NHSaves 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

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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!*

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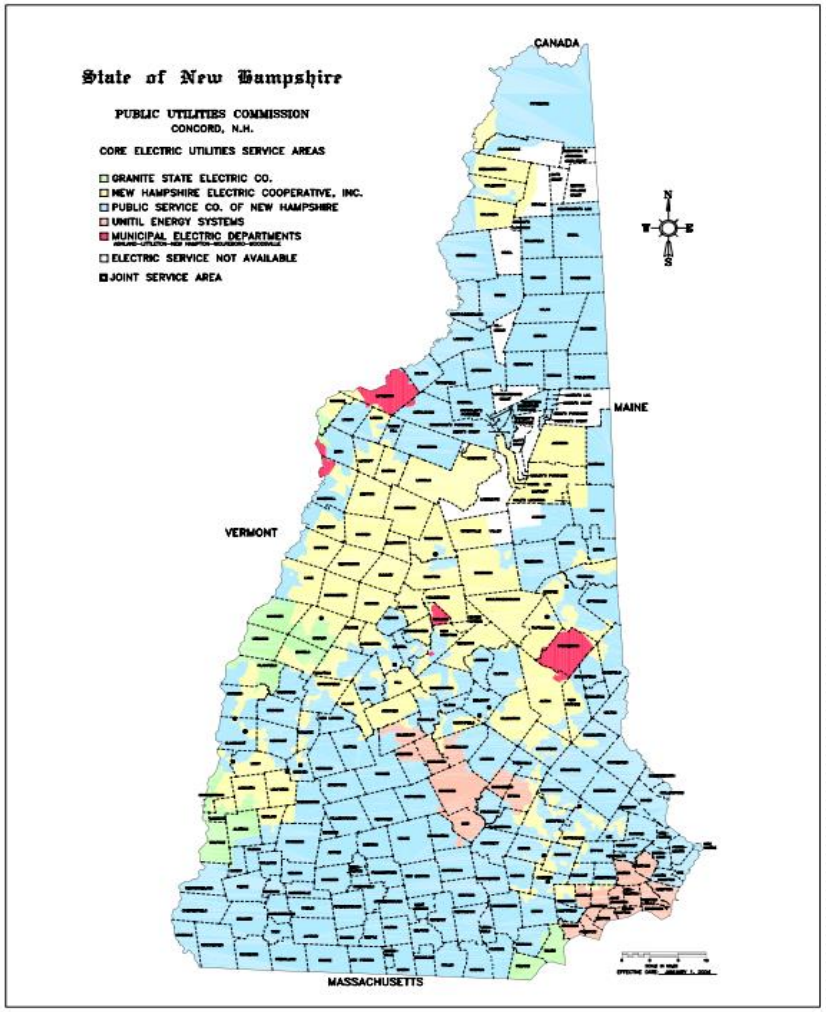
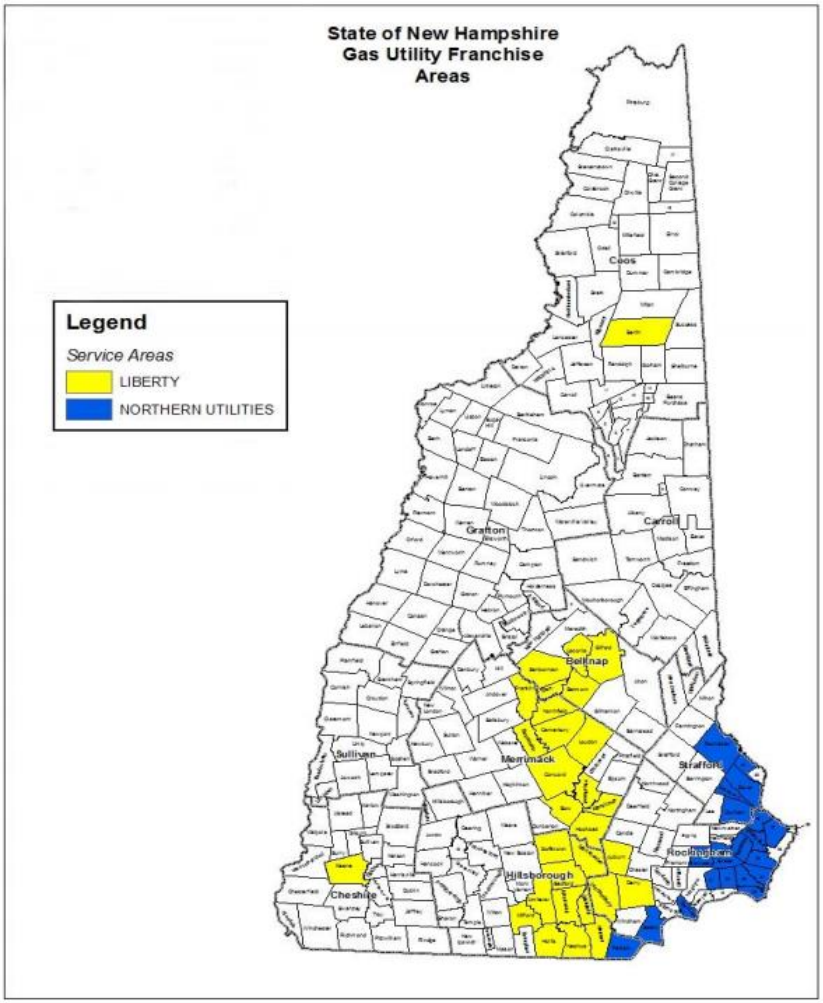
Energy Efficiency Program Administrators





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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

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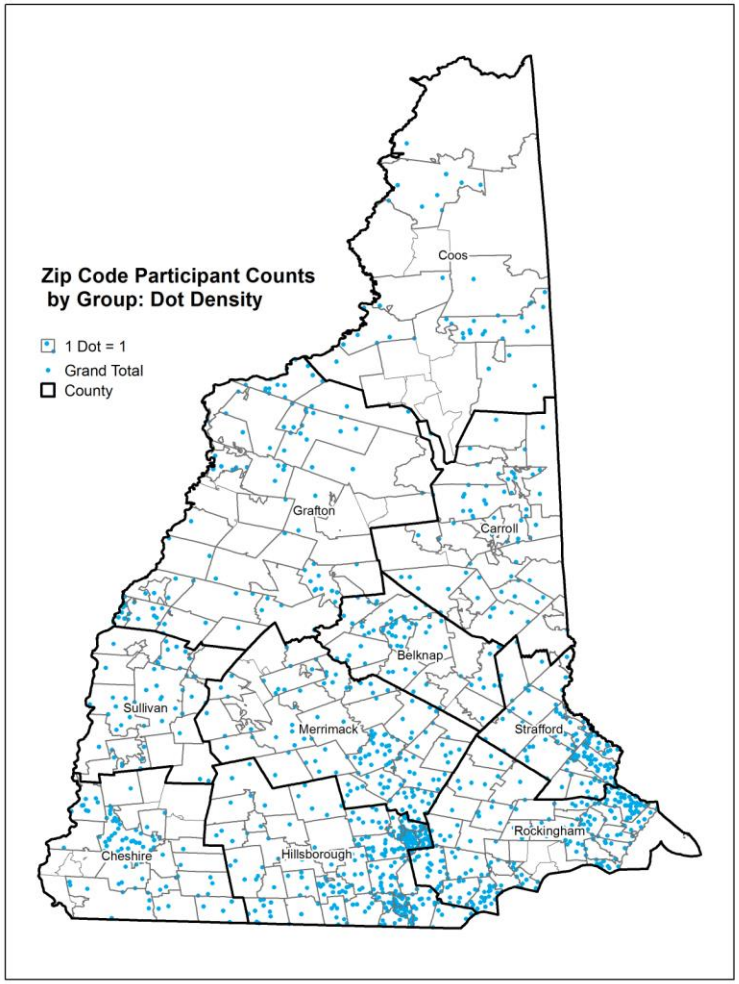
Local Economic Activity



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+

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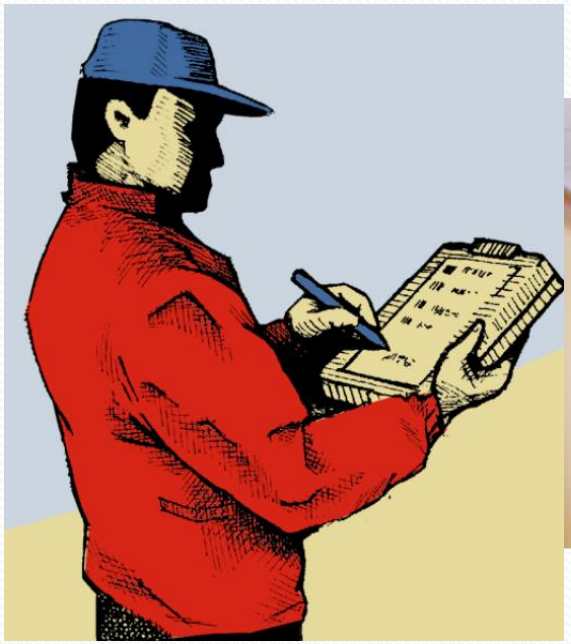
Retrofit Projects

Improving the Energy Usage, Comfort, and Usability of existing facilities…



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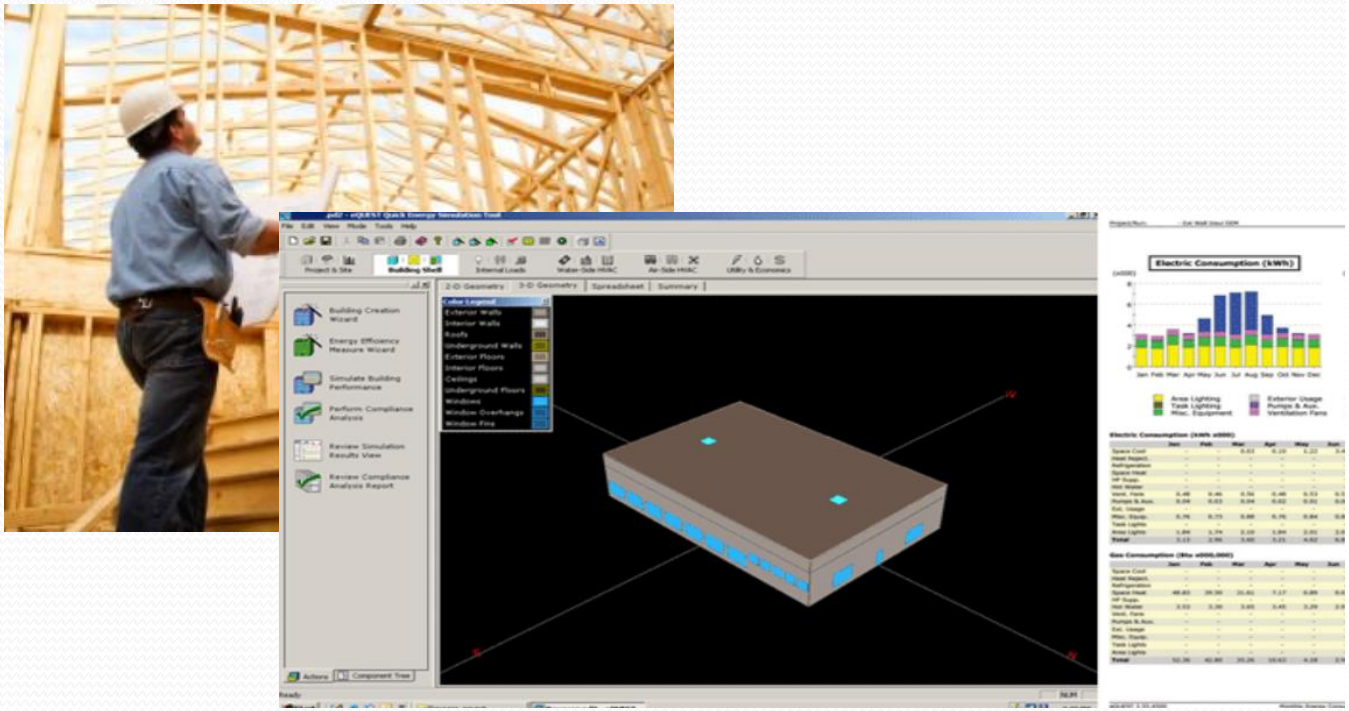
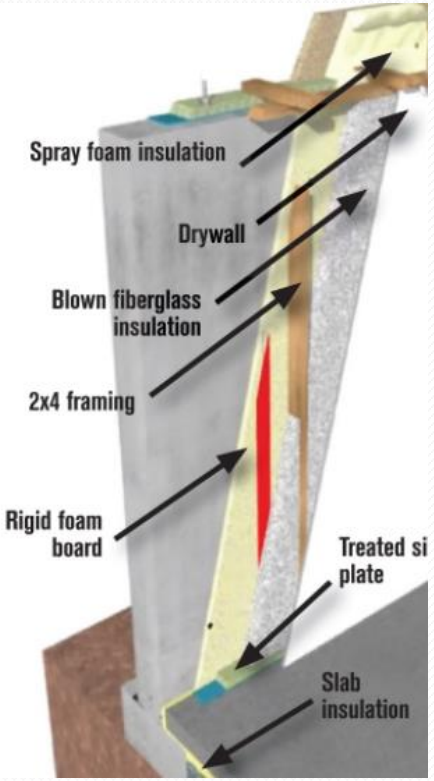
New Construction/Major Renovation

A significant capital investment is happening, and it is the best opportunity to invest in efficiency…





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NH Energy Efficient Schools Initiative

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

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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

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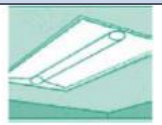
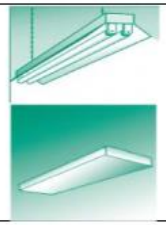
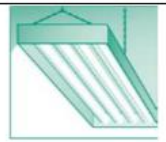
Product Code	Product Description	Per Fixture Incentive	Eligibility Criteria	Min Watts Saved	
22L	LED Advanced Recessed Fixtures	$60	Fixtures are required to be listed by Design Lights Consortium (for more information see www.designlights.org)	32	
30L	LED Industrial/Commercial Fixtures 4ft & 8ft Fixtures	$60	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 www.designlights.org)	32	
31L	LED Clean Room Rated or Vapor Tight Fixtures 1x4 or 2x4	$75	Fixtures are required to be listed by Design Lights Consortium (for more information see www.designlights.org)	32	
32L	LED Stairwell Fixture with integral Occupancy sensor controls	$75	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 www.designlights.org)	27	
40L	LED High and Low Bay High Intensity Fixtures & Retrofit Kits	$125	Minimum wattage is 35 watts to 149 watts. Recommended mounting height is > 16 feet above the floor. Fixtures are required to be listed by Design Lights Consortium (for more information see www.designlights.org)	95	

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2017 High-Efficiency Natural Gas Equipment Rebates

HEATING EQUIPMENT

CONDENSING BOILERS	RATING	REBATE
1701 to 2000 MBH	90% Thermal Efficiency or greater	$10,000
1000 to 1700 MBH	90% Thermal Efficiency or greater	$7,500
500 to 999 MBH	90% Thermal Efficiency or greater	$4,000
301 to 499 MBH	90% Thermal Efficiency or greater	$2,000
Up to 300 MBH	95% AFUE* or greater	$1,500
Up to 300 MBH	90% AFUE* or greater	$1,000

FURNACE	RATING	REBATE
Up to 150 MBH	97% AFUE* or greater & ECM motor	$450
Up to 150 MBH	95% AFUE* or greater & ECM motor	$300

WATER HEATING EQUIPMENT	RATING	REBATE
On-Demand Tankless	Energy Factor of .94 or greater	$800

INFRARED HEATERS	RATING	REBATE
All Sizes	Low Intensity	$750

INTERGRATED CONDENSING BOILER/WATER HEATER WITH ON-DEMAND HOT WATER	RATING	REBATE
	Minimum AFUE Rating of 95%	$1,500
	Minimum AFUE Rating of 90%	$1,000

Must be considered one unit by manufacturer.

CONDENSING UNIT HEATER	RATING	REBATE
Up to 300 MBH	90% Thermal Efficiency or greater	$500

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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

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RECENT ACCOMPLISHMENTS

COMMUNITY AND UTILITY SYSTEM IMPACTS

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Shaker Regional School District

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

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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

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Pelham High School

LED Lighting and Controls:

- Cost: $84,000
- Incentive: $35,000
- kWh Saved: 238,000
- Payback: 1.5 years

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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

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Plymouth High School

LED Lighting and Controls:

- Cost: $195,000
- Incentive: $60,000
- kWh Saved: 185,000

Weatherization:

- Cost: $57,000
- Incentive: $17,000
- mmBTU Saved: 734

Boilers:

- Cost: $183,000
- Incentive: $40,000
- mmBTU Saved: 960

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NHSaves Energy Efficiency Contacts

Organization	Name	Email	Phone
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NHEC	Joe Lajewski	lajewskij@nhec.com	603.536.8663
Unitil	Joe Van Gombos	vangombosj@unitil.com	603.294.5023

Connect –> Collaborate –> Educate –> Innovate

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NH CDFA
Financing Clean Energy for NH Schools

Scott Maslansky

Director of Clean Energy Finance

CDFA
Community Development Finance Authority
Strengthening New Hampshire's Communities

Who We Are

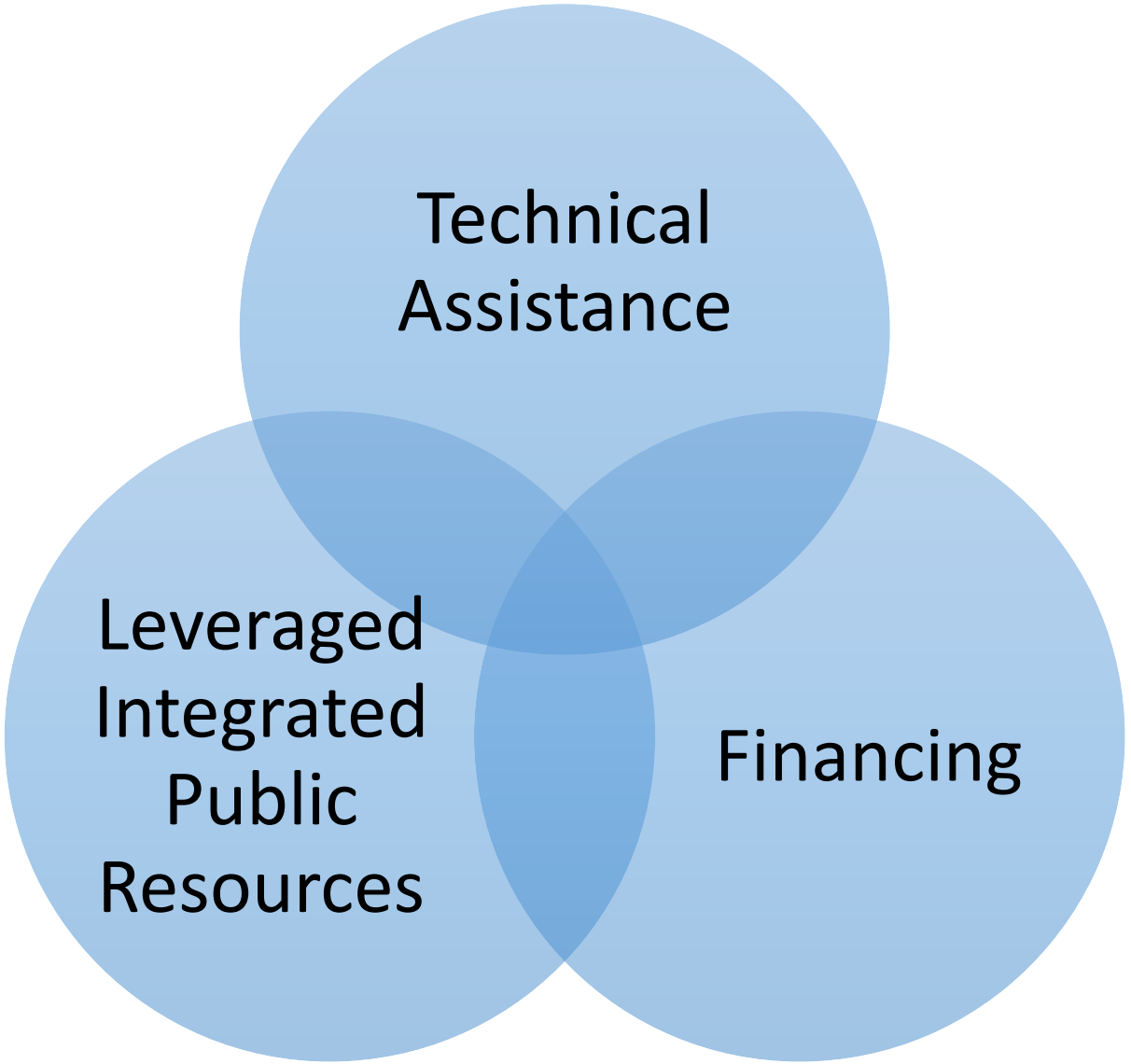

Capitol Center for the Arts


ECOCA


Serenity Place


THE COLONIAL THEATRE

CDFA's Clean Energy Fund



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

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

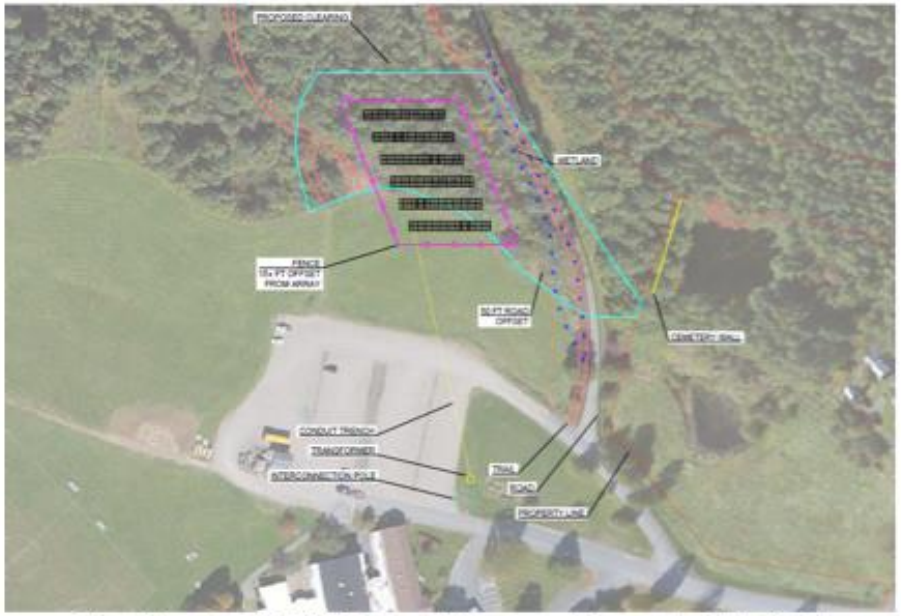
The project will help save the Lisbon Regional School District over $35,000 per year.

White Mountain School

2011 Energy Efficiency Upgrades

	Enterprise Energy Fund Loan	Enterprise Energy Fund Grant	Enterprise Energy Fund – Audit Refund	Total
Total	$178,706	$44,676	$7,185	$230,567
Replace boilers with pellet furnace				
Building Envelope & some lights				
Dishwasher				
Replace Garage Doors				
Replace Windows				
Thermal Shades				
Administrative/Mgmt				

Plainfield Elementary & East Rochester Elementary



Site Plan for 134kW Ground Mounted Array in Plainfield

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 ½ 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

www.nhcdfa.org

603-226-2170

smaslansky@nhcdfa.org

Innovation: Technology and Financing

Clay Mitchell, Esq PhD

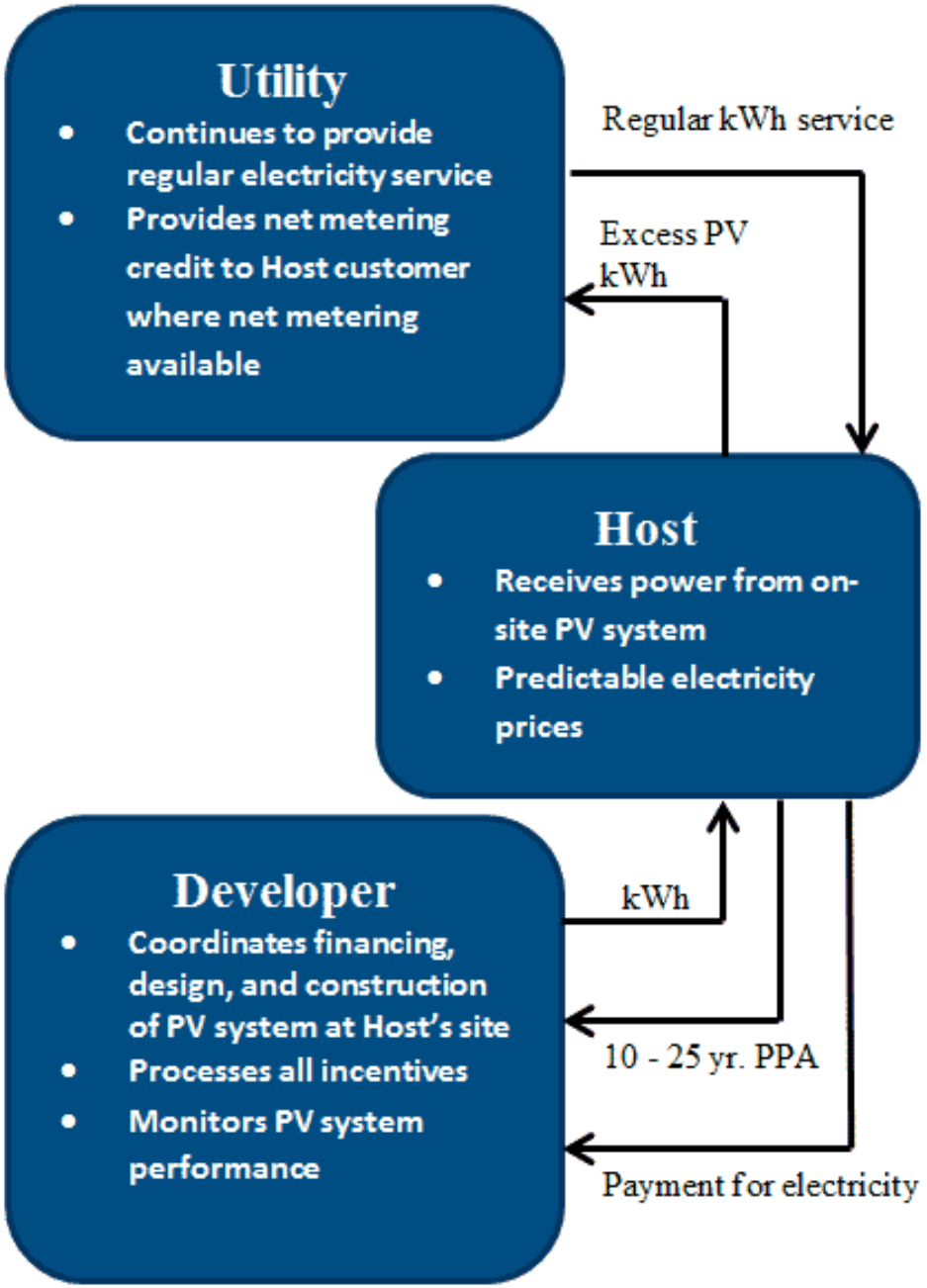
University of New Hampshire

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
Regular kWh service
Excess PV kWh
Host
Receives power from on-site PV system
Predictable electricity prices
kWh
10 - 25 yr. PPA
Payment for electricity
Developer
Coordinates financing, design, and construction of PV system at Host's site
Processes all incentives
Monitors PV system performance

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.

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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).

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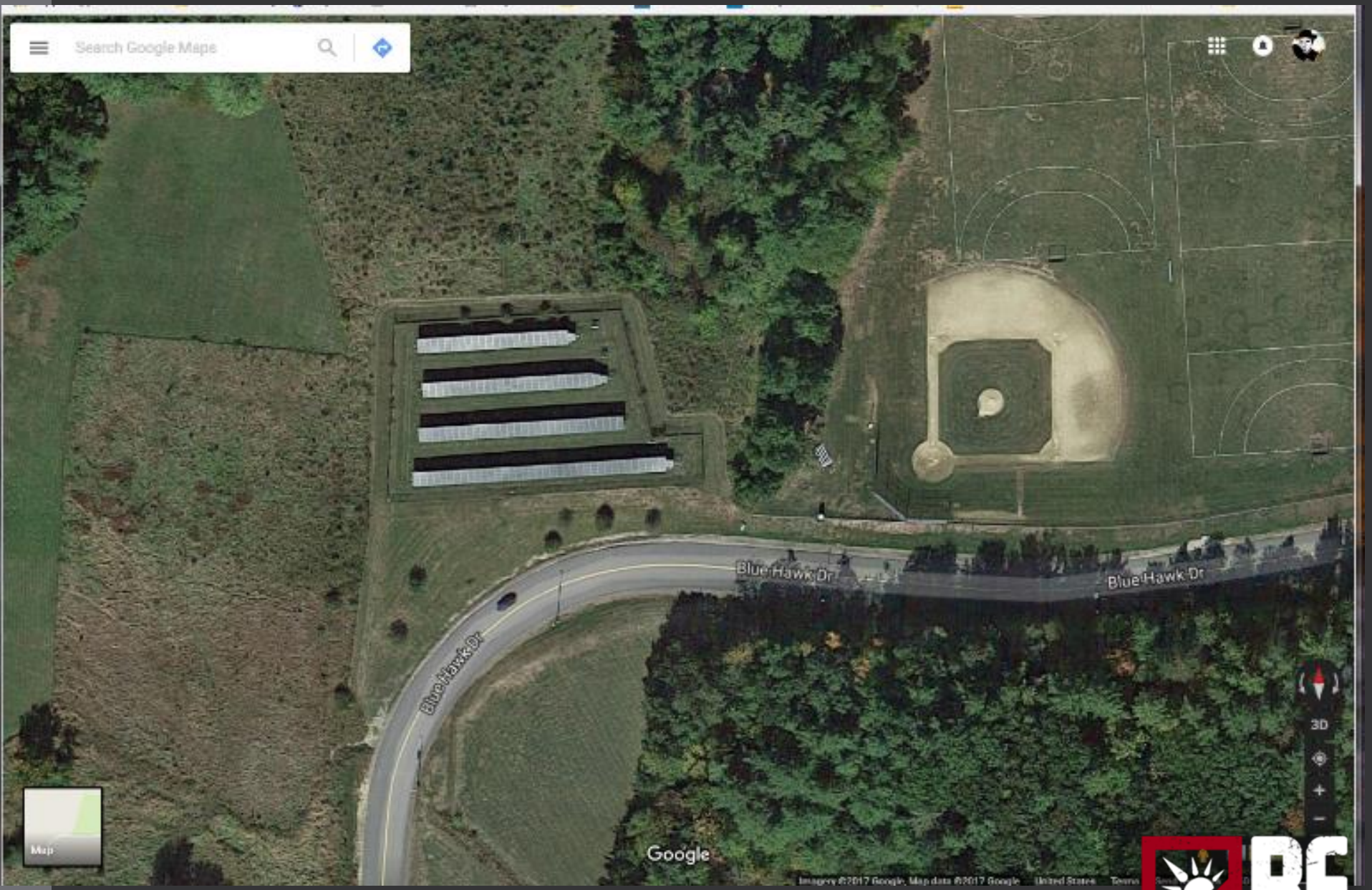

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The Host

- 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.

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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.

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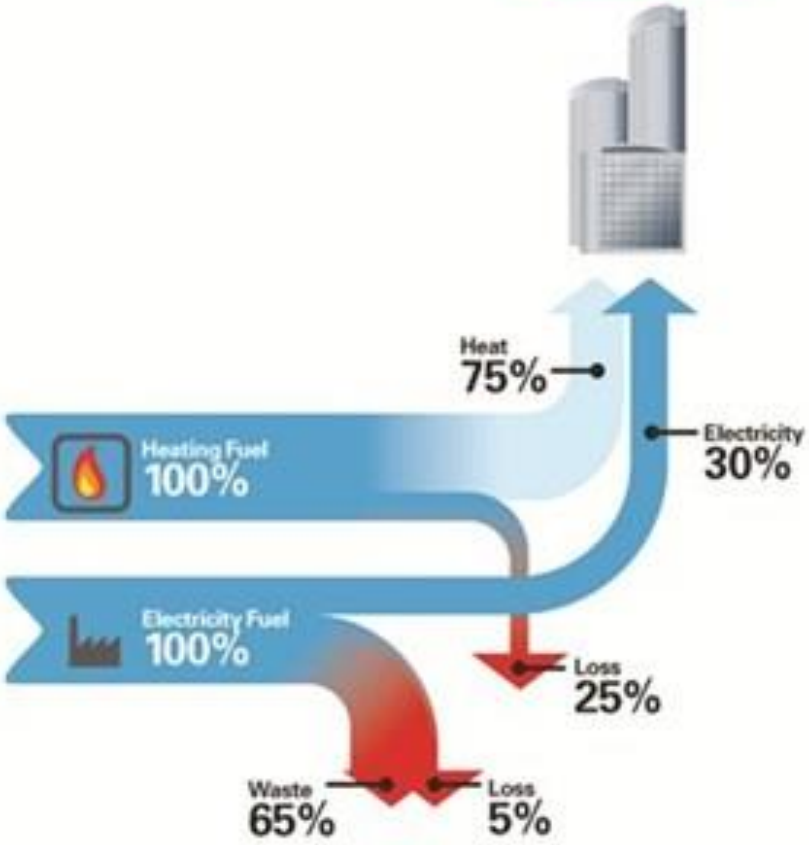
Combined Heat & Power

- 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

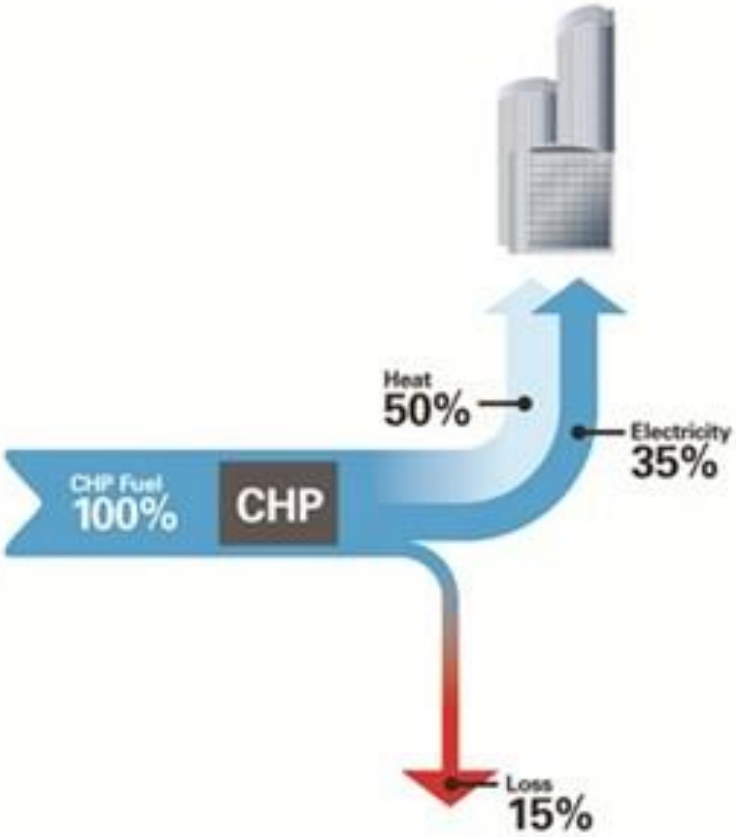
Conventional Generation

Total Fuel Efficiency
52.5%



CHP

Total Fuel Efficiency
85%




Capstone

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.

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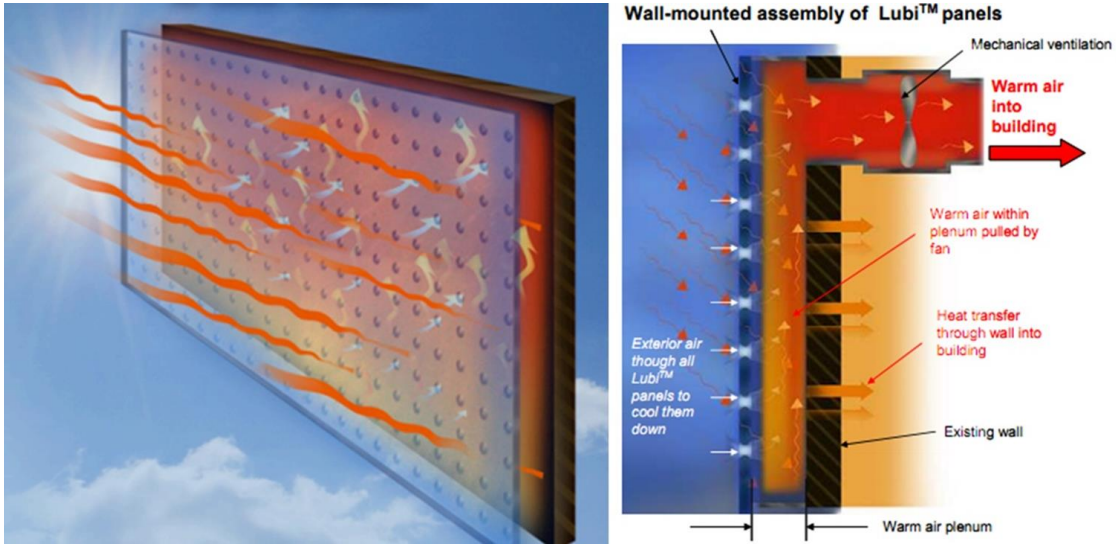
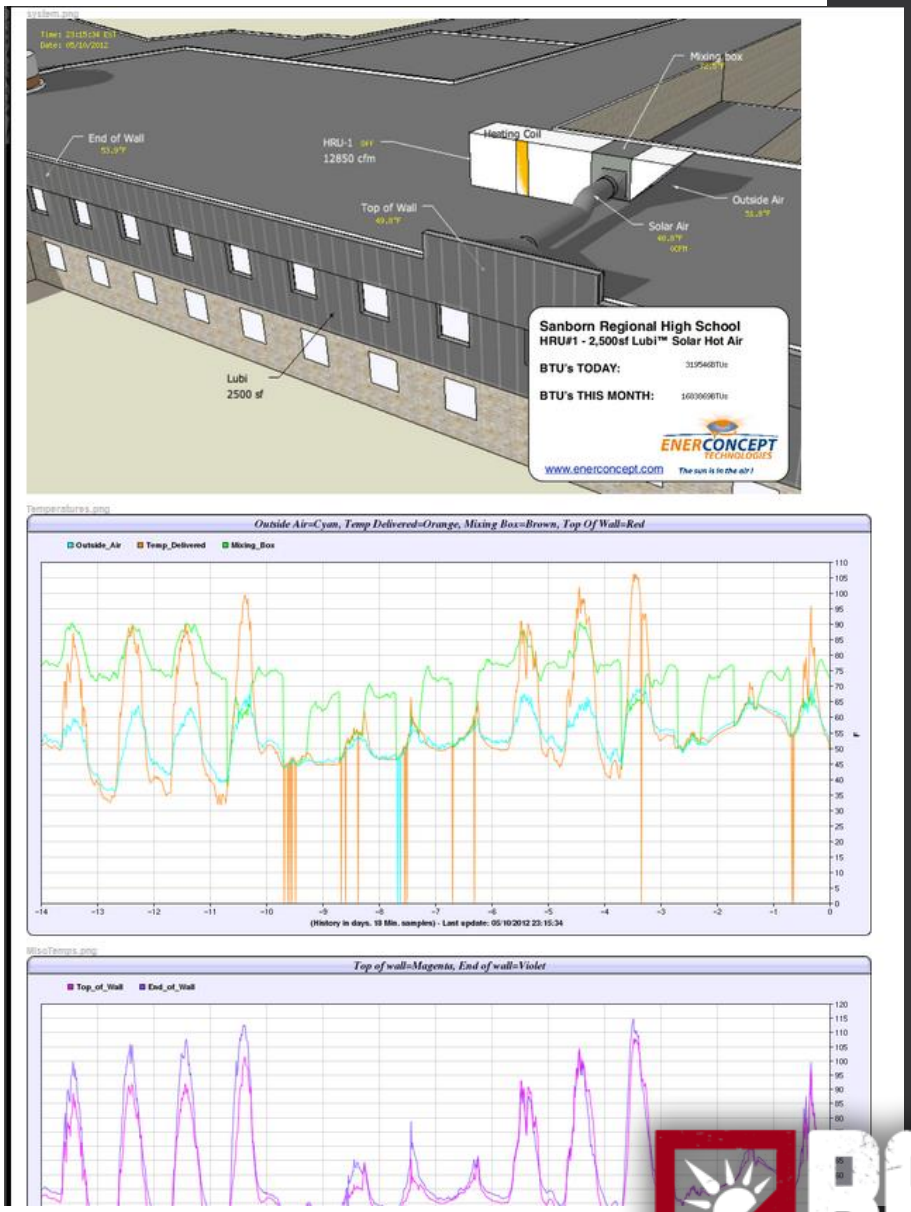
Solar Hot Air

- 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



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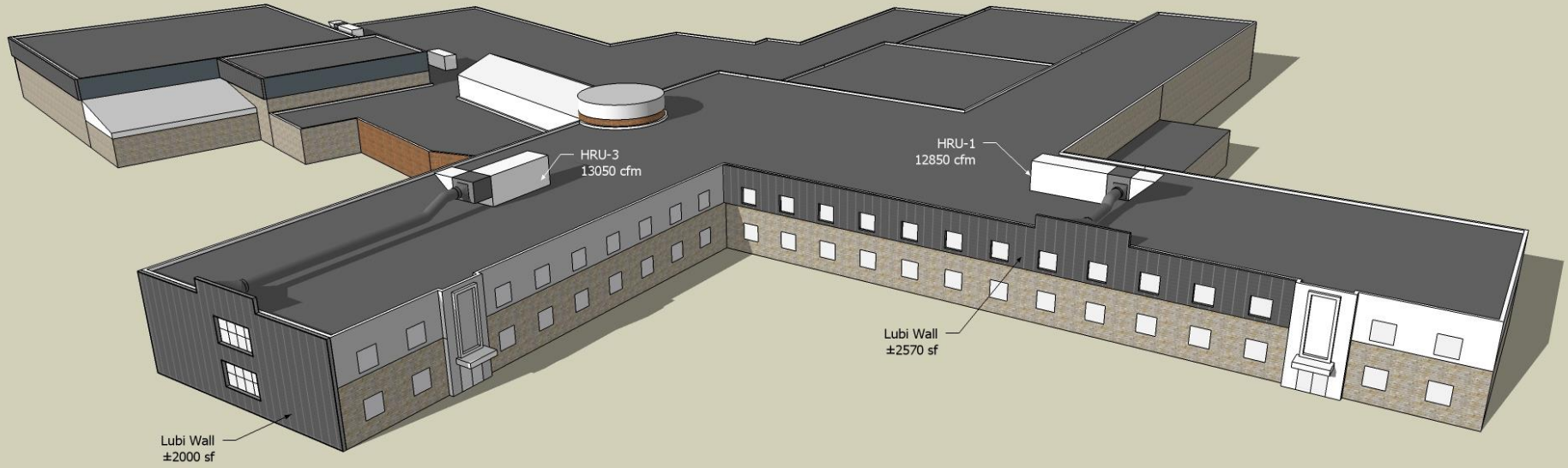
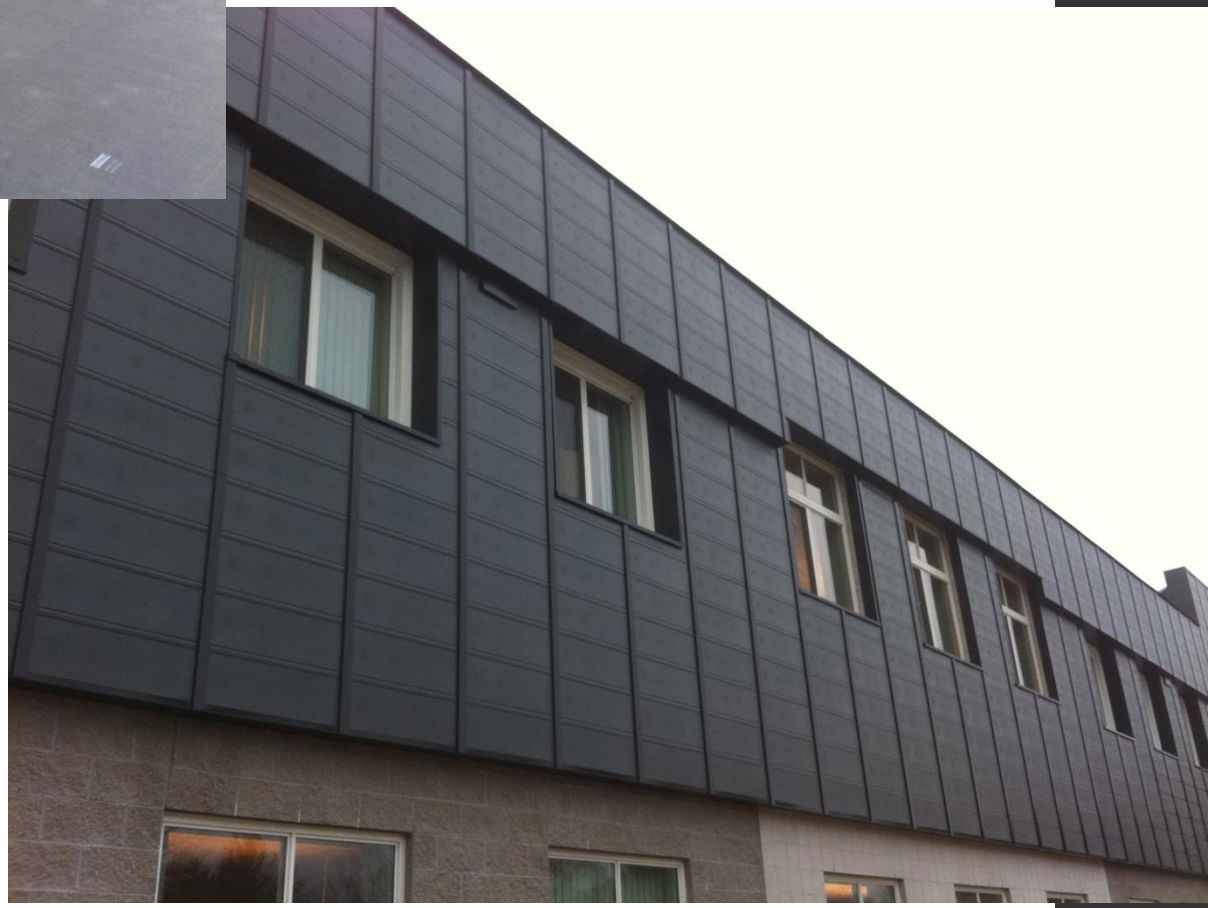


REVOLUTION ENERGY


New fan with mixing damper
±5000 cfm
New fan with mixing damper
±1300 cfm
Lubi Wall
±650 sf
Lubi Collector
±2500 sf




SKYJACK

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.

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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.

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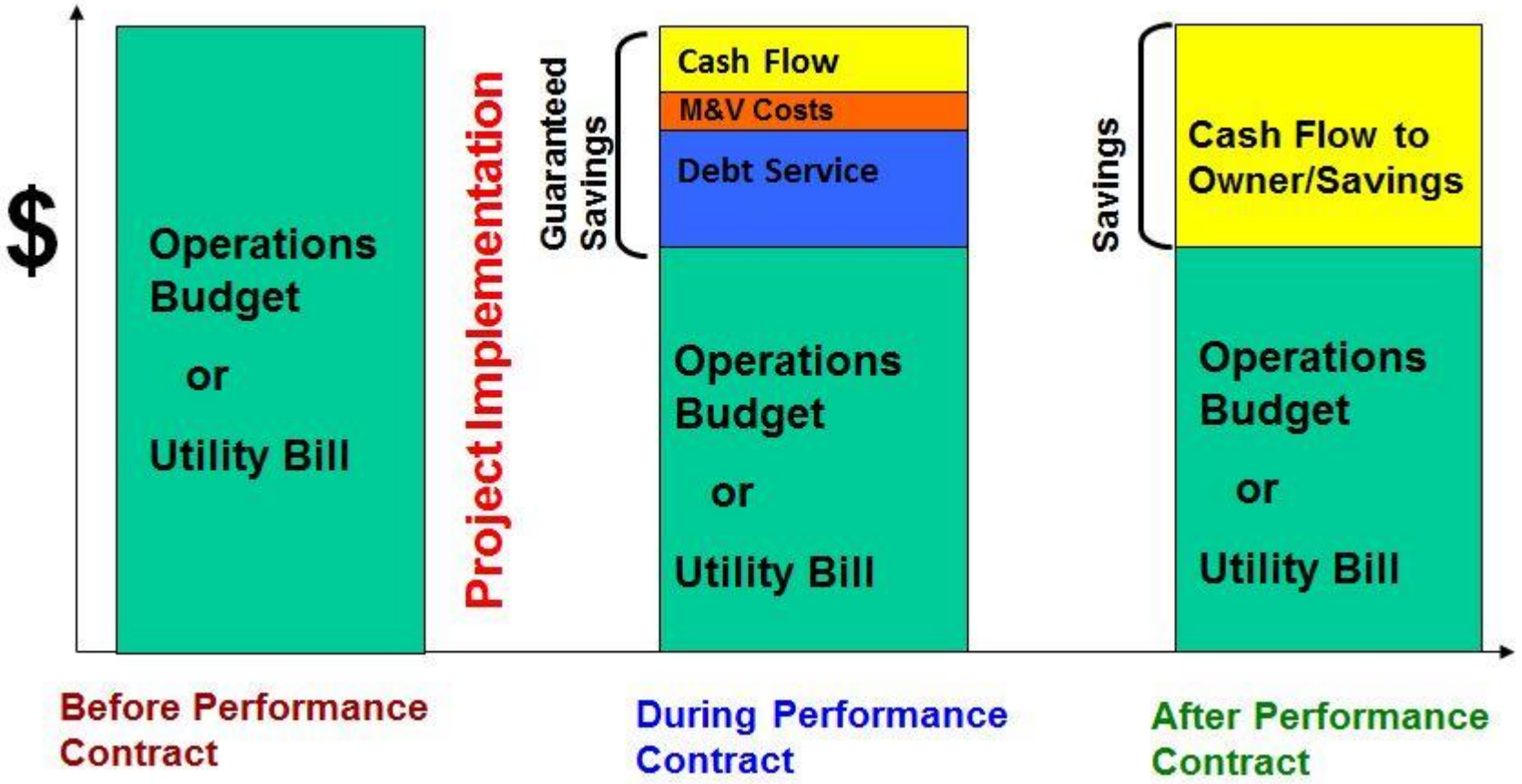
$
Operations Budget or Utility Bill
Project Implementation
Guaranteed Savings
Cash Flow
M&V Costs
Debt Service
Operations Budget or Utility Bill
Savings
Cash Flow to Owner/Savings
Operations Budget or Utility Bill
Before Performance Contract
During Performance Contract
After Performance Contract

Going Forward

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

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Green Mountain Fibers
Applebee's
Neighborhood Grill &...
Mountain Rock
Climbing Center
Ben & Jerry's
SUBWAY® Restaurants
Woodstock Ave
Woodstock Ave
Stafford Technical Center
Rutland Senior
High School
Elements
on & Day Spa
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