



MESM ACADEMY:

Building Decarbonization & Energy Efficiency Strategies for Municipal Buildings



12/16/2025
10am

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MESM ACADEMY:

Building Decarbonization & Energy Efficiency Strategies for Municipal Buildings



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Today's Lesson

Lesson Questions

- How do I decarbonize my municipality's buildings?

Learning Objectives

- Identify where to start the municipal decarbonization journey.
- Identify the barriers and considerations of electrification and how to overcome them.
- Understand the various funding sources available to municipalities and schools to study facilities.





Introductory Polls

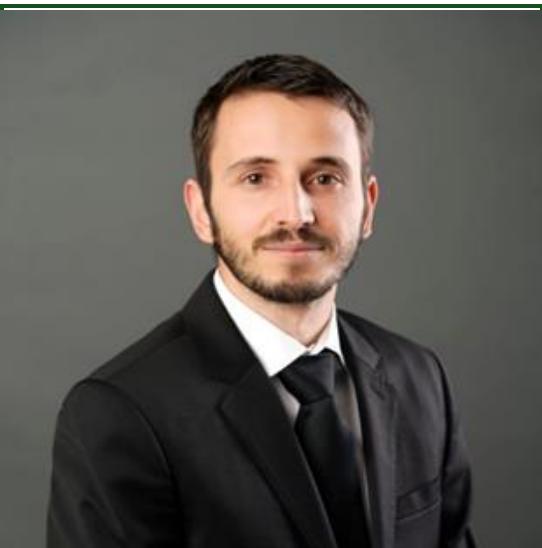
Rate your level of agreement with the following statements:

- I know where to start the municipal decarbonization journey.
- I know the barriers and considerations of electrification and how to overcome them.
- I understand the various funding sources available to municipalities and schools to study facilities.

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

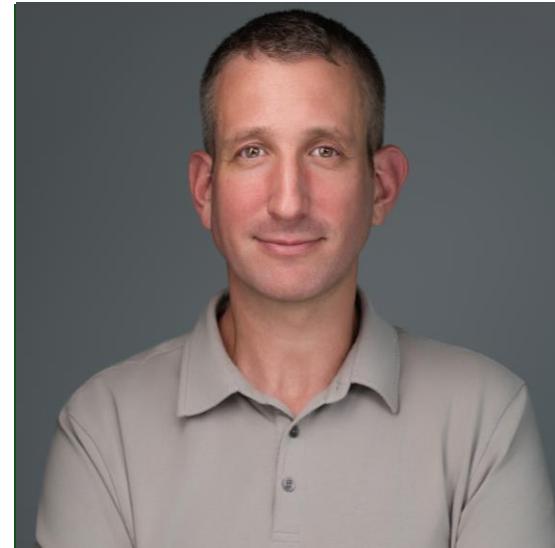


Meet the Instructors



Kevin Silveira

**Lead Development
Engineer**
National Grid



Greg Sine

**Senior Energy Efficiency
Consultant**
Eversource

Decarbonization Strategies Agenda

- **Mass Save Technical Assistance**
- **Pre-Electrification Barriers and Strategies**
- **Existing Heating Systems**
- **Heat Pump Solutions**
- **Case Studies**



Electrification Technologies for Every Aspect of Your Building – How Mass Save Can Help

Part One: Pre-electrification



2025 Mass Save Technical Assistance Offerings

- Portfolio Prioritization Plan (PPP)
- Comprehensive Building Assessments (CBA)
- Technical Assistance Plans

Benchmarking/ Prioritization

Portfolio Prioritization Plan

Identify buildings with greatest potential; capture building data

Measure Identification

Comprehensive Building Assessment

Scope opportunities for energy efficiency + electrification

Investment Decision

Focused Study

Detailed, actionable project estimates

Implementation



INCENTIVE OFFER

Portfolio Prioritization Plan

- High level study to understand a portfolio of buildings and which buildings to target for:
 - Comprehensive Building Assessment studies
 - or direct electrification measures
- Minimum 5 buildings considered a “portfolio”
- No cost to customer



Portfolio Prioritization Plan – Town of Leominster 1

Gage Blanchflower
Sales Engineer
Customer Sales and Solutions
National Grid

Subject: Proposal to provide a Portfolio Prioritization Plan Report

Dear Mr. Blanchflower,

Thank you for the opportunity to submit this proposal for a portfolio prioritization plan (PPP) evaluation of twenty (20) municipal buildings located in the Town of Leominster, MA. As part of this study, RISE will evaluate the energy use intensity of multiple town buildings in order to highlight existing energy consumption deficiencies and opportunities for energy efficiency and decarbonization efforts. The following facilities will be included in this PPP study:

Site	Address	Facility Size (Sq. Ft.)
Public Safety Building	37 Carter Street	22,478
Bennett Elem. School	145 Pleasant Street	11,920
Leominster City Hall	25 West Street	29,330
Leominster Courthouse	25 School Street	18,161
Fire Station Headquarters	210 Lancaster Street	11,648
Fire Station 1	19 Church Street	11,648
Fire Station 2	598 Central Street #578	6,312
Fire Station 3	534 Main Street	6,026
Gallagher Bldg.	24 Church Street	57,040
Leominster High School	122 Granite Street	274,739
Highway Public Works Bldg.	109 Graham Street	57,188
Johnny Appleseed Elem. School	845 Main Street #1	78,403
Leominster Public Library	30 West Street	41,173
Leominster Northwest Elem. School	45 Stearns Avenue	78,249
Sky View Middle School	500 Kennedy Way	152,966
Veterans Center	100 West Street	8,650
Leominster Doyle Field	162 Priest Street	6,273
Priest Street Elem. School	115 Priest Street	18,000
Barrett Park (house)	40 Barrett Park Drive	1,448
Barrett Park Office (house)	40 Barrett Park Drive	1,152

Comprehensive Building Assessments

- Deep dive into building to
- Determine energy reduction measures:
 - Insulation and air sealing
 - Ventilation
 - Etc.
- Determine electrification measures
- Evaluate electrical infrastructure needed for electrification
- Identify barriers
- Estimate installation costs, operating costs, and incentives for proposed solutions



Timony Grammar School
City of Methuen
45 Pleasant View St.
Methuen, MA 01844

CBA Report # 0001
12/4/2025 – Revision Date

Prepared by
Cadmus Group
33 Irving Pl.
New York, NY 10003



WE ARE MASS SAVE:
EVERSOURCE Liberty nationalgrid Utilil

Electrification-Three System Problem



Generation



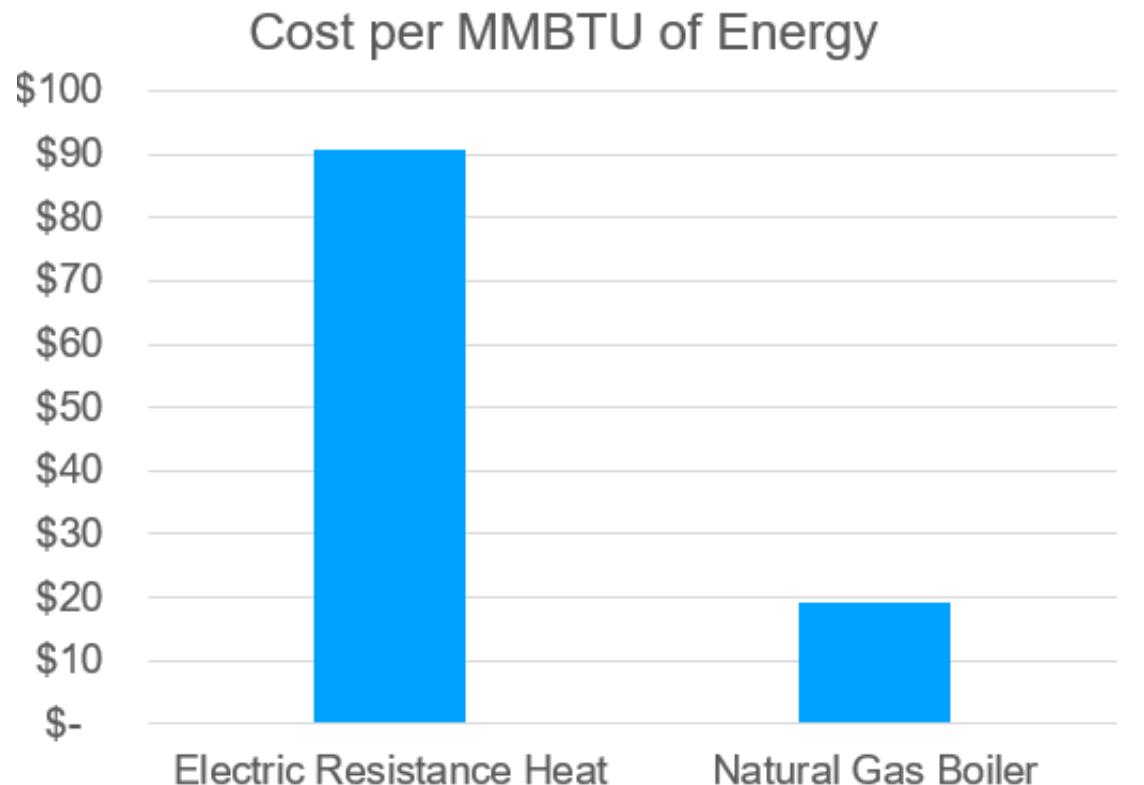
Distribution

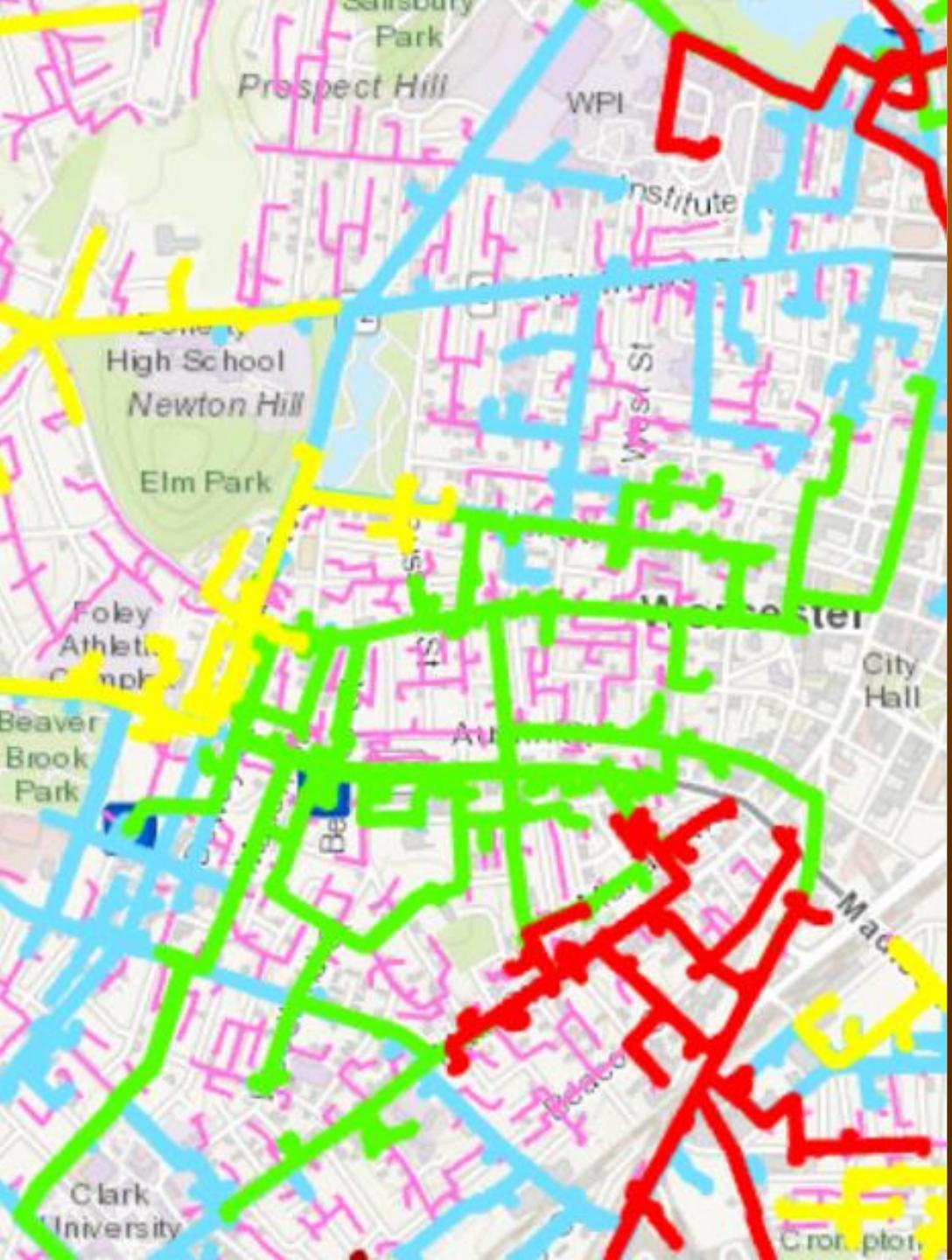


Building End Use

Pre-Electrification

Why not just take the existing building and convert to electric resistance?





Grid Capacity

- Current capacity
- The grid powering your building may not have the power necessary to power your electrified equipment.

Building Capacity

- Current infrastructure
- Building internal electrical system may need to be upgraded to install electrical equipment



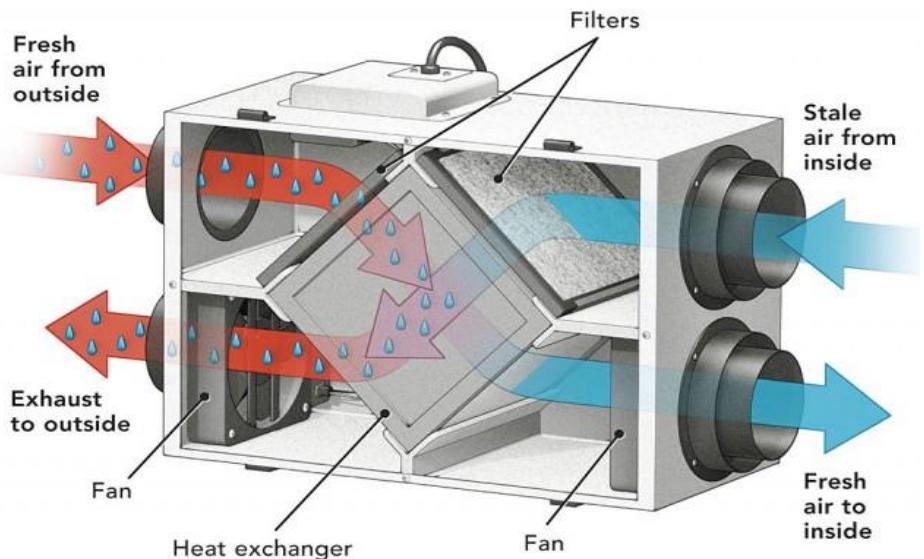


Pre-Electrification: Weatherization

- Insulation and Air Sealing
 - Reduces energy use
 - Reduces equipment size

Pre-Electrification: Ventilation

- Energy Recovery
- Custom Offering
 - \$/MMBTU, \$/Therm
- Prescriptive Offering 2025
 - \$/CFM



Pre-Electrification: Distribution

Steam Distribution

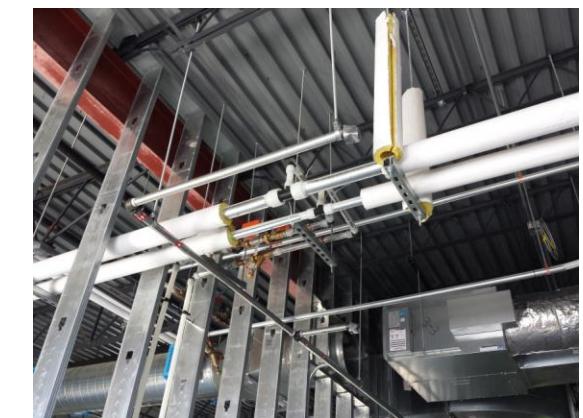
- Cannot be reuse

Hydronics

- Switching to low temp



Steam



Hydronics



Pre-Electrification: Electric Load Reduction

- Variable frequency drives (VFDs)
- Transformers
- Compressed air
- Lighting

Implementing these projects
reduces future service upgrades



Back up Generation / Resilience

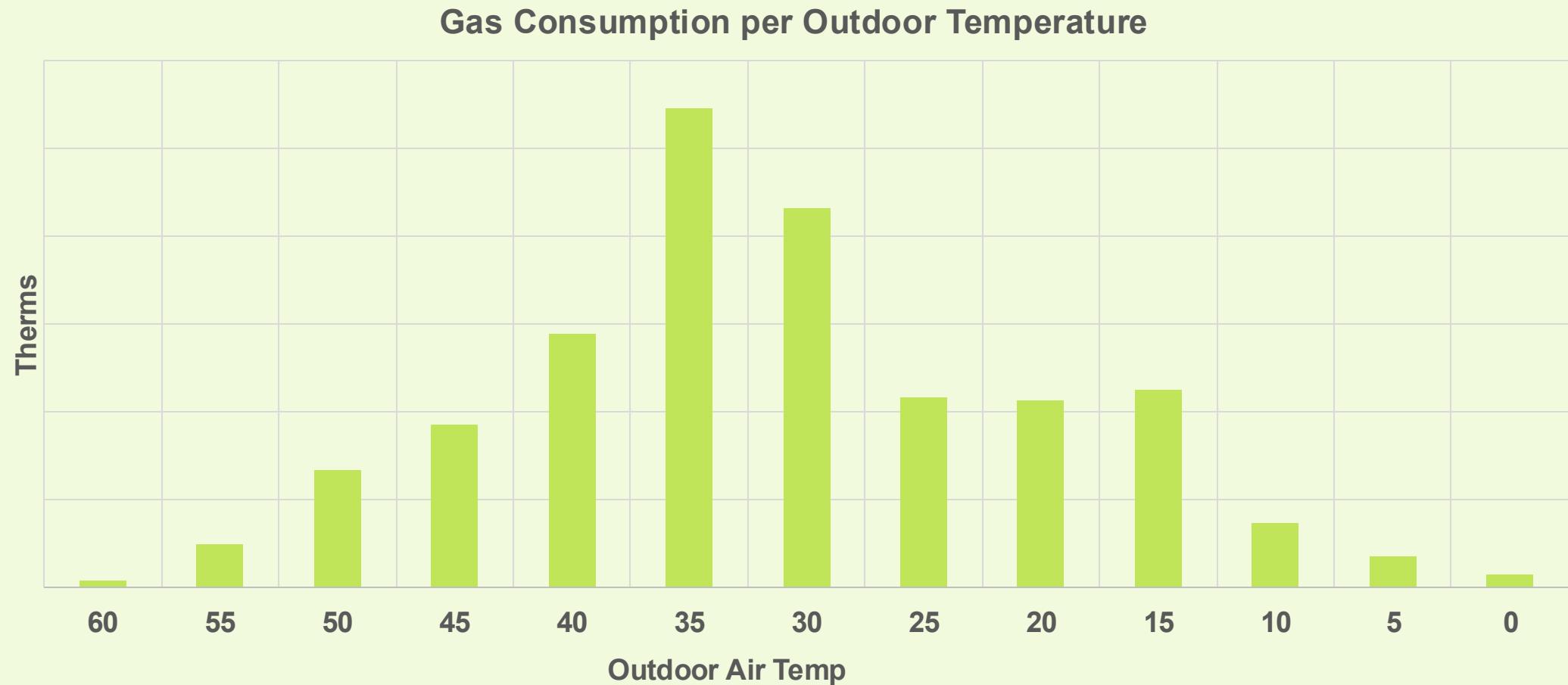
- Generators
- Electric Battery
- Thermal Battery



Electric
Battery



Partial Vs Full Electrification





Learning Check!

**A Mass Save Comprehensive Building Assessment
can identify a building's barriers to electrification.**

- A. True
- B. False



Existing Heating Systems

- Boilers with hydronic
- Forced hot air
- Steam
- RTU
- VAV

Steam

Biggest challenge – distribution system



Hot Water Boilers



Non-condensing



Condensing

Furnace



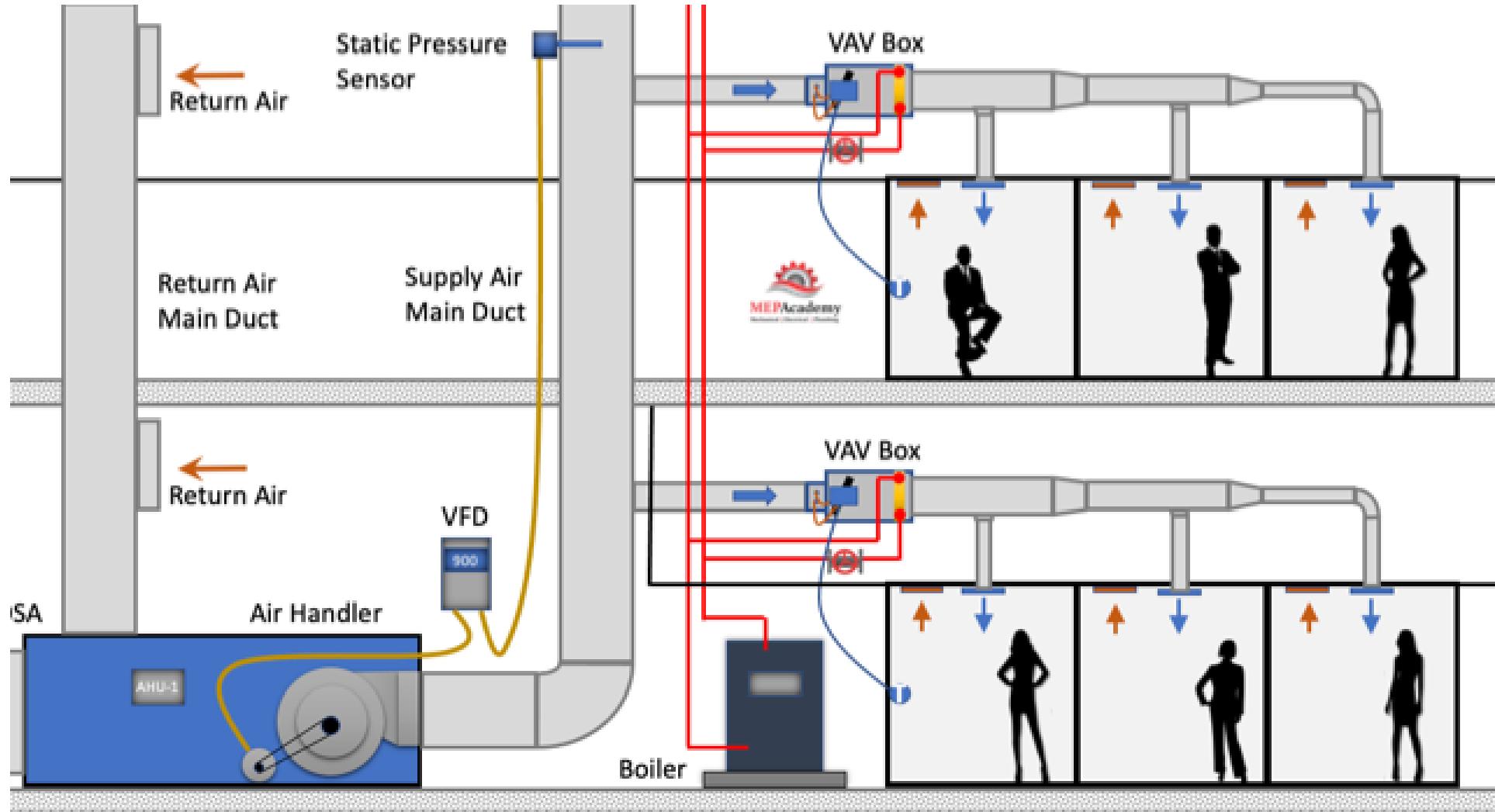
Inside building
Has exhaust flue

RTU

Located on roof
Can have A/C and heat, but
might only have one



Variable Air Volume (VAV)





Electrification Technologies for Every Aspect of Your Building – How Mass Save Can Help

Part Two: Electrify Everything

Electrifying HVAC: Air Source Heat Pumps

Prescriptive

- \$2,000/ton - Retrofit
- \$800/ton - New Construction

Advantages

- Heating down to -15F

Indoor Units

- Wall mount
- Ceiling cassettes
- Floor mount
- Ducted units



Electrifying HVAC: Heat Pump Roof Top Unit (RTU)

Prescriptive

- \$2,000/Ton - Retrofit
- \$800/Ton - New Construction

Advantages

- Hybrid Models Available
- One for one replacement of existing RTU

Disadvantage: need supplemental heating at lower temps due to outside air



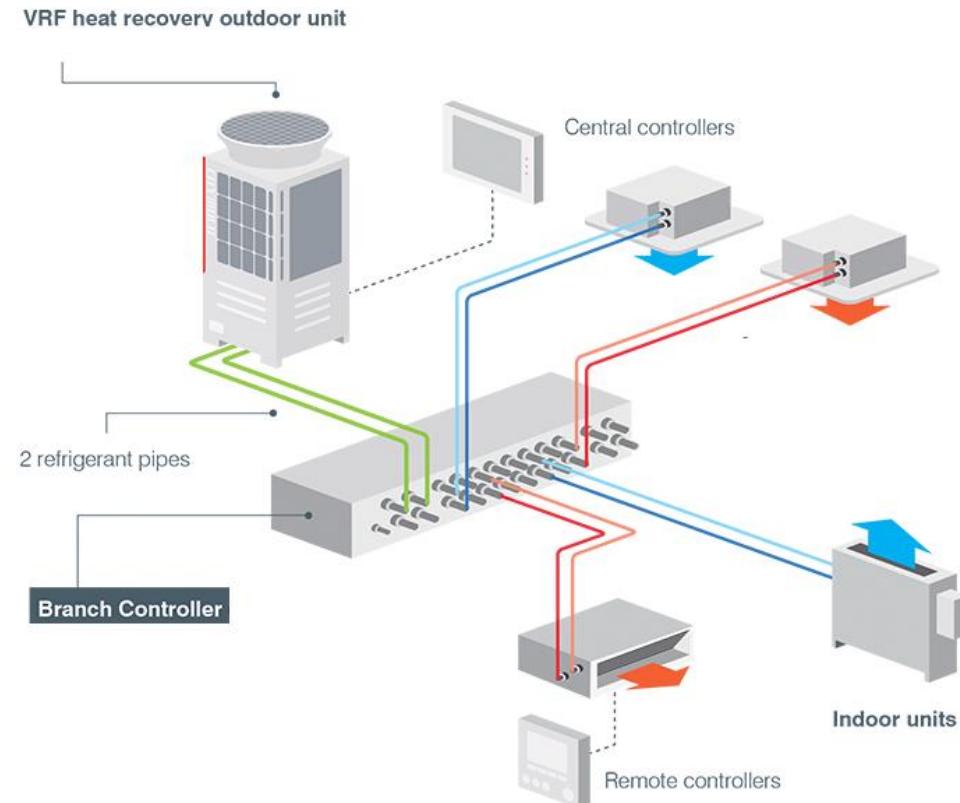
Electrifying HVAC: Variable Refrigerant Flow (VRF)

Prescriptive

- \$2,800/ton - Retrofit
- \$1,200/ton - New Construction

Advantages

- Heat recovery can simultaneously heat and cool



Electrifying HVAC: LEV Kits

May be Custom or Prescriptive

If prescriptive:

- \$2,800/ton - Retrofit
- \$1,200/ton - New Construction

Advantages

- Can connect existing air handlers and RTUs to a VRF outdoor unit

Contact your energy efficiency representative for assistance



Electrifying HVAC: Heat Pump Chiller/Air to Water

Custom Incentives

- \$/MMBTU

Advantages

- Can use existing distribution

Disadvantages

- High temp water is less efficient at lower temps



Electrifying HVAC: Ground Source Heat Pump

Prescriptive Incentive

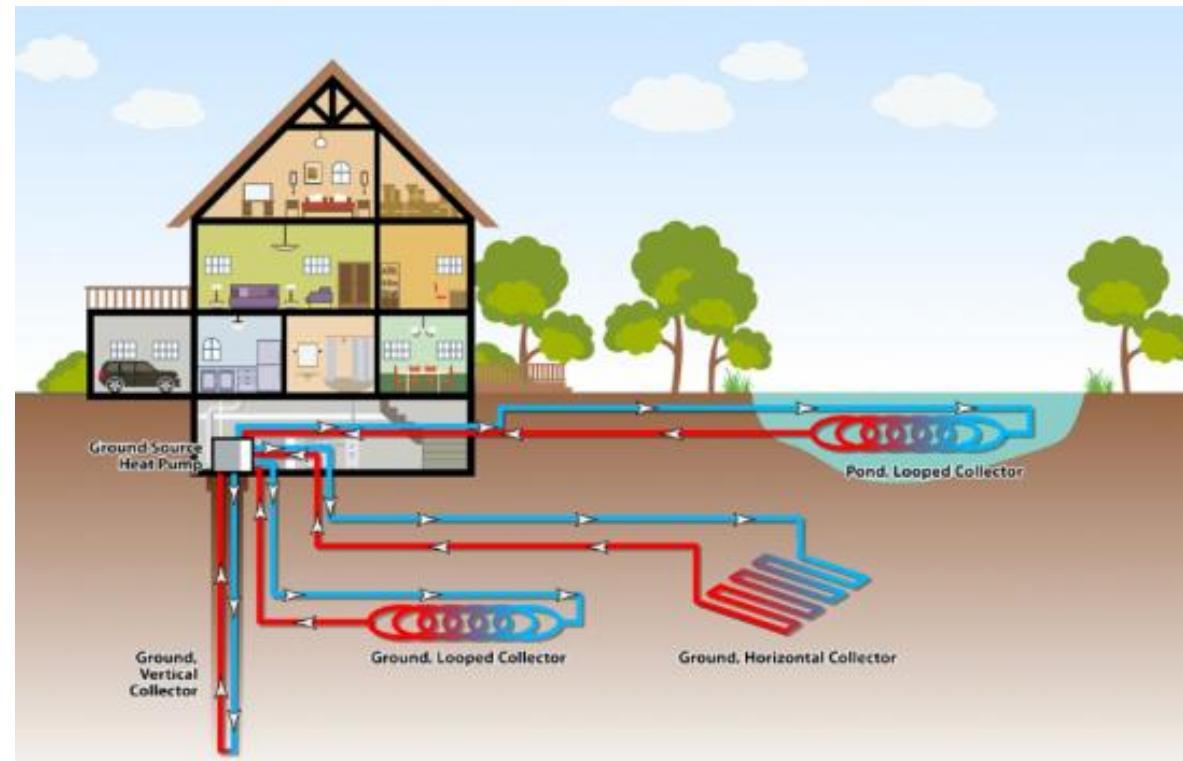
- \$3,600/ton - Retrofit and New Construction

Advantages

- Most efficient electrification solution

Disadvantages

- Install cost very high (expensive \$/GHG reduction)





Learning Check!

Which type of heat pump is best to replace a chiller?

- A. Air source (air to air) heat pump
- B. Variable Refrigerant Flow (VRF)
- C. Air to water heat pump (heat pump chiller)
- D. Ground source heat pump





Electrification Technologies for Every Aspect of Your Building

Part Three: Case Studies

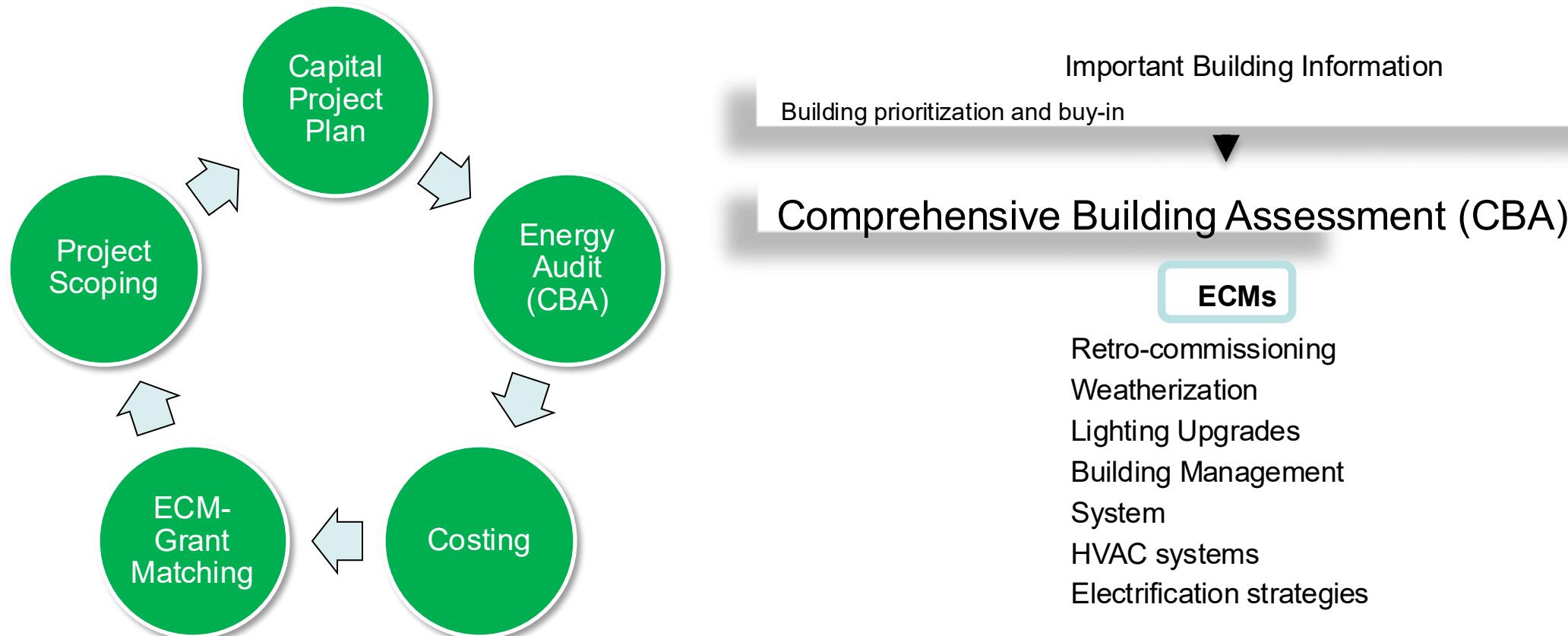
City of Lynn – CBAs

Dele Akinwolemiwa
Energy Manager, City of Lynn
bakinwolemiwa@lynnma.gov

Town of Medfield – RTUs

Susan McPhee
Spark Energy Conservation
sgmcphée@me.com

Adoption of CBAs in the City of Lynn (selected examples)



Adoption of CBAs in the City of Lynn (selected examples)

CBA-1: Lynn Voc Tech High School

Recommended ECMs were stacked and matched to 3 different grants ➔

GSW: \$4.83M
MSBA: >\$2.0M
TESI

Recommended ECMs enhanced the drive towards electrification ➔

Some Notes
Internal assessment of the types of ERVs even with “rigorous costing” must be cognizant of relevant codes e.g.: ASHRAE 62.1-2022



Adoption of CBAs in the City of Lynn (selected examples)

CBA-2: Fallon ES

Cost of main ECMs could be covered internally/rebates

Recommended ECMs targets the electrification of HVAC

Building envelope requires major upgrades; CBA does not recommend this due to cost/abatement challenges.

Sometimes the Best Investment is No Investment!



Adoption of CBAs in the City of Lynn (selected examples)

Things to consider

- ❖ Age of building, and the building's EUI relative to CBECS (Commercial Buildings Energy Consumption Survey) data: MEI Buildings to Target is an important resource in this regard.
- ❖ A record of previous ECM projects implemented on the building and corresponding savings: EUI reduction, energy savings, etc.
- ❖ GHG emissions target should be adequately calculated, some decarbonization grants may require $\geq 60\%$ GHG reduction for project.
- ❖ MEM continually discusses with project/facilities managers, custodians, etc.
- ❖ Adopting a CBA is an iterative process, and its recommendations should also consider relevant codes during scoping.
- ❖ Phased project implementation approach (ECM prioritization).

Medfield Library
Heat Pump Roof Top Units

Medfield Library Heat Pump Roof Top Units

Total Cost	\$234,850
Green Communities Competitive Grant	\$145,700
Utility Incentive	\$ 56,250
Town Contribution	\$ 32,900

Setting up the install



Incoming!



Two of our new RTUs

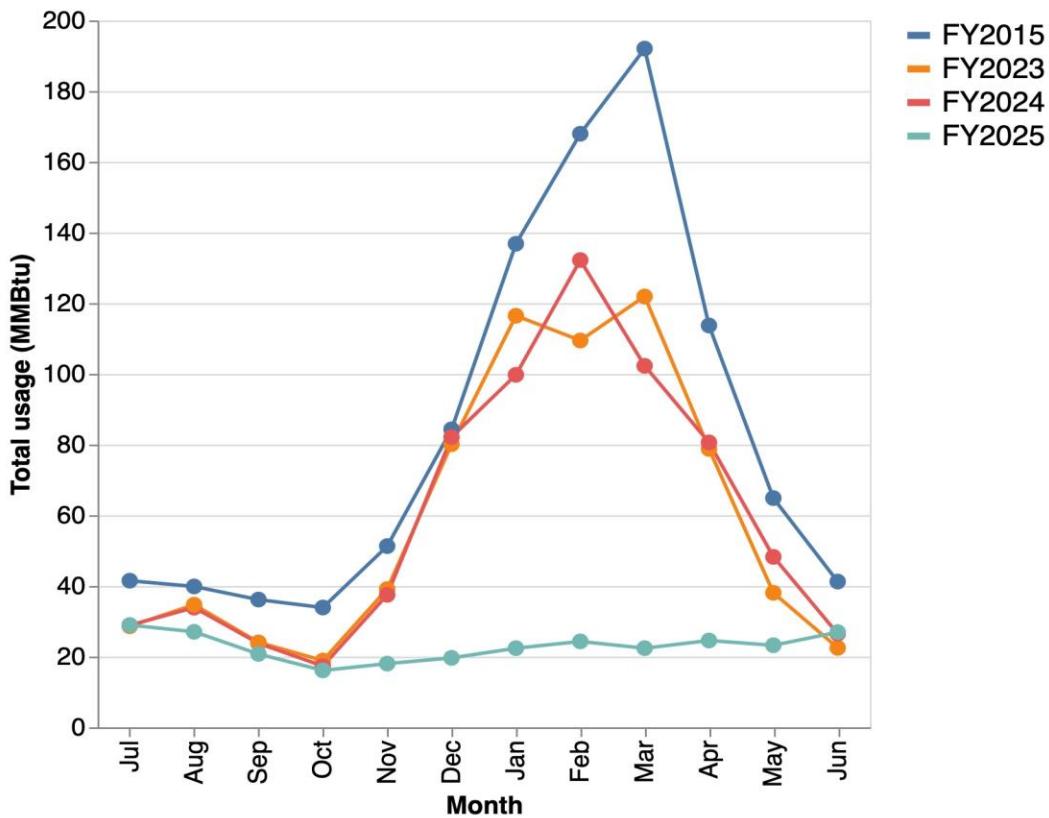


...Two more new RTUs, note how close together they are!

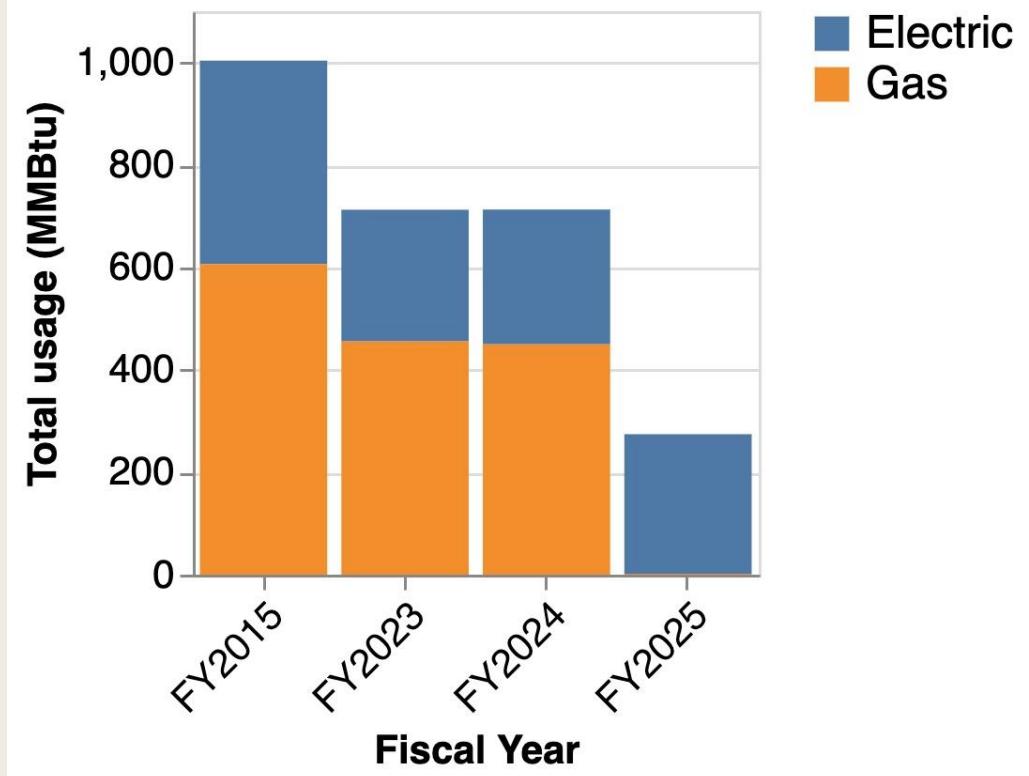


RESULTS

Seasonal usage trends



Facility energy usage over time (MMBtu)



Next Steps

- **Optional**, in-person site visits to heat pump training/manufacturing centers
 - Mitsubishi-Jan 30
 - Daikin-Mar 30
- Please take 3-5 mins to please complete the anonymous evaluation form (link in chat)

Upcoming Events:

- 12/17: Peer Learning Network Meeting
- 1/6: **Optional** Annual Reporting Training
- 1/TBD: Contracting & Procurement Training
- 1/30: **Optional** Mitsubishi Heat Pump Center Site



HVAC Decarbonization Technologies 2025 and Beyond

Technical Roundtable

About this Course

Building decarbonization is a key strategy for reducing environmental impact across the built environment, and HVAC systems can be a major contributor to both direct and indirect emissions. Recent advancements in technology have made it possible to decarbonize nearly every component of HVAC systems —from heating and cooling to hot water generation.

This course is designed specifically for architects who are seeking a deeper understanding of how HVAC technologies intersect with building decarbonization goals. While mechanical consultants typically specify HVAC systems, architects play a critical role in setting performance expectations, coordinating systems with building layouts, and making design decisions that influence long-term outcomes. By gaining familiarity with key HVAC technologies and their applications, architects will be better equipped to lead integrated design efforts that balance carbon reduction with comfort, space planning, and overall building performance.

Course Modules

1. Overview of HVAC's role in decarbonization
2. Packaged heat pump systems
3. Hydronic-based heat pump systems
4. Refrigerant-based (VRV/VRF) heat pump systems
5. Ventilation and Indoor Air Quality Solutions
6. Domestic hot water heating systems

1 Corporation Way,
Suite 110,
Peabody, MA

 Breakfast provided for all attendees

 AIA Approved (3LU|HSW)

**REGISTER
NOW!**

Organized by:
nationalgrid

Hosted & Presented by:
 

How to Utilize Mitsubishi Electric Heat Pumps for Building Decarbonization

Date: January 30, 2026

Time: 9:00 a.m. - 2:00 p.m.

Location: Boston Training Center
150 Cordaville Rd Suite 110
Southborough, MA 01772

Cost: FREE!

Lunch will be provided



Mitsubishi Electric Trane HVAC US is a global front runner in heat pump technology, dedicated to producing high-quality, reliable, and efficient heat pumps designed for cold climates. Our company prides itself on innovation, offering a range of heat pump solutions (air-air, water-air, and air-water) suitable for various building applications.

Join us to explore new technologies and understand the design, installation, and servicing of heat pump systems in both new and existing building infrastructures.

This event is open to anyone interested in learning about heat pump technology and its applications in existing buildings or new construction to meet your electrification, decarbonization, and sustainability goals.

Thank you!



Notes from Q&A

- Q: Was there a specific portion of the Medfield Library project that Green Communities didn't cover?
 - Susan: Figuring out grants is almost an algebra problem. Green Communities did not cover all costs.
 - Lori: Convincing municipalities to put skin in the game to make projects happen.
 - Susan: When choosing a project, people are hung up on simple payback for town/GC's point of view with a focus on energy savings. There are other lots of non-financial factors such as avoided costs and practicality. In Medfield, the town had to make so many trips to the library to fix rooftop units. Ask facilities' pain points. Facilities staff have the wherewithal to go to town purchasing dept/accountant/treasurer and make a strong case. You also want to show municipalities cost savings. Facilities staff can do that too – please dig deep, give me 40K, if this equipment fails and we have to replace at the last minute will be 200K emergency. Let's team up.
- Q: What are the tradeoffs between rooftop equipment and solar?
 - Looking at canopies at school, they have ground mounted solar, etc. Got a lot of schools where can't do solar, a municipality-wide issue. Part of the whole PPP – DIY a PPP for solar. Put solar on skating rinks, that's a good one.
- Q: There is incentive materials from GC for replacing, but one of the biggest challenges is adding cooling to buildings that have never had it before. In situations where that's not feasible, what good cooling solutions that are separate from heat conversions?
 - We can always add heat pump system that can do some of the heating (30 degree switch over, that's always an opportunity). Put in VRF system that does entire cooling and above 30 degree for heating. Put in AC, building needs cooling, can decarbonize some. Will be less of a bills impact. Above 30 degrees, efficiency of heat pump is higher.

- Q: The CBAs/planning strategies are great opportunities to have but fret about timing. It is important to have technical materials in place before going to town meeting/applying to green communities, etc.– what's timeline for TA/how much at the drop of a hat are you able to accommodate vs getting full assessment done.
 - Program is still being built out so still onboarding a lot of the vendors. We're about 2 months out from more ad-hoc assistance. Takes 1-2 months to complete CBA. PPP takes about 2-3 months (get list of equipment that is close to end of life). Not for emergencies.
 - Susan: Don't let the perfect be the enemy of the good. If facilities is saying that's the building that's keeping me up at night, call the vendor the facilities trusts, see what the recommendations are. Don't wait for CBA/PPP, etc. can start the process on that building, while parallel tracks for CBA.
 - Dele: CBA is part of instruments of basic walkthrough analysis with facilities managers, to assess the energy state of that building. Think about the funding priorities and end use –for example indoor comfort issues at school they want to address. CBA just an instrument. There are other things you can do on the ground.
 - In terms of town meeting: different towns work differently, if you have a town admin that is comfortable saying this building needs help now, if we get this grant, this is what economics looks like, go to town meeting with an asterisk*. May be able to proactively move ahead without waiting 6 months.
- Q: Just curious if the utilities are or could make a map of grid capacity so that municipalities or other parties can quickly see where capacity is more available or less so?
 - There is a map for national grid Kevin/greg your sales rep, can come in to help interpret. This map is summer peak heat map. Just because it's red during the summer, doesn't mean it's red during the winter. And vice versa. We're working on getting the winter peak map.
 - National Grid Hosting Capacity
Map: https://systemdataportal.nationalgrid.com/MA/?_gl=1*1ei7ct*_gcl_au*MTk2MjkzODc4NS4xNzY1NDczMjgx*_ga*MTMzMzA2MDY2Ni4xNzUzMTkzMTE5*_ga_FH50R0D4B4*czE3NjU5MDY5NDYkbzQkZzAkdDE3NjU5MDY5NDYkajYwJGwwJGgw
 - Eversource Capacity Map: <https://navigator.eversource.envelio.com/?lang=en-us#7.79/42.025/-71.67>

- Q: What are some pitfalls to avoid?
 - Develop a menu of projects and grants. May think something is a long shot or – work with same vendors over time, let's scope 2-3 projects, maybe only 1 or 2 can go into a grant. Share that with the leadership in the community. Need to put this much skin in the game.
 - Start developing projects a year in advance, ideally. After developing, get them to Kevin/Greg, even getting incentives confirmed can take awhile.
- The technology side of understanding decarbonization and energy efficiency is still confusing. Will spend more time researching online these technologies. Could have used this training a couple months ago.
 - Kevin: If have questions on specific technologies, reach out to Kevin or Greg.
 - Medfield has a volunteer energy committee of 15 genius engineers. They are right there in the community, are super knowledgeable and want to help.
- Q: The incentives don't always match fire unit and clean energy unit, what other resources are ppl using to bridge that gap? We have fire station built, already lost the battle because millions of \$s in diff and incentives not making it up. What others said/used?
 - NGrid has on-bill financing – can bridge that differential. For fire station, was full electrification, or partial/sectional electrification? Usually easier to electrify the living quarters and leave bay station. Easier to convert to heat pump option. Fossil fuels coming from HVAC /cooking. If use any amount, don't get any incentives. If not getting incentives, they end of using the cheaper option.
 - Working with first responders a challenge throughout the state. Recommendation to have special outreach to fire fighters/safety responders through the utilities.
 - Folks in new construction and retrofit scenarios. Newburyport just launched net zero fire station – there are examples of ways to make it work. New construction where it's worked. Acton and Lexington have net zero and my firefighters don't care. A lot of fire stations built in the 1800s. Can utilities reach out and demystify for the first responders?
 - If they won't work with you on new building, you can leverage the specialized opt in code (if your community has passed it). Also, if you have a climate action plan that has been formally adopted by your community you can use that too. The money is important but you can encourage electrification through policy as well.
- Q: How are RTUs covered as hybrid in GC?
 - New construction that is not able to have new gas connection. Need to confirm gas is only for emergency/back up.
 - Federal tax credits for geothermal? There's a state office that can assist. Connect with Lori to learn more.