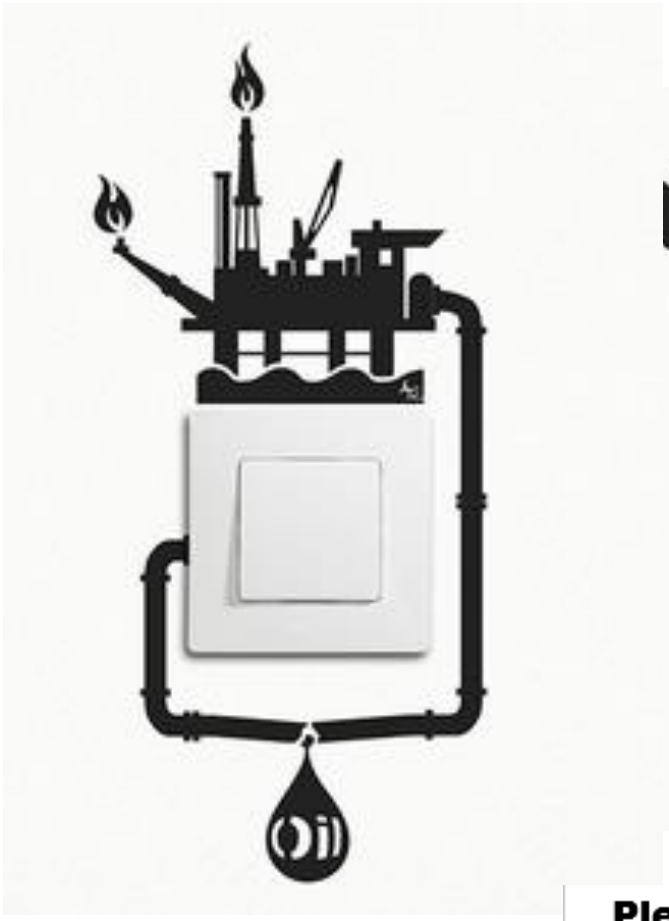
# TODAY'S NEEP PRESENTATION COVERS

1. "No-cost" Energy Efficiency Measures
   - Occupant Engagement
   - Equipment Scheduling
   - Maintenance Policies and Planning
2. Cost-Saving Technologies
   - LED Streetlight Conversions and Lighting Controls
   - Identifying Envelope Improvements with New Imaging Options
   - Three no-brainer technologies
     - NEMA Motors
     - Advanced Power Strips
     - Infrared Heating in High Bay Areas
3. Financing Strategies
   - Utility Incentives
   - Revolving Loan Fund
   - Performance contracting and collective bargaining
4. Department of Energy Resources
5. NEEP's FREE Resources

# ‘NO-COST’ ENERGY EFFICIENCY MEASURES

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

# OCCUPANT ENGAGEMENT




**Please, switch me off**

www.neep.org


**Please, shut down the computer**

www.neep.org

**Please, turn off the copier at the end of the day**

www.neep.org


**Please, don't leave the faucet running**

www.neep.org

**Please, turn off the lights**

www.neep.org



Photo Credit: HU2.com Eco Reminders

# EQUIPMENT SCHEDULING

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

Photo Credit: Our Greenwich

# 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

# COST-SAVING TECHNOLOGIES

1. LED Streetlight Conversions and Lighting Controls
2. Identifying Envelope Improvements with New Imaging Options
3. Three no-brainer technologies
    a. NEMA Motors
    b. Advanced Power Strips
    c. Infrared Heating in High Bay Areas

# LED STREETLIGHT CONVERSIONS

## Cost Savings

- ❑ Energy Cost-Savings (uses 50% less energy)
- ❑ Maintenance Cost-Savings (~$50/lamp/year)

## Collateral Benefits

- ❑ Extended Lifecycle
- ❑ Reduced Carbon Emissions
- ❑ Reduced Light Pollution at Night
- ❑ Lighting Quality
- ❑ Durability Impedes Vandalism
- ❑ Great Perceived Security

***See in Action:***

**New Hampshire Communities Taking Advantage of PSNH Municipal Smart Start Program to Upgrade Streetlights**

The Smart Start Program offered by Public Service of New Hampshire (PSNH), an electric utility, assists municipalities installing energy-saving measures with no up-front costs. Payments can be made over time through an added cost, which is calculated to be less than the monthly savings to a municipal facility's monthly electric bill. Municipalities benefit from both the payment plan and savings obtained from lower energy costs.

Thanks to the PSNH's Smart Start program, several New Hampshire communities have been able to make important energy saving upgrades to their streetlights by replacing inefficient fixtures with more energy-efficiency ones. For example, towns of Bristol, Chesterfield, Jaffrey, and Marlow converted a total of 479 inefficient streetlights, with an estimated conversion cost per town ranging from $10,904 to $91,038. Savings are estimated to range between 15 to 30 percent of an annual municipal street lighting bill.

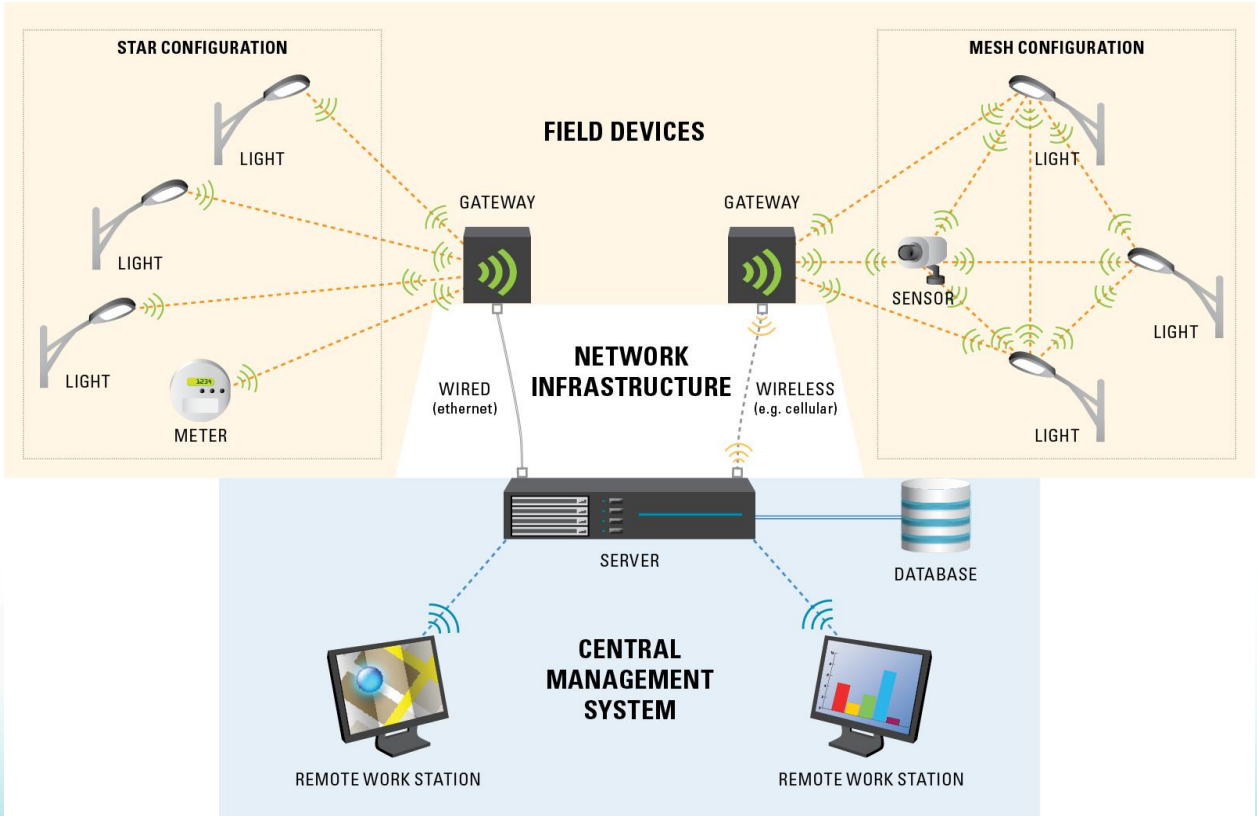
# STREET LIGHTING CONTROLS

## Traditional Controls

- Three-prong
- Photocell
- Unmetered
- Fail in the “on” position
- Do not offer dimming

## Advanced Controls

- Seven-prong
- Contain a meter
- Allow for dimming during off-peak hours to preserve night sky
- Potentially act as wireless hotspots
- Can alert to failed lamps
- Allows manipulation to alert motorists of approaching emergency vehicles or other public safety concerns




*(Image Credit: California Lighting Technology Center, UC Davis)*

# 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

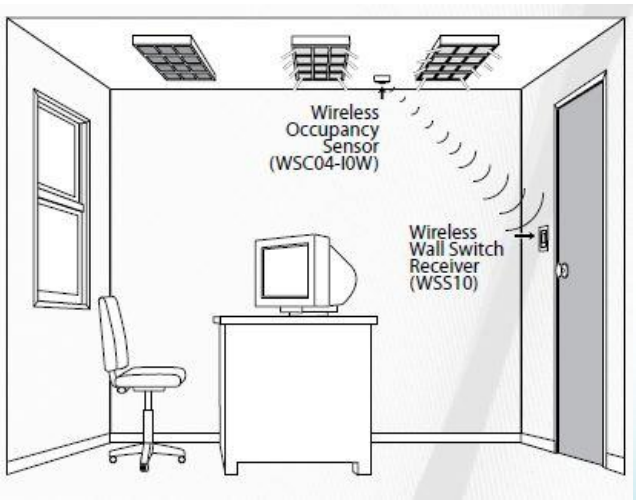




Photo Credits: Lighting Controls Association

# 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

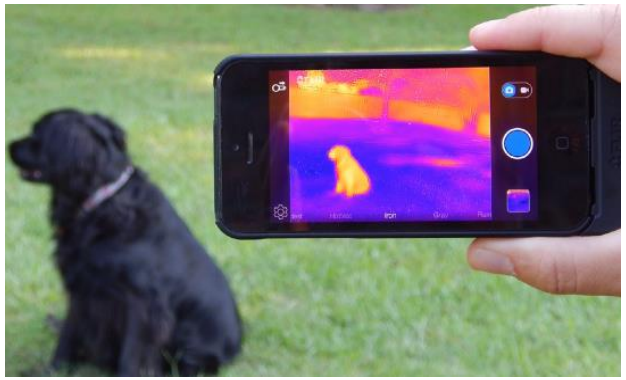


Photo Credit: Abby Allain

Photo Credit: Abby Allain

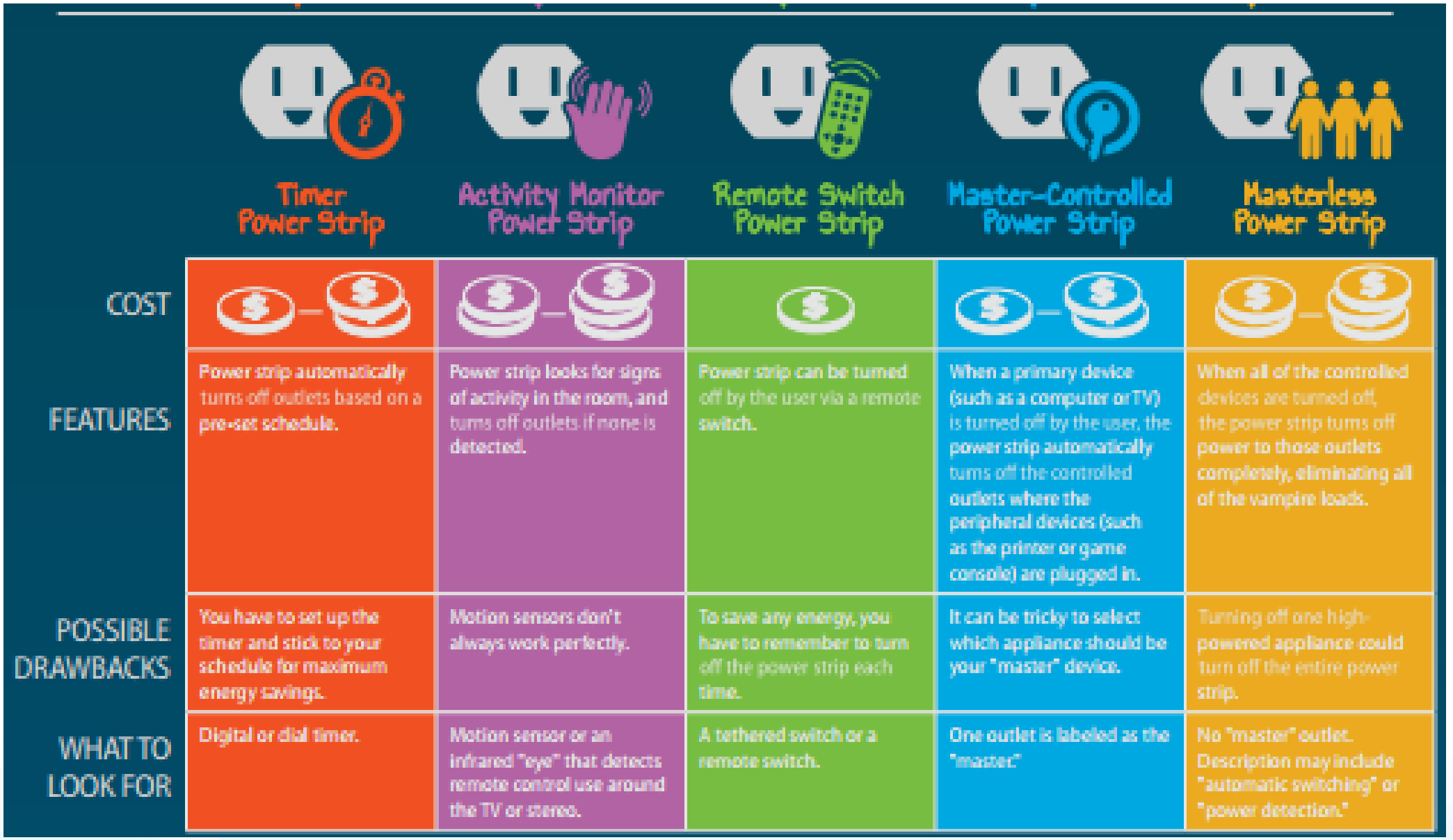

Photo Credit: Alan Mulak

# 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

# ADVANCED POWER STRIPS




Infographic Credit:
Lawrence Berkley
National Labs

# INFRARED HEAT

How it works:

- Infrared rays heats objects, not air (floors, tools, and machinery)
- Objects act as a heat sink, where warmth is stored and re-radiated to warm the surrounding air
- Reduces heat stratification
- Energy savings of 40% possible


Photo credit: Gordon Heaters

Applications:

- Firehouses
- Garages
- Other High Bay Areas

Photocredit: Alan Mulak/BOC

# Financing Strategies

1. Efficiency Program Incentives
2. Revolving Loan Fund
3. Performance contracting

# Efficiency Program Incentives

Check Before Purchase!!

PSEG LONG ISLAND
We make things work for you.

Public Service of New Hampshire
A Northeast Utilities Company

NSTAR ELECTRIC GAS

Sponsored by: nyserda
Energy. Innovation. Solutions.

Southern Connecticut Gas
Service First!

your NEW HAMPSHIRE Electric Co-op
A Touchstone Energy® Cooperative

nationalgrid
HERE WITH YOU. HERE FOR YOU.

Liberty Utilities

energize CONNECTICUT

CNG

Western Massachusetts Electric
A Northeast Utilities Company

Efficiency Vermont

DC SUSTAINABLE ENERGY UTILITY

ui The United Illuminating Company

Cape Light Compact

Unitil

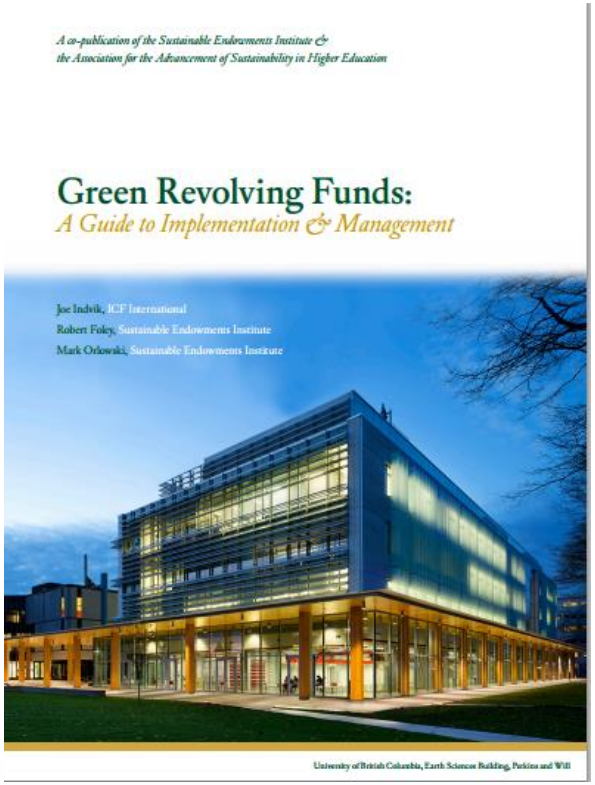
Connecticut Light & Power
The Northeast Utilities System

Connecticut Municipal cmeec Electric Energy Cooperative

Slide Credit: Alan Mulak

# 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)

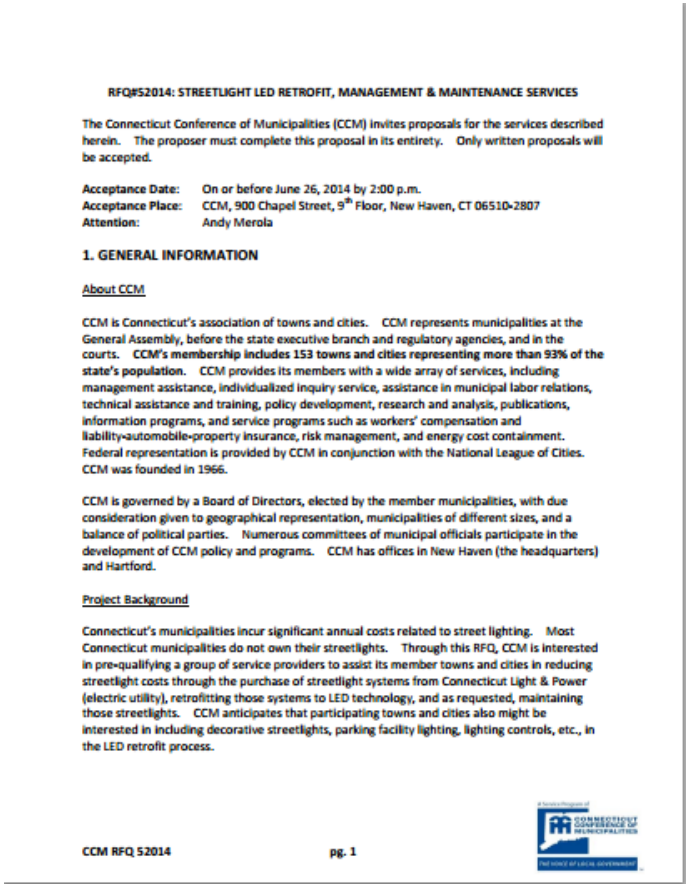


# Performance Contracting

- 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#52014: 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.

**CCM RFQ 52014** **pg. 1**

BUT (2)

Beware: Not all energy performance contracts/ESCOs are equal

# NEEP DOE Resources

1. Municipal Solid State Lighting Consortium
2. US Department of Energy Better Buildings Challenge
3. Green Button Initiative
4. NEEP Operations and Maintenance Guide
5. Other NEEP Resources

# US Department of Energy Initiatives

## Municipal Solid State Street Lighting Consortium (MSSSLC)

Shares technical information and experiences related to LED street and area lighting demonstrations, standing as an objective resource for evaluating new products on the market intended for those applications.

MODEL TOOLS AND SPECIFICATIONS

- Streetlight retrofit financial analysis tool to help municipalities determine cost-savings of a potential conversion


- Model Specification for LED Roadway Luminaires, V2.0

- Model Specification for Networked Outdoor Lighting Control Systems V2.0

# US Department of Energy Initiatives

## US Department of Energy Better Buildings Challenge

The US Department of Energy's Better Buildings Challenge supports building owners by providing technical assistance and strategic partnerships (including financial institutions) to accelerate energy efficiency. Partners agree to **reduce portfolio energy usage by 20% over the next 10 years.**

**Regional Participants include:** Delaware; Maryland; Massachusetts; Rhode Island; Pittsburgh, PA; Medford, MA; Rochester, NY; Worcester, MA; District of Columbia; Boston, MA; Huntington, NY; Indian River School District, NY; Delaware State University; Anne Arundel Public Schools; Allegheny College; Housing Authority of the City of Bristol, CT; Village of Hempstead Housing Authority; Philadelphia Housing Authority.

- ## Outdoor Lighting Accelerator

  The US Department of Energy's Outdoor Lighting Accelerator program provides municipalities with the tools and guidance necessary to complete a goal of replacing all lights system-wide within two years.

- ## Energy Data Accelerator

  The US Department of Energy's Energy Data Accelerator program identifies best-practices for streamlined access to building energy usage data. The icon to the left is the Green Button, an initiative of the department of energy that focuses on a universal format for building energy usage data.

# Who Offers Green Button?

(Northeast and Mid-Atlantic Region)

## Currently uses

- Pepco Holdings
- National Grid
- Baltimore Gas and Electric
- Bangor Hydro Electric Company
- Consolidated Edison
- Connecticut Light and Power
- NSTAR
- Public Service of New Hampshire
- United Illuminating
- Western Massachusetts Electric Company

## Future Commitments

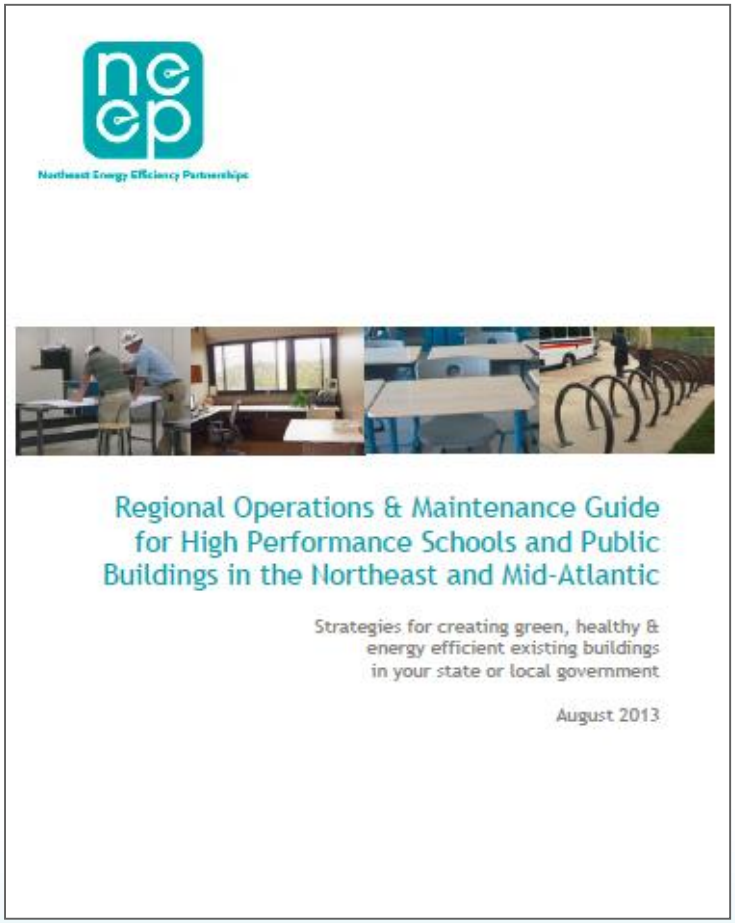
- Central Maine Power
- Efficiency Vermont
- PPL Electric Utilities
- PECO
- West Penn Power

# REGIONAL OPERATIONS & MAINTENANCE GUIDE

## STRATEGIES FOR CREATING GREEN, HEALTHY & ENERGY EFFICIENT EXISTING BUILDINGS IN YOUR STATE OR LOCAL GOVERNMENT

## WHAT IS IT?

- A pathway for existing Public Buildings to adopt high performance strategies
- Many low cost ideas
- Regionally developed, as a companion to NE-CHPS Criteria
- Available online as a free resource

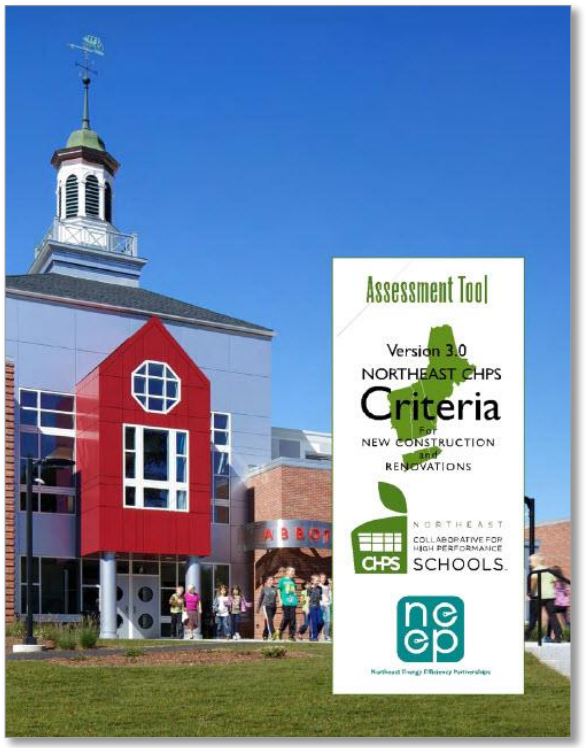


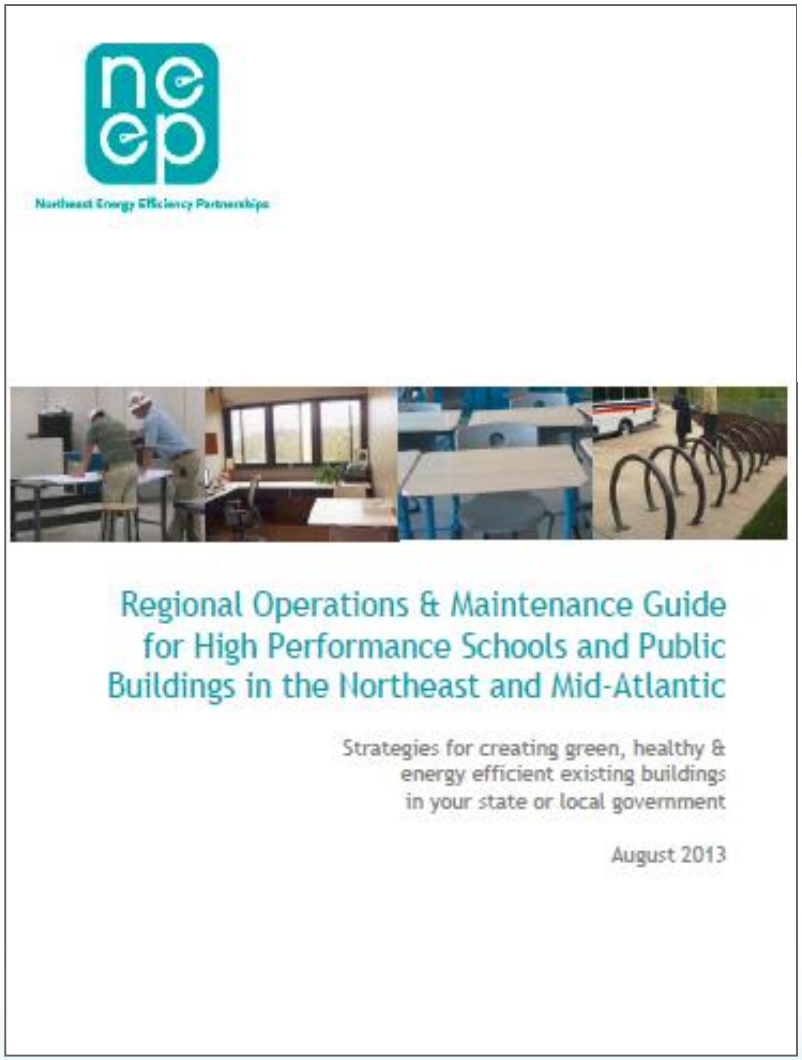
# COVERING

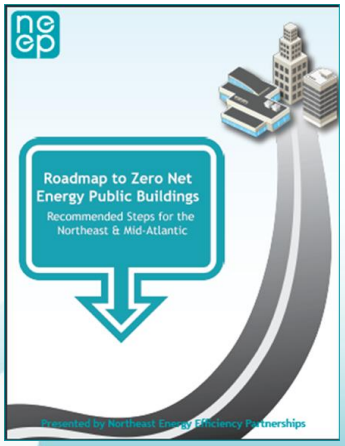
- Establishing Operations and Maintenance Policies
- Occupant Engagement
- Indoor Environmental Quality
- Integrated Pest Management
- Energy Efficiency
- Alternative and Renewable Energy Systems
- Commissioning and Retro-Commissioning
- Water Efficiency
- Materials Selection and Specification
- Recycling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

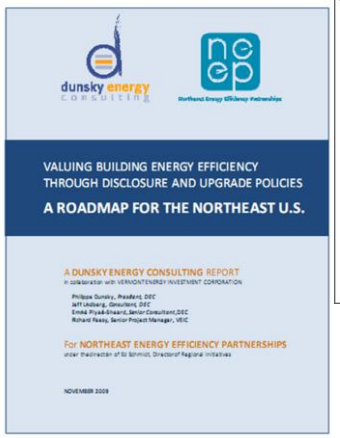
# OTHER RESOURCES

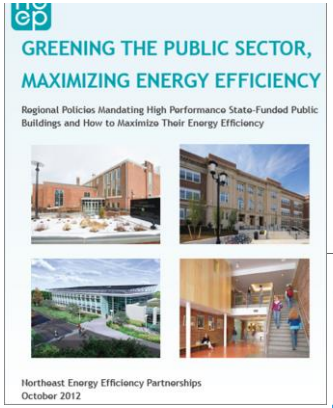
## Available at www.neep.org

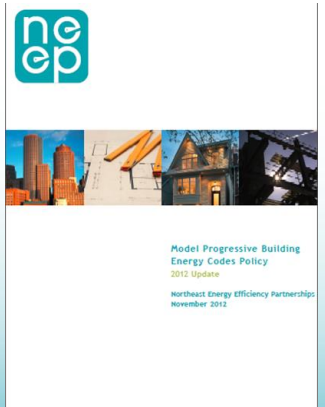


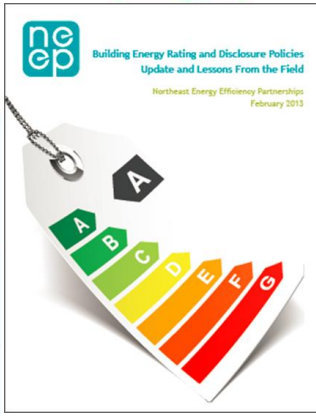



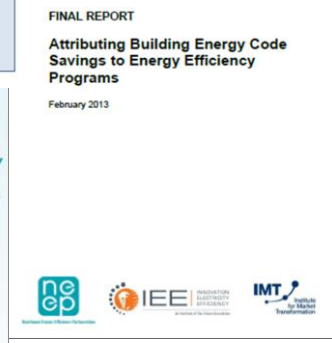



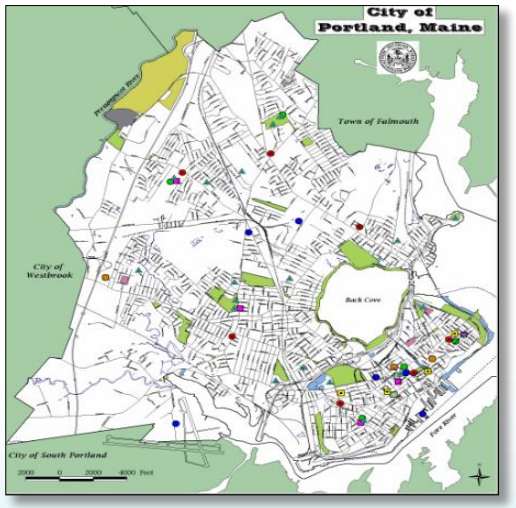




# Municipal Energy Efficiency in Portland, ME

1. Building Energy Benchmarking
2. Energy Performance Contracting
3. Specific Energy Conservation Measures
4. Green Building Policy



# Building Energy Benchmarking

## Benefits of Benchmarking

- Used to target specific buildings for capital improvements based on potential performance opportunities such as boiler conversions to natural gas reducing our fuel oil usage further.
- Reveals seasonal variations in building use or performance, resulting in review of a particular buildings operations or long-term energy performance
- Reveals opportunities for switching fuels in the summer or changing operating procedures to save money
- Allows for confidence in estimating future utility costs
- Can help identify efficiency rebate opportunities

Portland benchmarks all of its buildings annually in preparation for the annual operating budget

ENERGY STAR® Statement of Energy Performance

86

ENERGY STAR® Score[1]

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

Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Sample Property<br>123 Main Street<br>Arlington, Virginia 22030 | Wellington Commercial Property Managers<br>1 Washington Blvd<br>Arlington, VA 22030<br>(___)___-____ | Jane Smith<br>1 Washington Blvd<br>Arlington, VA 22030<br>(___)___-____<br>jsmith@wcpp.com |

Property ID: 5000023

Energy Consumption and Energy Use Intensity (EUI)

| Site EUI | Annual Energy by Fuel | | National Median Comparison | |
|---|---|---|---|---|
| 75 kBtu/ft² | Electric - Grid | 13,202,160 (88%) | National Median Site EUI (kBtu/ft²) | 122 |
| | Natural Gas | 1,853,000 (12%) | National Median Source EUI (kBtu/ft²) | 352 |
| Source EUI | | | % Diff from National Median Source EUI | -38% |
| 217 kBtu/ft² | | | Annual Emissions | |
| | | | Greenhouse Gas Emissions (MtCO²e/year) | 1,927 |

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

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

Professional Engineer Stamp
(if applicable)

# Energy Performance Contracting

## Energy Savings

- 1,490MWh/year
- Reduced greenhouse gas emissions by over 10% Reduced building fuel oil usage by 80%

## Cost Savings:

- Projected $914,687 Annually
- First Year Savings of $999,503

Below: 2.07 kW PV Array on the roof of Portland Arts and Technology High School was part of the performance contract

## Funding

- 15 year contract with Ameresco
- $9.4 Million cost
- $200,000 in rebates
- $50,000 in grants from Efficiency Program Administrator

**Links:**

2010 Audit
http://portlandmaine.gov/DocumentCenter/View/6306

2014 Status Update
http://portlandmaine.gov/DocumentCenter/View/6308

## Third Party Review

- Ensured oversight of the ESCO project development
- Helped negotiate a contract that was to the maximum benefit of the City
- Ensured that the total budget for the project was reasonable compared to the scope of the projects planned

# Energy Conservation Measures and First Year Energy Cost-Savings

- **Lighting retrofits** at 34 facilities saved $176,000+ in first year
- **Laundry plant** retrofit at a single facility saved $104,000+ in the first year
- **Water Conservation** measures at 10 facilities saved $63,000+ in first year

- **Energy Management System** install or upgrade at 29 facilities saved $301,000+ in the first year
- **Boiler retrofit or replacement** at 16 facilities saved $266,000+ in the first year

Right: Former Laundry plant at Barron Center, which after retrofit saves the city $104,000 annually.

Right: Former oil-fueled boiler at Deering High School, which was been retrofit to instead use natural gas.

# Green Building Policy

## Covers:

- New construction/major renovation
- Municipal buildings with 2,000ft$^2$ floor space
- Private buildings with 10,000ft$^2$ floor space that receive more than $200,000 from the city.

## Requires:

- Municipal building must attain a LEED Silver rating
- Private buildings must rise above ASHRAE 90.1 (2010) by 30% for new construction, 25% for existing buildings, and 20% for historic buildings.

# THANK YOU!

May 28, 2014

## CONTACT

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BBuckley@neep.org

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www.neep.org

# DISCUSSION