NH Saves Energy Efficiency for NH Schools

October 20th, 2017
Joe Van Gombos, Unitil Energy Efficiency
What We’re Selling…

- What is Energy Efficiency All About?
- Types of Projects – Retrofit and New Construction/Major Renovation
- Energy Efficient Schools Program
- Common (Prescriptive) Solutions – Electrical and Thermal
- Comprehensive (Custom) Solutions – Electrical and Thermal
- Recent Accomplishments
- What’s Next? Connect – Collaborate - Innovate
New Hampshire’s First Fuel

Primary Purposes:
- Improve Energy Security
- Lower Energy Bills
- Progress on Climate Goals

Secondary Benefits:
- Improve Businesses and Communities Operations, Comfort
- Invest in Technology Advancement

Information Exchange
- Educate Customers & Learn from Customers – this is how we improve!
Energy Efficiency Program Administrators

State of New Hampshire

PUBLIC UTILITIES COMMISSION
Concord, N.H.

Core Electric Utilities Service Areas:
- Eversource Energy
- Liberty Utilities
- Northern Utilities
- National Grid
- Public Service Co. of New Hampshire
- Unitil

Service Area:
- Liberty
- Northern Utilities

Legend
Service Areas
- Yellow: Liberty
- Blue: Northern Utilities

State of New Hampshire Gas Utility Franchise Areas

Legend
Service Areas
- Yellow: Liberty
- Blue: Northern Utilities

Massachusetts

New Hampshire

Vermont
What Is In The NH Tool Box?

Information

- Expert Partner Network
- Seminars/Education Classes/Technical Assistance (Audits)
- Bill Inserts / Online Business Newsletters / NHSaves website
- Benchmarking Resources

Financial Incentives

- Minimum dollar contributions to move projects forward
- Project Financing
Businesses do energy efficient work in NH:

20+ Technical Assistance (auditors)

20+ Weatherization Contractors

333+ Homebuilders

143+ Heating & Cooling Installers

600+ Energy Service Companies (including electricians & distributors)

150+ Retailers

1,200+

Local Economic Activity
Retrofit Projects

Improving the Energy Usage, Comfort, and Usability of existing facilities...
New Construction/Major Renovation

A significant capital investment is happening, and it is the best opportunity to invest in efficiency...
NH Energy Efficient Schools Initiative

Aim to cover **100% of the incremental cost** for key components of efficiency investments in New Construction Projects!!
Prescriptive Incentives & Rebates

Fixed Dollars based on specific quantities ranging from count of various light fixtures to capacity (size) of heating and cooling equipment

**Low Hanging Fruit:**
- LEDs & Controls
- Low-flow plumbing fixtures
- Pipe Insulation
- Thermostats

**More Capital Intensive or Site Specific**
- HVAC Equipment
- Cooking Equipment
- Motors/VFDs
- Air Compressors
- Chillers
<table>
<thead>
<tr>
<th>Product Code</th>
<th>Product Description</th>
<th>Per Fixture Incentive</th>
<th>Eligibility Criteria</th>
<th>Min Watts Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>22L</td>
<td>LED Advanced Recessed Fixtures</td>
<td>$60</td>
<td>Fixtures are required to be listed by Design Lights Consortium (for more information see <a href="http://www.designlights.org">www.designlights.org</a>)</td>
<td>32</td>
</tr>
<tr>
<td>30L</td>
<td>LED Industrial/Commercial Fixtures 4ft &amp; 8ft Fixtures</td>
<td>$60</td>
<td>LED industrial/commercial strip or wrap fixtures. Applies to fixtures installed 16 feet or less above the floor. Only one incentive may be counted per fixture. Fixtures are required to be listed by Design Lights Consortium (for more information see <a href="http://www.designlights.org">www.designlights.org</a>)</td>
<td>32</td>
</tr>
<tr>
<td>31L</td>
<td>LED Clean Room Rated or Vapor Tight Fixtures 1x4 or 2x4</td>
<td>$75</td>
<td>Fixtures are required to be listed by Design Lights Consortium (for more information see <a href="http://www.designlights.org">www.designlights.org</a>)</td>
<td>32</td>
</tr>
<tr>
<td>32L</td>
<td>LED Stairwell Fixture with integral Occupancy sensor controls</td>
<td>$75</td>
<td>To be eligible for incentives, fixtures must be installed in an 8,760 hour stairwell application with integral occupancy sensor control, setting lights to 50% output or less in control mode (not occupied). Not eligible for additional control incentive Fixtures are required to be listed by Design Lights Consortium (for more information see <a href="http://www.designlights.org">www.designlights.org</a>)</td>
<td>27</td>
</tr>
<tr>
<td>40L</td>
<td>LED High and Low Bay High Intensity Fixtures &amp; Retrofit Kits</td>
<td>$125</td>
<td>Minimum wattage is 35 watts to 149 watts. Recommended mounting height is &gt; 16 feet above the floor. Fixtures are required to be listed by Design Lights Consortium (for more information see <a href="http://www.designlights.org">www.designlights.org</a>)</td>
<td>95</td>
</tr>
</tbody>
</table>
# 2017 High-Efficiency Natural Gas Equipment Rebates

## Heating Equipment

<table>
<thead>
<tr>
<th>Condensing Boilers</th>
<th>Rating</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1701 to 2000 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$10,000</td>
</tr>
<tr>
<td>1000 to 1700 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$7,500</td>
</tr>
<tr>
<td>500 to 999 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$4,000</td>
</tr>
<tr>
<td>301 to 499 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$2,000</td>
</tr>
<tr>
<td>Up to 300 MBH</td>
<td>95% AFUE* or greater</td>
<td>$1,500</td>
</tr>
<tr>
<td>Up to 300 MBH</td>
<td>90% AFUE* or greater</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Furnace</th>
<th>Rating</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 150 MBH</td>
<td>97% AFUE* or greater &amp; ECM motor</td>
<td>$450</td>
</tr>
<tr>
<td>Up to 150 MBH</td>
<td>95% AFUE* or greater &amp; ECM motor</td>
<td>$300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Heating Equipment</th>
<th>Rating</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Demand Tankless</td>
<td>Energy Factor of .94 or greater</td>
<td>$800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infrared Heaters</th>
<th>Rating</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sizes</td>
<td>Low Intensity</td>
<td>$750</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Integrated Condensing Boiler/Water Heater with On-Demand Hot Water</th>
<th>Rating</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum AFUE Rating of 95%</td>
<td>$1,500</td>
<td></td>
</tr>
<tr>
<td>Minimum AFUE Rating of 90%</td>
<td>$1,000</td>
<td></td>
</tr>
</tbody>
</table>

- Must be considered one unit by manufacturer.

<table>
<thead>
<tr>
<th>Condensing Unit Heater</th>
<th>Rating</th>
<th>Rebate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 300 MBH</td>
<td>90% Thermal Efficiency or greater</td>
<td>$500</td>
</tr>
</tbody>
</table>

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[Logos of Eversource, Liberty Utilities, New Hampshire Electric Co-op, Unitil, and NH SAVES.]
Custom Incentives

Variable Dollar Contributions based on specialized, site-specific opportunities for weatherization, advanced controls, etc.

Low Hanging Fruit:
- Envelope Improvements
  - Insulation
  - Air Sealing

More Capital Intensive or Site Specific
- HVAC Controls - EMS
- Energy Recovery Solutions
- Process Improvements
- Heating/Cooling System Modifications
RECENT ACCOMPLISHMENTS

COMMUNITY AND UTILITY SYSTEM IMPACTS
Shaker Regional School District

- 4 Building Projects
- LED Lighting
- Propane Boilers
- Wood Pellet Boilers
- Insulation/Air Sealing
- HVAC Controls
Shaker Regional School District

Project financed through Performance Contract

- Electric savings: 287,000 kWh per year
- Oil Savings: 17,174 gallons per year
- Propane Savings: 3,679 gallons per year
- Eversource Incentive: $200,000

Other Benefits
1. a better learning environment,
2. guaranteed energy savings (via Performance Contract)
3. reduced maintenance costs
Pelham High School

LED Lighting and Controls:
- Cost: $84,000
- Incentive: $35,000
- kWh Saved: 238,000
- Payback: 1.5 years
Salem High School

LED Lighting, Controls and Electric HVAC:
- Cost: $74,000
- Incentive: $55,000
- kWh Saved: 177,000
- Payback: 1 year

Gas Boilers:
- Cost: $92,000
- Incentive: $67,005
- mmBTU Saved: 2,336

Gas Cooking Equipment:
- Cost: ~$12,000
- Incentive: $6,050
- mmBTU Saved: 184

**EVERSOURCE** **Liberty Utilities** **New Hampshire Electric Co-op** **Unitil**

**NH SAVES** we all win
# Plymouth High School

<table>
<thead>
<tr>
<th>LED Lighting and Controls:</th>
<th>Weatherization:</th>
<th>Boilers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost: $195,000</td>
<td>Cost: $57,000</td>
<td>Cost: $183,000</td>
</tr>
<tr>
<td>Incentive: $60,000</td>
<td>Incentive: $17,000</td>
<td>Incentive: $40,000</td>
</tr>
<tr>
<td>kWh Saved: 185,000</td>
<td>mmBTU Saved: 734</td>
<td>mmBTU Saved: 960</td>
</tr>
</tbody>
</table>
## NHSaves Energy Efficiency Contacts

<table>
<thead>
<tr>
<th>Organization</th>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eversource</td>
<td>Mark Toussaint</td>
<td><a href="mailto:Mark.toussaint@eversource.com">Mark.toussaint@eversource.com</a></td>
<td>603.634.2301</td>
</tr>
<tr>
<td>Liberty</td>
<td>Bob Reals</td>
<td><a href="mailto:Bob.Reals@libertyutilities.com">Bob.Reals@libertyutilities.com</a></td>
<td>603.216.3634</td>
</tr>
<tr>
<td>NHEC</td>
<td>Joe Lajewski</td>
<td><a href="mailto:lajewskij@nhec.com">lajewskij@nhec.com</a></td>
<td>603.536.8663</td>
</tr>
<tr>
<td>Unitil</td>
<td>Joe Van Gombos</td>
<td><a href="mailto:vangombosj@unitil.com">vangombosj@unitil.com</a></td>
<td>603.294.5023</td>
</tr>
</tbody>
</table>

Connect -> Collaborate -> Educate -> Innovate
NH CDFA
Financing Clean Energy for NH Schools

Scott Maslansky
Director of Clean Energy Finance
Who We Are
CDFA’s Clean Energy Fund

- Technical Assistance
- Leveraged Integrated Public Resources
- Financing
The Clean Energy Fund
Clean Energy Fund

Markets
- Municipalities/Counties
- Schools
- Non-Profits
- Businesses

Past Projects
- All Energy Efficiency measures
- Street Lighting
- Renewable Energy
  - Solar PV
  - Biomass
Clean Energy Fund

History
- $9.5MM RLF – ARRA funds, MERF, CDFA
- 27 projects since 2015
- $5MM in loans deployed leveraging additional $3.1MM

2017 – Year to Date
- 7 - approved loans
- $1.3MM – loans
- $1.5MM – leveraged funds
- $183,000 - est. annual energy savings

Technical Assistance
- Provide TA for financing & project development
Clean Energy Fund

Example Terms & Conditions

School EE or RE

• 2.0 – 2.5%
• Up to 10 yr. term
• Likely Federal Funds
  • Davis Bacon Wages
  • Procurement
Clean Energy Fund

Loan Applications Process

• Contact CDFA to discuss Projects
• Apply online via CDFA Grants Management System
• Review project scope/eligibility
• Project underwriting
• Approx. 30 day turnaround
Clean Energy Fund

Loan Requirements

- 15% Energy Savings
- Total Cost Savings > Total Project Cost
- > 12 months previous energy use
- Level II Energy Audit Required (EE projects only)
Lisbon Regional School District

2016 Energy Efficiency Upgrades

• Initial utility spend (heat + electricity) = $133,000
• Expected annual savings = $35,000 (guaranteed savings as part of performance contract with school)
• 26% energy cost reduction
• 11-year payback
• 3% interest rate over a 12-year term.
• Loan is structured so that the annual savings exceeds the annual loan payments.
### Lisbon Regional School District

#### 2016 Energy Efficiency Upgrades

<table>
<thead>
<tr>
<th>Project Description</th>
<th>CDFA Clean Energy Fund</th>
<th>Utility Rebates</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Lighting – Interior and Exterior</td>
<td>$153,000</td>
<td>$30,850</td>
<td>$183,850</td>
</tr>
<tr>
<td>Heating System Efficiency Upgrades</td>
<td>$79,903</td>
<td></td>
<td>$79,903</td>
</tr>
<tr>
<td>HVAC Controls Upgrade – Ability to Control Systems Remotely</td>
<td>$81,657</td>
<td>$22,000</td>
<td>$103,657</td>
</tr>
<tr>
<td>Weatherization</td>
<td>$65,000</td>
<td>$37,000</td>
<td>$102,000</td>
</tr>
<tr>
<td>Walk In Cooler – Controls Upgrade</td>
<td>$13,590</td>
<td>$5,000</td>
<td>$18,590</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$393,150</strong></td>
<td><strong>$94,850</strong></td>
<td><strong>488,000</strong></td>
</tr>
</tbody>
</table>

The project will help save the Lisbon Regional School District over $35,000 per year.
## White Mountain School
### 2011 Energy Efficiency Upgrades

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Enterprise Energy Fund Loan</th>
<th>Enterprise Energy Fund Grant</th>
<th>Enterprise Energy Fund – Audit Refund</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$178,706</td>
<td>$44,676</td>
<td>$7,185</td>
<td>$230,567</td>
</tr>
<tr>
<td>Replace boilers with pellet furnace</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Envelope &amp; some lights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dishwasher</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace Garage Doors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace Windows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Shades</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative/Mgmt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Plainfield Elementary & East Rochester Elementary

Power Purchase Agreement (PPA) – Public-Private Partnership
Plainfield Elementary School

2017 Solar PV Installation

- 134 kW ground mounted solar array
- To provide 15% of the school's electrical needs.
- Expected annual savings = $900 to $1,000 per year
- Option to buy system after five years at fair market value (est. at $1,000 original cost).
- No out of pocket expense (unless they purchase system later) and immediately saving from solar electricity production.
- System to be owned by BP Plainfield, LLC, who will sell the solar electricity to PES at a discounted rate.
- $445,000 project - BP Power, LLC uses:
  - $65,000 PUC rebate
  - $220,000 CDFA CEF loan
  - $160,000 in tax equity investment.
Innovative Financing

2017 Rockingham County T-RECs Project

Background

- Thermal Renewable Energy Credits (T-RECs) are purchased as part of NH’s Renewable Portfolio Standard (RPS)
  - Certificates “minted” based on thermal energy production: Biomass, geothermal, solar thermal
  - Current market exists due to RPS
  - Large biomass system eligibility limited by emissions

- School District biomass projects selling T-RECs:
  - Claremont
  - Mascoma Valley
  - Fall Mountain
  - Shaker
  - Interlakes
  - Lyme
  - White Mountains Regional
Rockingham County

2017 T-RECs Project

• Electrostatic Precipitator (ESP) installed to reduce emissions of biomass system
  • Project will be eligible to generate T-RECs

• CDFA Pre-purchases T-RECs before they are generated in order to finance project
  • CDFA then sells T-RECs once generated to repay loan with interest
    • $265k financed, <3 yr. payback, County owns/sells subsequent T-RECs through at least 2025.

• School biomass projects could potentially be financed this way (no need for ESP equipment)
  • Limited by appetite for T-RECs in future market
Innovation: Technology and Financing

Clay Mitchell, Esq PhD
University of New Hampshire
Environmental Policy & Sustainable Energy
The Power Purchase Agreement

- Host contract is basically collateral.
- Schools are great – stable, pay bills, not going anywhere.
PPA

**Utility**
- Continues to provide regular electricity service
- Provides net metering credit to Host customer where net metering available

**Host**
- Receives power from on-site PV system
- Predictable electricity prices

**Developer**
- Coordinates financing, design, and construction of PV system at Host’s site
- Processes all incentives
- Monitors PV system performance

**Diagram Flow**
- Regular kWh service
- Excess PV kWh
- 10 - 25 yr. PPA
- Payment for electricity
PPA Provider

- Will make up front investment.
- Will “monetize” the tax incentive.
  - Because schools cannot.
  - But watch – decline on horizon.
- Will O & M the system.
- Has own incentive to make work.
  - Gets paid based on output.
The System

• Solar just works.
• No moving parts (unless fans in inverter).
• Can survive most weather.
• Will report out issues via web.
• Can be integrated into curriculum with monitoring program.
• O & M low and panel output warranty 25 years usually 80% nameplate (will last longer).
The Host

• You!

• Must pay the bill.

• Option to take over system at end of PPA.
  • At Fair Market Value

• Will need to pay over time.
  • Districts differ on whether promise requires vote.
Risks

• Legislative Stability.
  • “Tough Bananas”
  • NH House Rep recently on making changes that affect business investment in renewable energy.
Other topics

• CHP

• Solar Hot Air – TPA

• Innovation:
  • Energy services contracts.
  • Investment and service contracts at new construction.
Combined Heat & Power

• One system / fuel.
• 2 energies – heat & electricity.
• Can be used for resilience.
• At a steady run state can lower demand charges.
Conventional Generation vs CHP

Conventional Generation

Total Fuel Efficiency 52.5%

- Heating Fuel 100%
- Electricity Fuel 100%
- Waste 65%
- Loss 25%

CHP

Total Fuel Efficiency 85%

- CHP Fuel 100%
- Heat 50%
- Electricity 35%
- Loss 15%
Economics of CHP

- Run for heat load.
- Electricity is a “by product”.
  - Payment for electricity output can be part of PPA.
- Want it to run as long as heat is being used.
- Can provide back-up.
Solar Hot Air

- Renewable energy source.
- Can be developed as TPA (thermal purchase agreement – like solar PV but with btu).
- Pre-heats air coming into building.
SAU 17 Solar Air Thermal PPA
Contracting & Beyond

• Traditional procurement – well known.
  • Annual / multi-year contracts.
  • Long-term debt – more challenging (meeting vote).

• What about the long-term obligation that is not debt.

• Energy Performance Contract:
  • Wide range of options for technologies and services.
  • 20 years (used to be 10).
  • May be able to enter without Legislative Body vote.
    • This requires an allocation dependency clause.
    • Risk to provider but why would district not allocate for a project that saves money.
Is Innovation Possible?

• Query:
  • Could a district engage an energy services provider to finance, install and operate an energy system at time of construction?
  • Assume: Standard construction.
    • System capital cost.
    • Low/medium efficiency system – high operating cost.
Benefits of Innovation at Construction.

- Standard construction – standard costs and operating expenses.
- Contract Facility construction.
- Lowers capital cost.
  - Provider invests in high-efficiency system.
  - Can leverage tax advantages or other incentives.
  - System management by provider.
- High-efficiency = lower operating costs.
  - The provider can recoup investment and O & M in contract.
Going Forward

• EERS
• Specific funding set asides.
• Programs supporting resilience.
• Working with new partners.
  • Towns.
  • Other Schools.
  • State.
  • Utilities.