Energy Efficiency Solutions for Long Term Care Facilities

Maine Health Care Association

Session Description

This webinar will discuss proven trends in commercial building electrification and key technologies helping to achieve it, including multiple types and applications of heat pump technology and LED lighting. The session will cover the shift to heat pump, and how building ventilation systems can be integrated when going all-electric (with no fossil backup). The session will wrap up with next step strategies and funding pathways.

Session Outline

- Electrification opportunities in long term care facilities
- Key Technologies
  - Heat Pumps
  - Variable Refrigerant Flow Systems
  - Roof-top Ventilation Units
  - Package Terminal Heat Pumps
  - Energy Recovery Ventilators
- Key Considerations for integrating electrification technologies
- Solutions with Efficiency Maine
- Getting Started

Importance of Physical Plant on Quality of Care

Impacts of climate change on human health

Importance of physical plant characteristics on health and comfort of residents and staff

The importance of temperature control and ensuring air quality

"Key elements of the physical nursing home environment include sensory-related elements such as light, sound, odor, and touch; air flow and temperature control; environmental aspects specifically related to personal care provision and staff function; the building's overall design; room layout and configuration; and indoor and outdoor spaces. These aspects of the physical environment are important to consider in constructing, renovating, and evaluating nursing homes and in planning the nursing home of the future."

Source: National Academies of Sciences, Engineering, and Medicine. 2022. The National Imperative to Improve Nursing Home Quality: Honoring Our Commitment to Residents, Families, and Staff. Washington, DC: The National Academies Press. https://doi.org/10.17226/26526.

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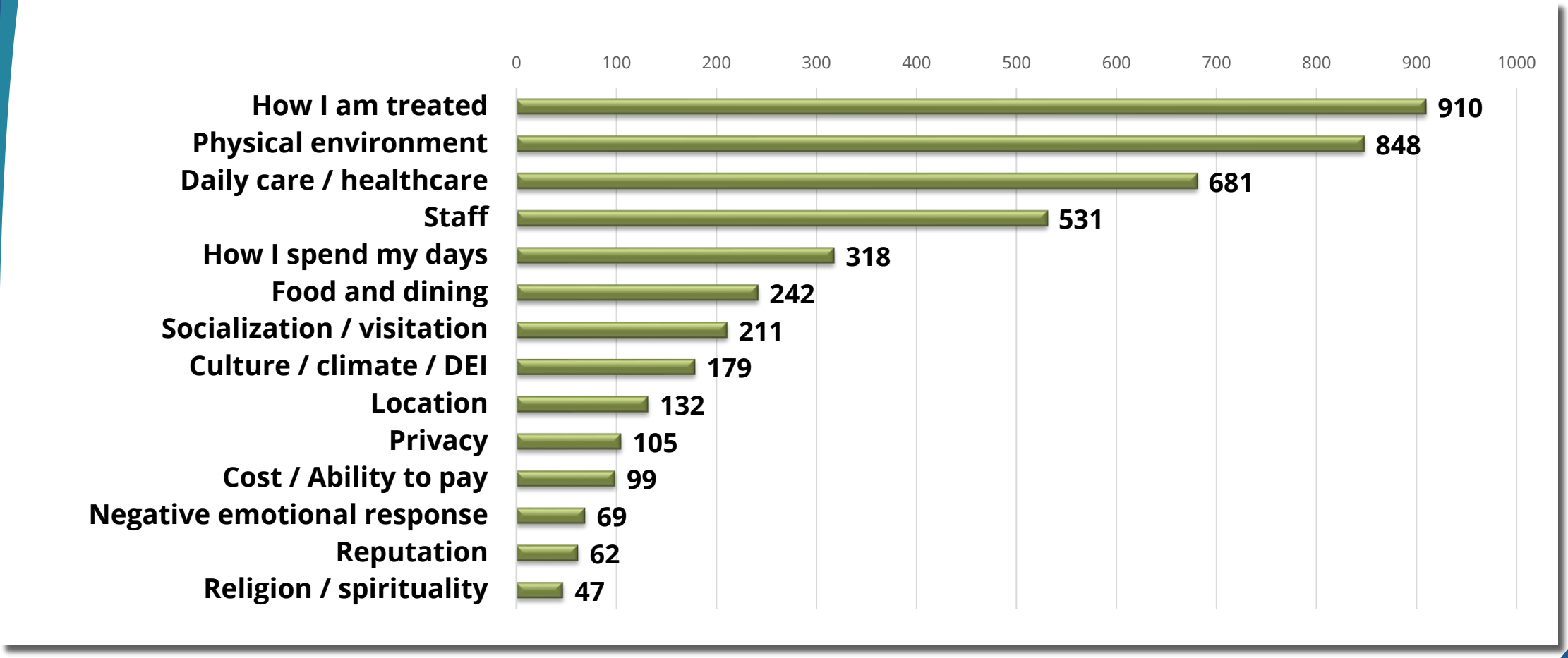
Summary of National Survey Responses: Conducted by UMaine Center on Aging

What is most important in choosing a long-term care community?

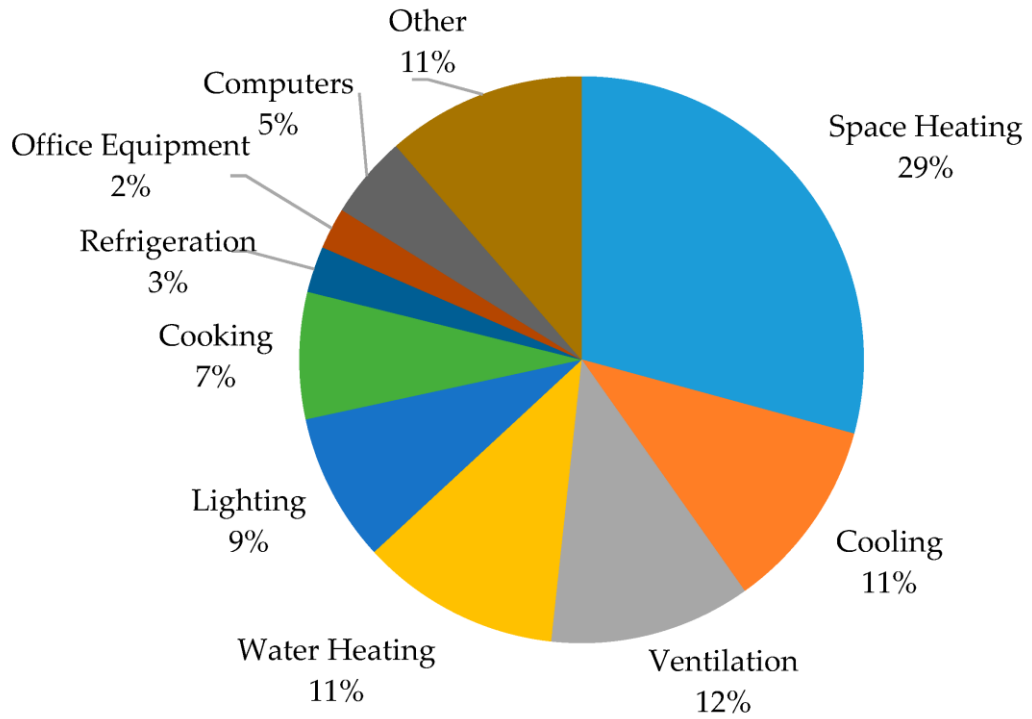
What is most important about the care you receive?



Electrification in Long Term Care Facilities

- Electrification = substitution of electricity for the direct combustion of fossil fuels used to provide the same service

Long Term Care Opportunities



61%

- Heating, Ventilation, and Air Conditioning (HVAC) **52%**
- Interior and Exterior Lighting **9%**
- Refrigeration Equipment **3%**

Source: https://www.mdpi.com/1996-1073/12/19/3775/htm

The Latest in Heating, Cooling, & Ventilation Technology

The HVAC industry is driven by many of today's top priorities…

Reduced GHG Emissions

Decarbonization Efforts

Improved Energy Efficiency

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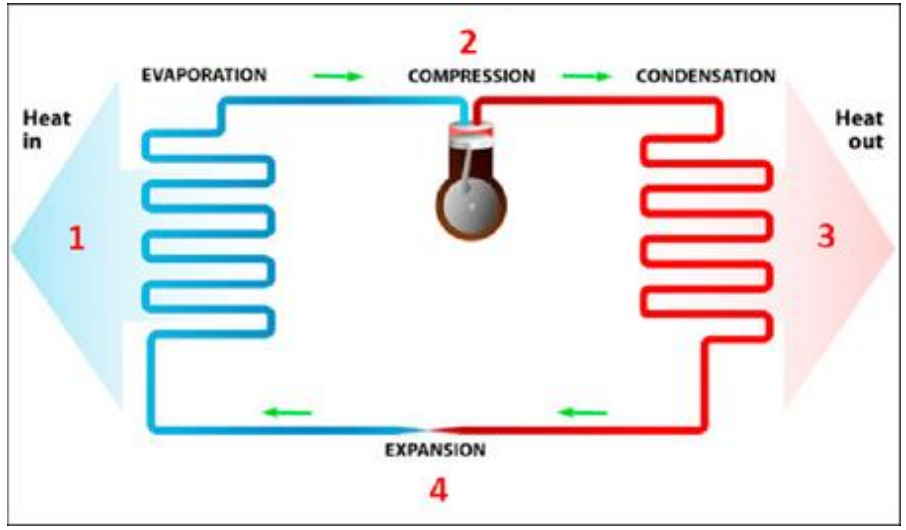
Proven Trends in HVAC Electrification

- HVAC technologies are trending towards electric systems that can heat and cool
- Whole building solutions without supplemental heat are proving effective in Maine
- Some technology, like VRF systems, can maximize simultaneous heating and cooling with room-by-room control
- Heat pump systems are manufactured with different designs to accommodate building type
- Efficiency Maine offers a one-stop-shop for electric HVAC systems

Air source heat pumps

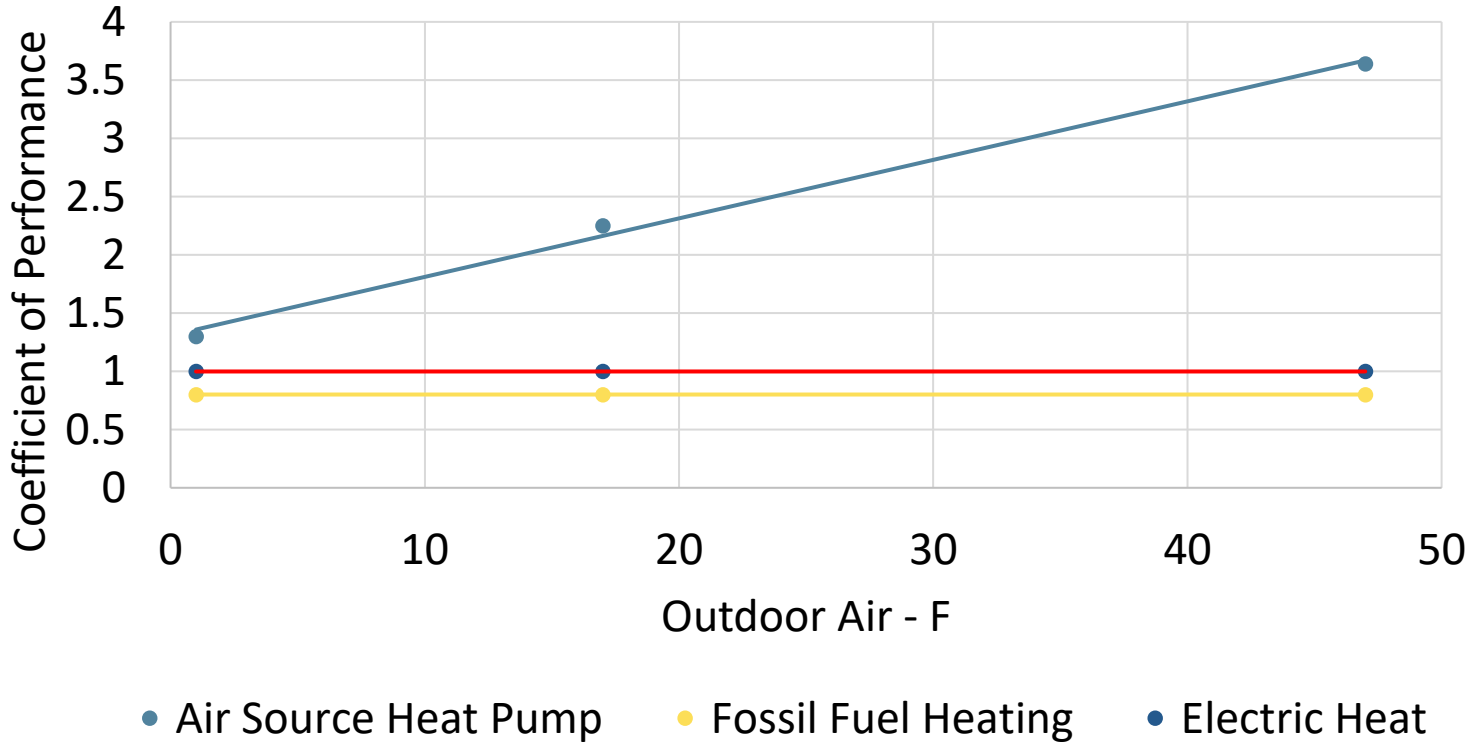
- Reject or absorb heat from the outside air = “air-source”
- Heat is moved through refrigerant to or from the indoor environment
- When heating, the outdoor unit (condenser) is the “cold side” of the system = heat is absorbed, even at low outdoor air temperatures
- When cooling, the outdoor unit is the “hot side” of the system, where heat absorbed from the interior is rejected to the outside air.
- A reversing valve changes the flow of the refrigerant, switching between heating and cooling



Air Source Heat Pump Performance

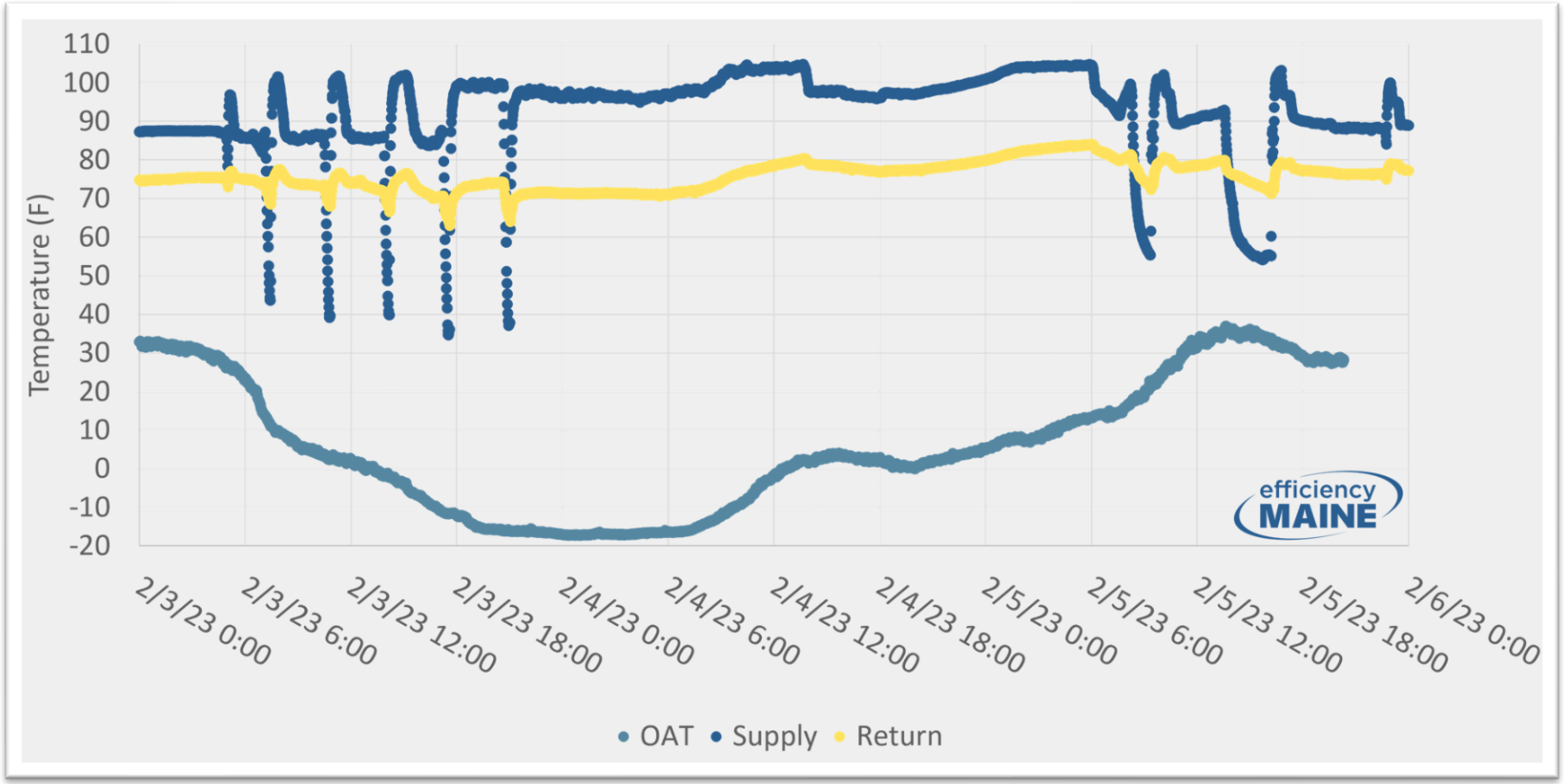
- The capacity and coefficient of performance (COP) of an air-source heat pump is dependent on the outdoor air temperature (OAT).
- As OAT drops, COP decrease, HOWEVER…….
- Regardless, at low ambient temps, heat pump COPs outperform fossil fuel-based systems

	COP at 17 F	Energy In	Energy Out
Fossil Fuel	0.8	1	0.8
Electric Heat	1	1	1
Air-source HPs	2.2	1	2.2



Heat pumps make enough heat in Maine to heat the whole home or building all year long.

(Coldsnap of Feb. 3-4, 2023, Hancock, Maine, at -16° F the heat pumps are still producing 90°-100°° degree heat.)



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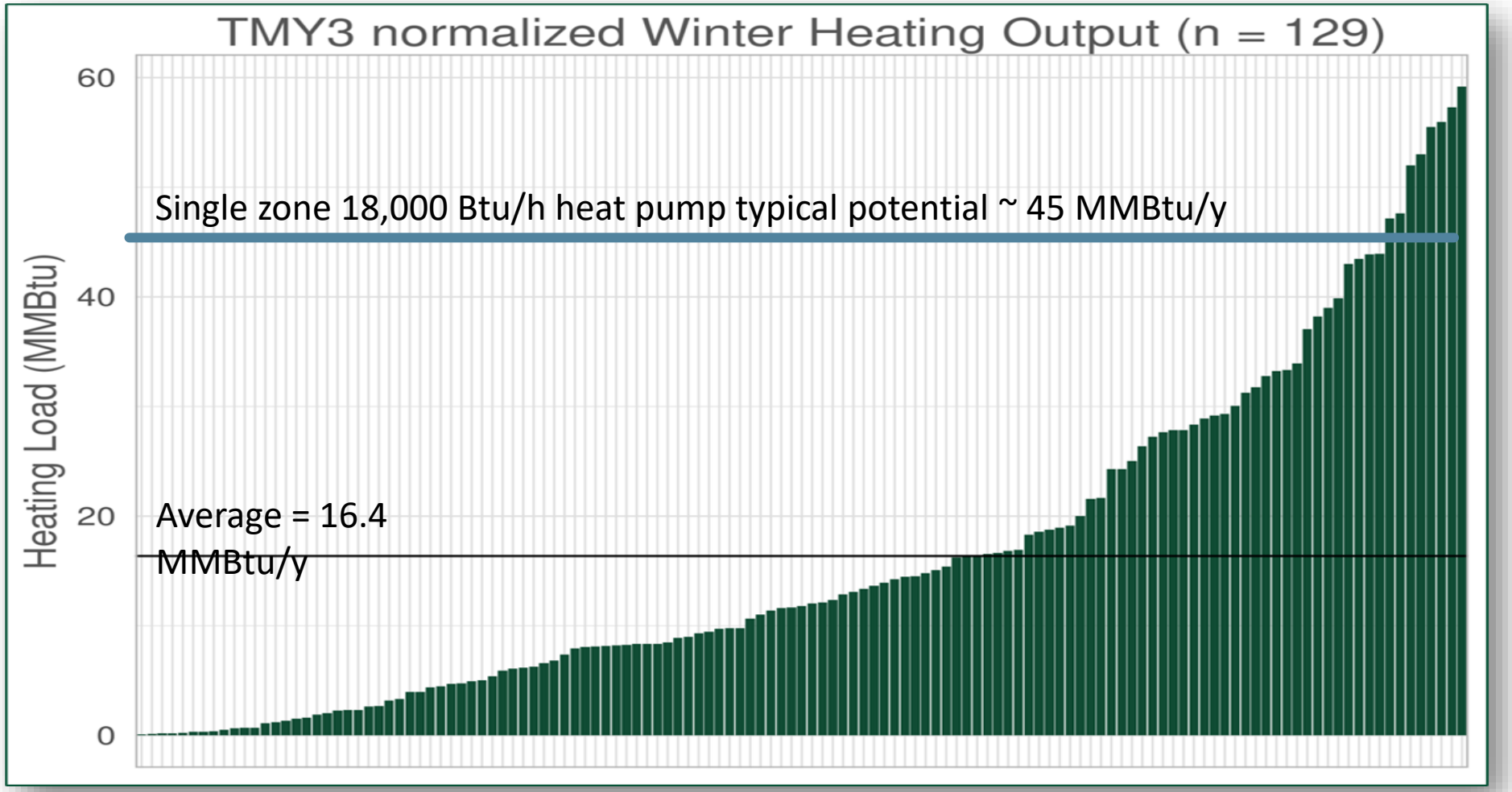
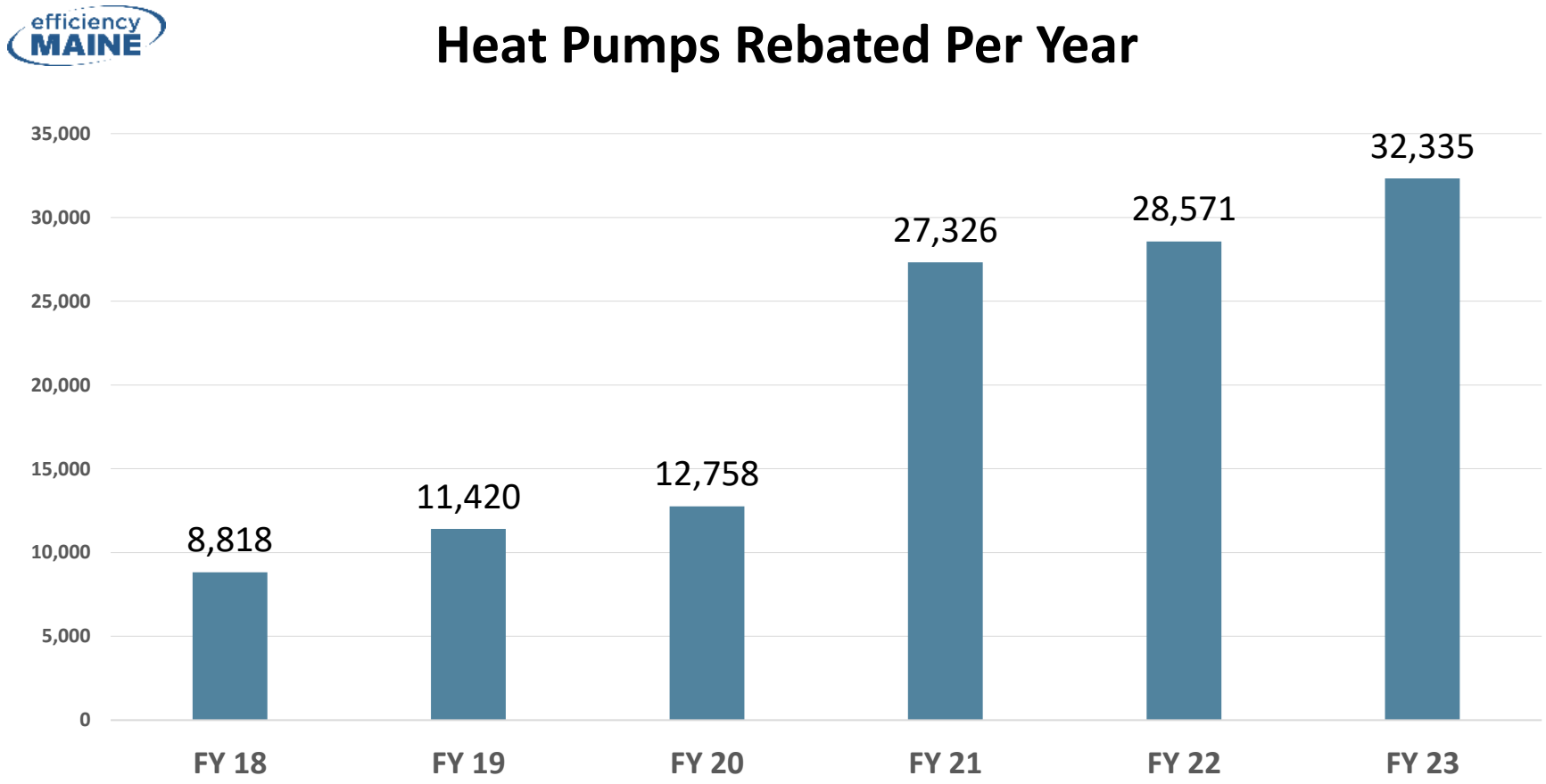
When supplemental HPs are operated concurrently with central, combustion system (systems installed December 2019 through June 30, 2021)



2/3 of supplemental heat pumps in Maine are delivering less than 1/2 of their potential.

Scaling Up Heat Pump Adoption in Maine: Effects of Incentives + Education



Heat Pump Mini-Splits

- Most common type of heat pump in Maine

Caribou Nursing Center

Two Fat Cats Bakery

Norridgewock Fire Department

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Variable Refrigerant Flow (VRF) Systems

- Heat pump technology that efficiently heats and cools large spaces

University of Maine Augusta Dorms

Fryeburg Academy Student Center

Presque Isle Community Building

Packaged Terminal Heat Pumps

- Alternative to lodging Packaged Terminal Air Conditioners. Includes vertical units

Katahdin Inn and Suites

Holiday Inn by the Bay

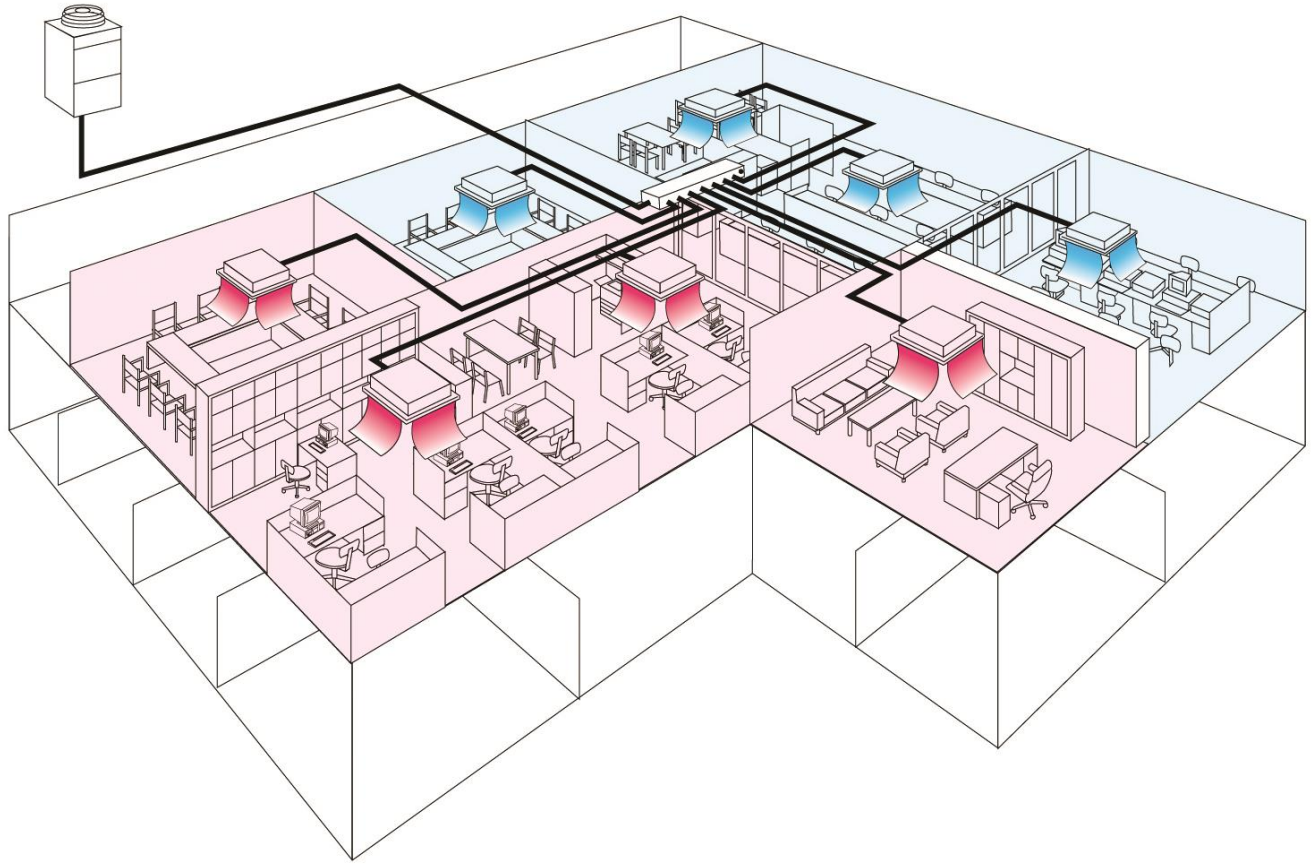
Fireside Inn Bangor

Vertical Unit Example

Variable Refrigerant Flow (VRF) Systems

VRF - Heat Pump with Heat Recovery

Simultaneous Heating and Cooling

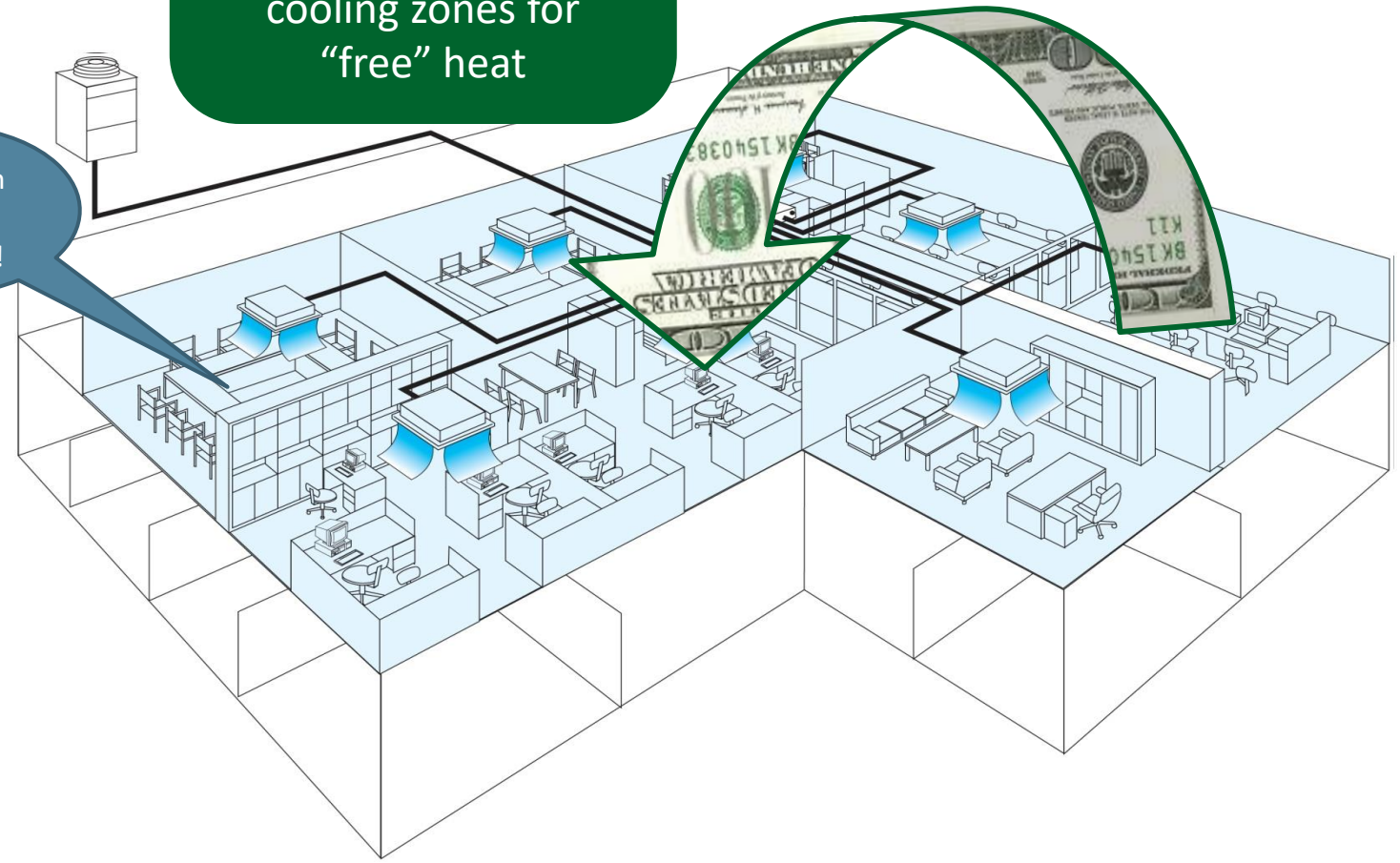


Typical Day

Afternoon

Recover heat from cooling zones for "free" heat

12 Person Staff Meeting!!



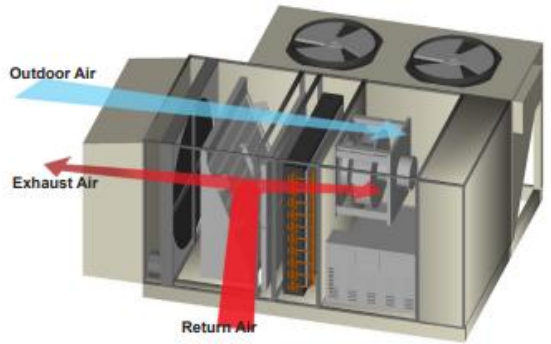
9:00 AM

Early Morning
100% Heating

Rooftop Units (RTUs)

Unitary/packaged rooftop heat pumps

- Very similar to traditional rooftop units (RTUs)
- Typical RTUs provide cooling through a refrigerant cycle, and heating through a furnace, electric resistance, or a hot water coil
- Heat pump RTUs providing heating through a heat pump, reducing or eliminating the need for fossil fuel-based heat
- Options for 100% outside air, economizers, hot gas reheat coils and energy recovery.
- An all-in-one packaged system for heating, cooling and ventilation



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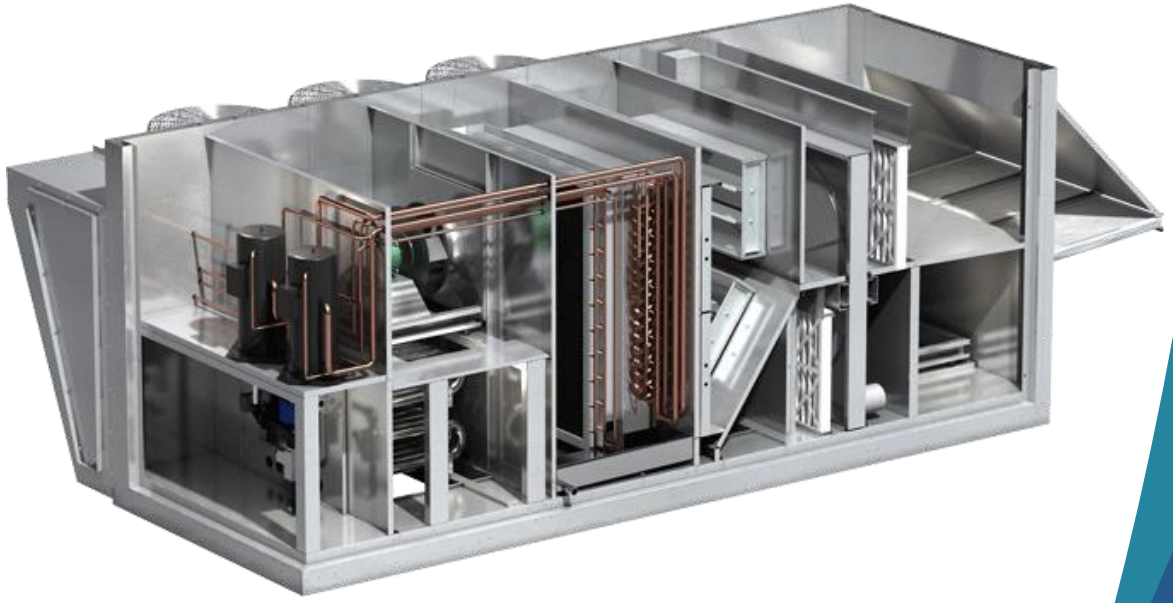
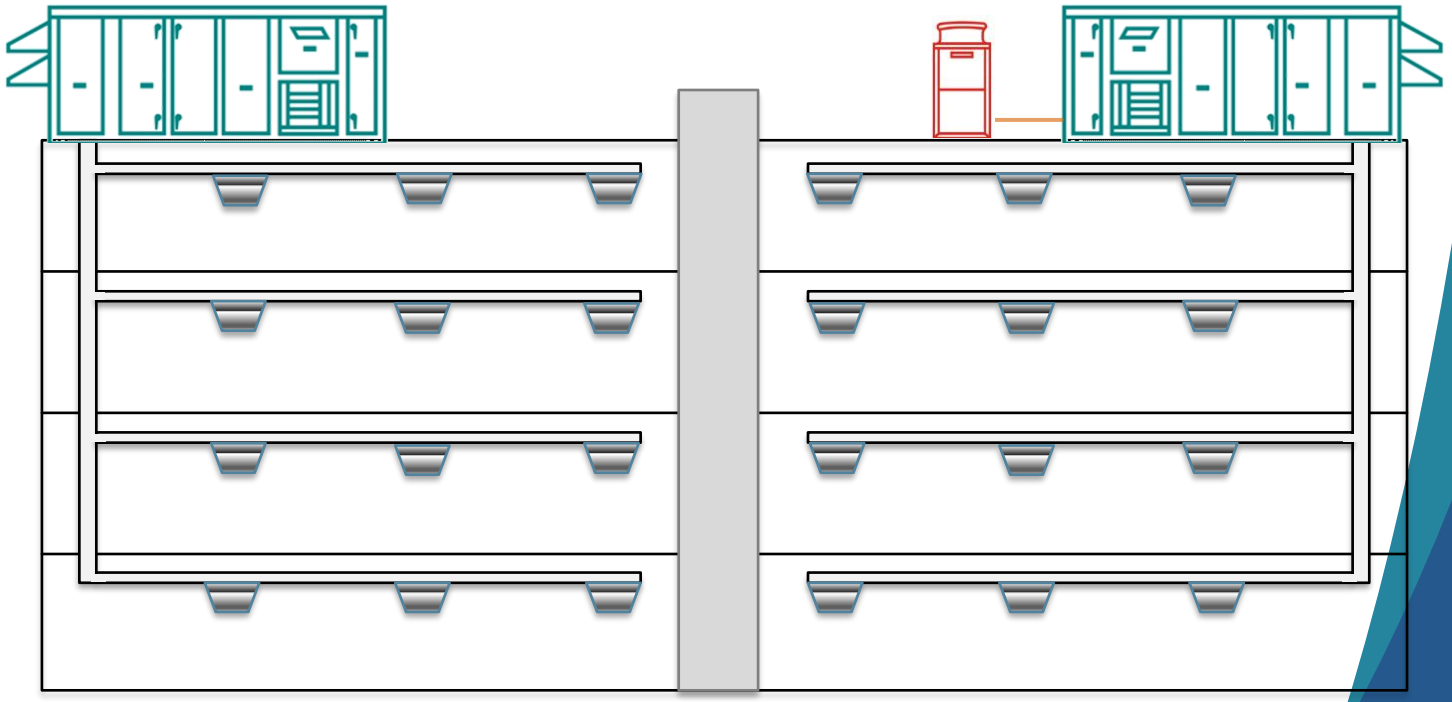
Dedicated Outside Air System (DOAS)

- Many sizes available
- Recirculation damper option
- Inclusion of energy recovery wheel or heat recovery core options
- Option to pair with VRF outdoor unit
- Controls can be integrated with VRF system



Ventilation Equipment: Rooftop DOAS is most common

- Advantages:
  - Familiar design / installation
  - Single point for maintenance
- Challenges
  - Considerable time & cost relating to fire-rated shaft(s)
  - Duct losses increase operation costs for life of system



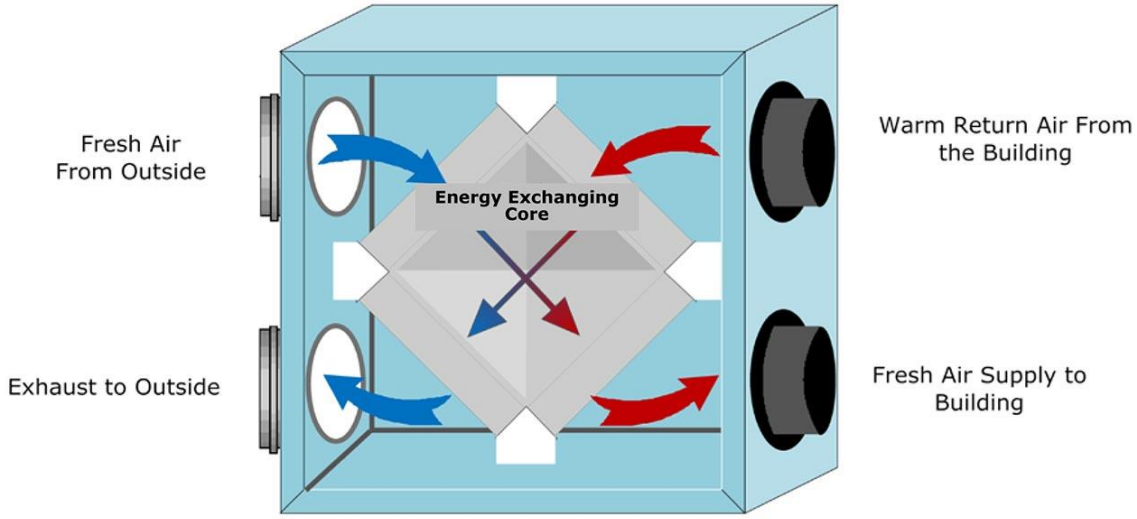
Rooftop Units (RTUs)

- Retrofit and new construction projects are eligible
- Units may be installed with dual fuel or supplemental heating systems
- See table for configurations of new Heat Pump RTU configurations with baseline equipment that are eligible for incentives
- Retrofits are limited to existing facilities with operating systems with remaining useful life, boilers less than 24 years old.
- Existing RTU with natural gas heat exchangers are not eligible for incentives.

Heating, Ventilation, and Air Conditioning Solutions

Energy Recovery Ventilators (ERVs)

- **Rotary Heat Exchanger**
  - Plastic or metal wheel that transfers heat.
  - Most popular type.
- **Plate Heat Exchanger**
  - Fixed core used as an energy exchange.
  - No moving parts.
- **Heat Pipe Heat Exchanger**
  - Tubes with refrigerant used to transfer heat.
- **Runaround Coil Heat Exchanger**
  - Water and glycol used as heat exchange.



Next Steps to Electrification

Funding Opportunity Notices (FONs)

FONs offer limited time enhanced, or increased, incentives on current program offerings to a specific sector of Commercial and Industrial Customer.

Customers that are not eligible for an FON may still qualify for the typical “prescriptive” incentives through CIPI.

Long-Term Care Retrofits – FON-011-2023

What's the Goal?

To accelerate electric HVAC and LED lighting upgrades in the long-term care facilities by offering project support and enhanced incentives for energy saving project.

CIPI FON-011-2023 – Long-Term Care Retrofits

FON Eligibility
Licensed Senior Long-Term Care Facilities

Eligible building types include:

- Senior assisted-living program facilities
- Continuing care communities
- Nursing homes
- Memory care facilities
- Hospice facilities

Ineligible buildings types include*:

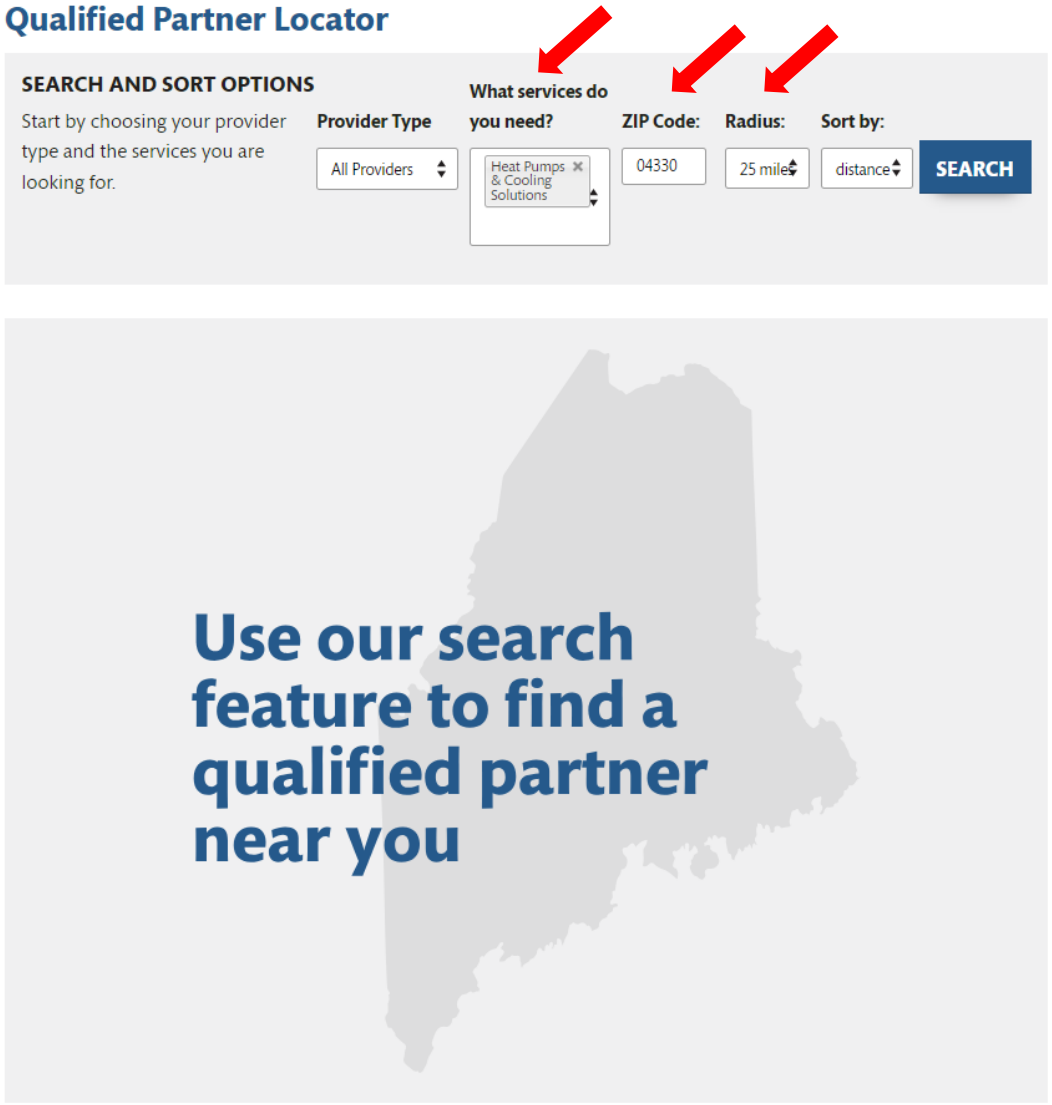
- Hospitals
- Independent living facilities
- 55 and older living facilities
- Adult day services facilities

*These facilities may be eligible for other Efficiency Maine incentives.

Schedule

Long-Term Care Retrofits FON Schedule	
FON Issue Date	January 1, 2024
FON Application Period	July 1, 2024
Project Completion Deadline	March 30, 2025

Efficiency Maine Qualified Partners



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Efficiency Maine Qualified Partners

Qualified Partner Locator

SEARCH AND SORT OPTIONS

Start by choosing your provider type and the services you are looking for.

Provider Type	What services do you need?	ZIP Code:	Radius:	Sort by:	
All Providers	Heat Pumps & Cooling Solutions	04330	25 miles	distance	SEARCH

Your Results:

	Vendor	Services Provided	Miles	More
1	American Home Systems Augusta, ME - 207-446-3368		0	
2	Augusta Fuel Company Augusta, ME - 207-623-3851 augustafuel.com		0	
3	Augusta Natural Gas, LLC Augusta, ME - 207-724-8034 augustanaturalgas.com		0	
4	BSR Systems, Inc. Augusta, ME - 207-242-9997		0	

PRINT THESE RESULTS

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Eligible Efficiency Solutions

- HVAC Solutions
  - Heat Pumps Mini-Splits
  - Variable Refrigerant Flow (VRF) Systems
  - Energy Recovery Ventilators (ERVs)
  - Roof Top Units (RTUs)
- Interior and Exterior Lighting

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First Steps in an FON Project

One of your first steps will be to ask your Qualified Partner for an assessment on your existing HVAC or lighting system

- The assessment is used to gather information so that the contractor can suggest a replacement system and produce an installation price quote.

Financial Incentives

Whole Building Single- or Multi-Zone Heat Pumps		
Zones(s)	**CIPI Incentive**	**FON Incentive**
1	$1,200/unit	$1,800/unit
2	$1,600/unit	$2,200/unit
3	$2,000/unit	$2,600/unit
Incentives are capped at 90% of total material costs		

Energy Recover Ventilator		
Sensible Heat Recovery	**CIPI Incentive**	**FON Incentive**
≥ 55% to < 65%	$1.50/CFM	$2.25/CFM
≥ 65% to < 75%	$1.75/CFM	$2.50/CFM
≥ 75% to < 85%	$2.00/CFM	$2.75/CFM
≥ 85%	$2.25/CFM	$3.00/CFM
Incentives are capped at 90% of total material costs		

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Financial Incentives

Variable Refrigerant Flow (VRF) Systems		
Type	**CIPI Incentive**	**FON Incentive**
Single-Phase VRF	**$10.00/sq.ft.**	**$12.00/sq.ft.**
VRF without Heat Recovery	**$13.00/sq.ft.**	**$15.00/sq.ft.**
VRF with Heat Recovery	**$15.00/sq.ft.**	**$18.00/sq.ft.**
Incentives are capped at 90% of invoiced project costs		

- Single-phase VRFs require a lower energy supply (three-phase)
- Heat recovery helps systems work more efficiently

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Financial Incentives

Heat Pump Rooftop Units (RTUs)	
Heating Capacity (MBH)	**FON Incentive**
24	$4,800/unit
36	$7,200/unit
48	$9,600/unit
60	$12,000/unit
90	$18,000/unit
120	$24,000/unit
132	$24,000/unit
Incentives are capped at 90% of total material costs	

Submitting Your Application

HVAC and Lighting Projects:

1) Attachment A: FON Project Application and Commitment Form
2) Attachment B: Lighting CLIC Tool
3) Qualified Partner Material Price Quote to Customer

Additional documents may be requested from the customer or Qualified Partner, like AHRI efficiency certificates, selection report, building layout/design, or more.

Send electronically to: CIP@efficiencymaine.com

with the subject line **CIP FON-011-2023**

All projects must follow the project timeline outlined with the FON schedule.

Approved Scope of Work (SOW)

Efficiency Maine will conduct a review on applications submitted.

- Projects are subject to a pre-inspection

After application review, a pre-approval offer will be emailed.

- Like the Proposed Scope of Work; however, it will say **“Approved”.**

This document will be sent to the customer and needs to be signed by both the customer and the QP.

Approved Scope of Work (SOW)

COMMERCIAL & INDUSTRIAL PRESCRIPTIVE LIGHTING SOLUTIONS

LONG-TERM CARE RETROFIT APPLICATION

SCOPE OF WORK (APPROVED) TERMS AND CONDITIONS

Cost-effective Lighting Investment Calculator (CLIC) CIPI FON-011-2023

Customer Name: **Long-Term Care Facility**
Qualified Partner #1: **Company A**
Qualified Partner #2: **Company B**
Facility Name: **LTC Facility**
Installation Address: **123 State St**
City: **Augusta** State: **Maine** Zip: **04330**
Reference Number: **CLIC43901**

This Approved Scope of Work Form is part of the Funding Opportunity Notice (FON) for the Efficiency Maine Commercial & Industrial Prescriptive Initiative. When executed by the Parties and submitted with CIPI FON-011-2023, constitute agreement to the following Terms & Conditions:

1. APPLICANT ELIGIBILITY REPRESENTATIONS.
Applicant represents that the following statements are true:
a. Applicant is a non-residential customer of electric utilities in the State of Maine,
b. Applicant's primary business function is not to generate power to be sold into a power market,
c. Applicant has the authority to contract for retrofit work in the Facility in connection with the Measures listed,

2. AGREEMENT AS TO THE MEASURES. Applicant agrees to have an Installation Contractor perform retrofit work at the Facility in connection with the Measures identified on the attached Section C to this Scope of Work. In consideration of the Contractor's performance of such work, Applicant agrees to pay Installation Contractor for Measures installed at the Facility, based on the Estimated Costs listed on said Section C for the number of completed units for each Measure upon receipt of invoice; provided

3. AGREEMENT AS TO INCENTIVE AMOUNTS.
a. Subject to the other terms of this Scope of Work, Applicant's obligation to pay for the installation and Measures shall be reduced by an amount (the "Incentive") provided under the Efficiency Maine CIPI FON-011-2023, which amount shall be equal to $0.36 per 1st years saved kWh or

Participating Customer _____ Date _____

Participating Qualified Partner _____ Date _____

Section B. Summary of Project Financials and Energy Savings

Estimated Annual kWh Savings:	87,355
Average cost per kWh:	$0.21
Estimated Annual Energy Cost Savings:	$18,344.59
Estimated Monthly Energy Cost Savings:	$1,528.72
Total Labor Costs:	$13,837.50
Total Material Costs:	$38,603.50
Total Taxes on Materials:	$2,123.19
Total Ancillary Costs:	$2,600.00
Total Project Costs (including tax):	$57,164.19
Estimated Incentives:	$31,448.00
Estimated Cost to Customer:	$25,716.19
Est. Simple Payback (years):	1.40

Section C. List of Measures

Measure Description	Location	Qty	Labor Cost	Material Cost	Total Cost	Estimated Incentive
Integrated Retrofit Kit for LED 2x4 Interior Fixture <50W	Receptionist	15	$562.50	$1,275.00	$1,837.50	$468.00
LED Surface-Mounted Downlight	Lobby	10	$375.00	$750.00	$1,125.00	$1,521.00
Integrated Retrofit Kit for LED 2x4 Interior Fixture <50W	Hallways	192	$7,200.00	$19,200.00	$26,400.00	$21,609.00
LED 2x4 Recessed Fixture <50W	Restrooms	12	$450.00	$1,080.00	$1,530.00	$177.00
Retrofit Kit for LED Direct Linear Ambient Luminaires <50W	Patient Rooms	80	$3,000.00	$6,000.00	$9,000.00	$3,164.00
LED Pole-Mounted Streetlight 100W - 250W	Exterior Parking Lot	30	$1,687.50	$8,250.00	$9,937.50	$3,274.00
LED Outdoor Wall Pack 30 - 60W	Exterior Wallpacks	10	$562.50	$2,048.50	$2,611.00	$1,235.00

Submit the Project Completion Form

When your new equipment upgrades have been installed:

- Fill out the Installation Completion & Acceptance Form.
  - This form needs to be signed by the customer and the QP.
  - All projects must be submitted with material invoices and installation invoices.
- Email to CIP@efficiencymaine.com
- Efficiency Maine will send the project incentive within two weeks following completion of the project review.

Efficiency Maine may elect to conduct project inspection prior to issuing incentive

Overview

Simple Steps:

1) Contact a Qualified Partner (contractor) to schedule an assessment.
2) Submit the FON application(s) with the material price quote from your assessment.
3) Efficiency Maine will review your project and email you an *Approved* Scope of Work.
4) Sign and return the Approved Scope of Work (sent by Efficiency Maine) and submit a W9.
5) Complete the installation.
6) Submit a completion form and invoicing when the project is complete.

Questions?

If you have any questions during any phase of your project (i.e. development, submission, execution and completion):

Call: 207-213-6247

Email: CIP@efficiencymaine.com

efficiencymaine.com/at-work/long-term-care-retrofits/