



SAVE TODAY. SAVE TOMORROW.  
SAVE FOR GOOD.

# 2023 ENERGY STAR Products Partner Meeting

## Heat Pump HVAC Solutions for Successful Programs in All Markets

### **Presenters:**

Mia Lombardi - Eversource

Bob Berry – Daikin

Dana Fischer - Mitsubishi

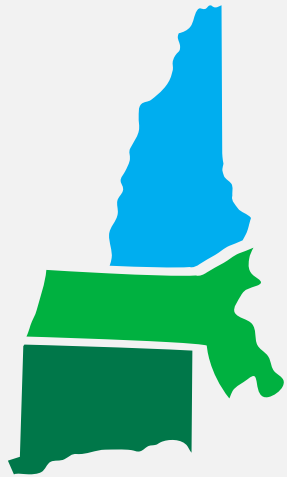
**September 27, 2023**



# New England Heat Pump Market Transformation

Mia Lombardi, Senior Consultant

# Eversource at a Glance

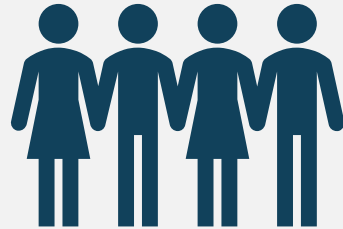


3 STATES

Largest energy company in New England

**4M CUSTOMERS**  
Servicing electric,  
natural gas, &  
water

**9,500 EMPLOYEES**  
Across all three states



**STEWARD TO  
RATEPAYER ENERGY  
EFFICIENCY FUNDS**

Eversource works collaboratively with other energy efficiency providers under the umbrella of these brand names

**#1 ENERGY  
EFFICIENCY  
PROVIDER IN THE  
NATION**  
**\$700m+** annual energy  
efficiency investment



# Channel Engagement & Support



# Program Priorities



Communication



Consistency



Clarity

# Ongoing Challenges to Adoption



Awareness and  
Perceptions



Upfront and  
Ongoing Expense



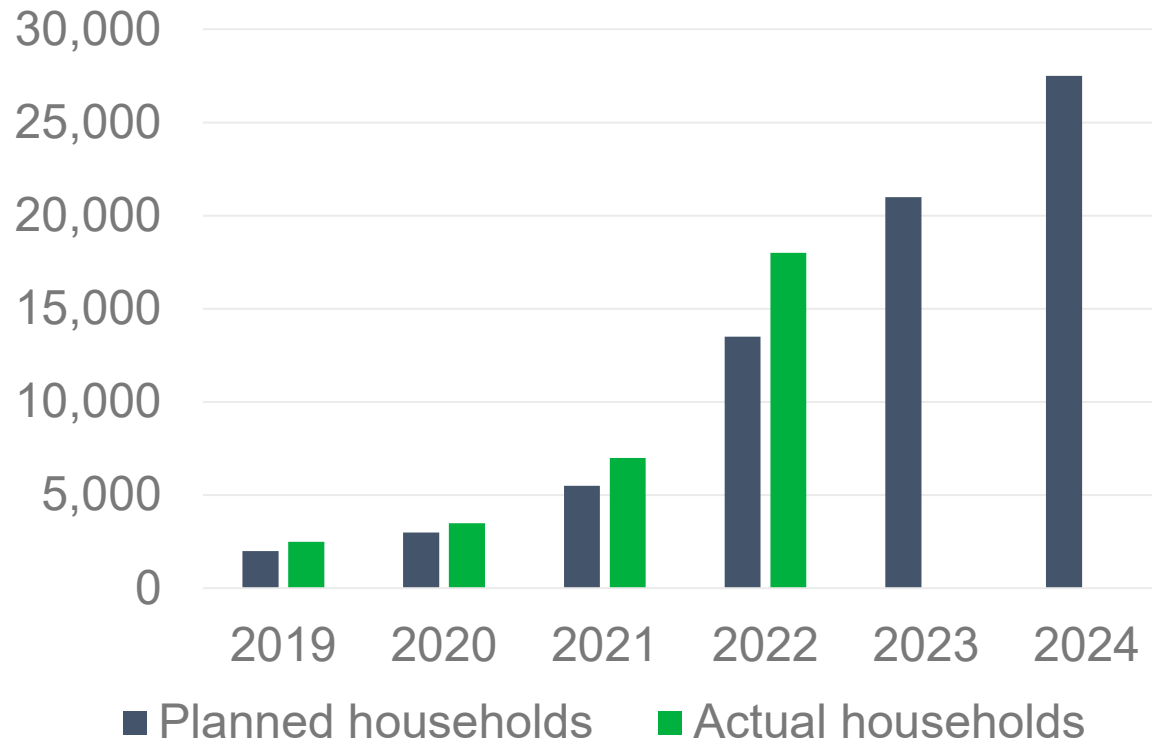
Equipment  
Availability



Quality Assurance

# Early Results

## Massachusetts Residential Heat Pumps



3,000+ customer consultations

150+ in-field industry trainings

94% satisfaction with installation

2,000+ quality installation inspections

93% satisfaction with system performance

2,000+ companies enrolled in Heat Pump Installer Networks

EMPOWERING

A CLEAN ENERGY

EVERSOURCE

FUTURE

Thank You



# Heat Pump Solutions for All Markets



## Household Main Heating Source



123M Households



63M Gas Furnace



17M Heat Pumps



25M Baseboard,  
Electric Furnace,  
Space Heaters



5M Fuel Oil



5M Propane



2M Wood



25M Baseboard,  
Electric Furnace,  
Space Heaters



- Operating Cost
- First Cost
- Perception



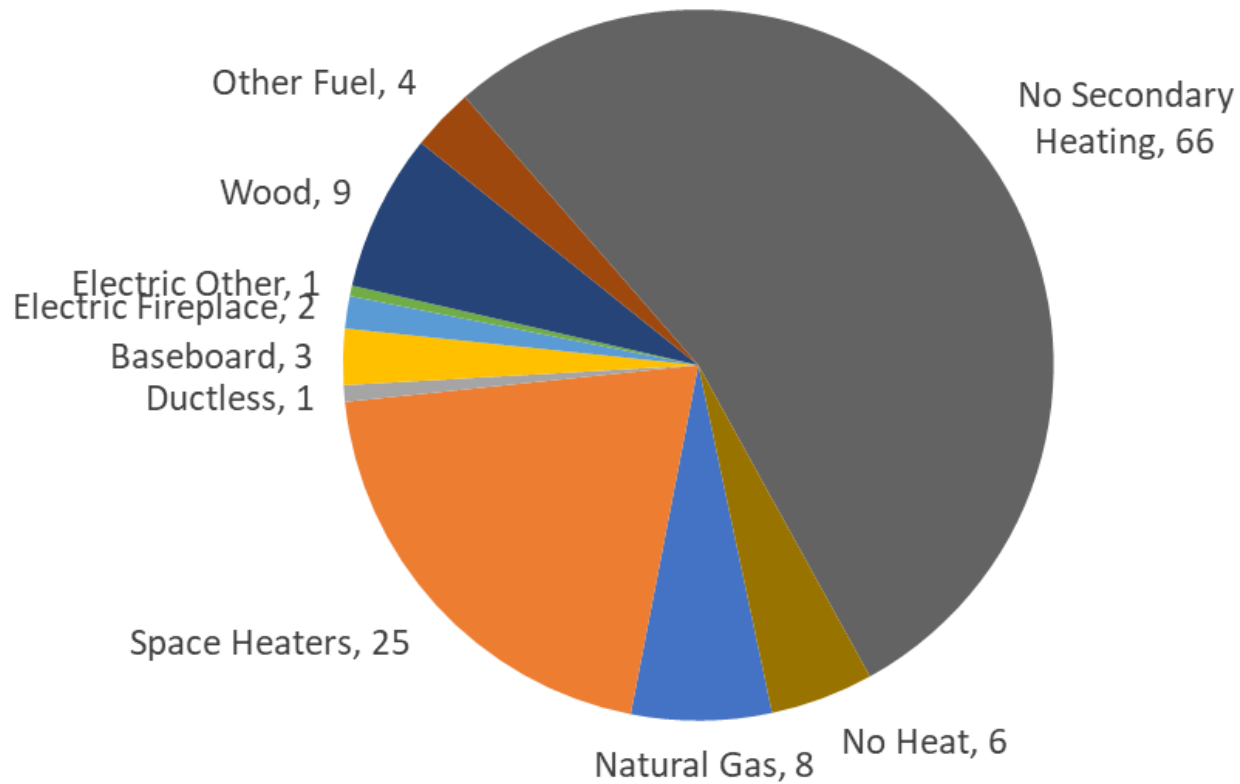


63M Gas Furnace

- First Cost
- Direct Comparison

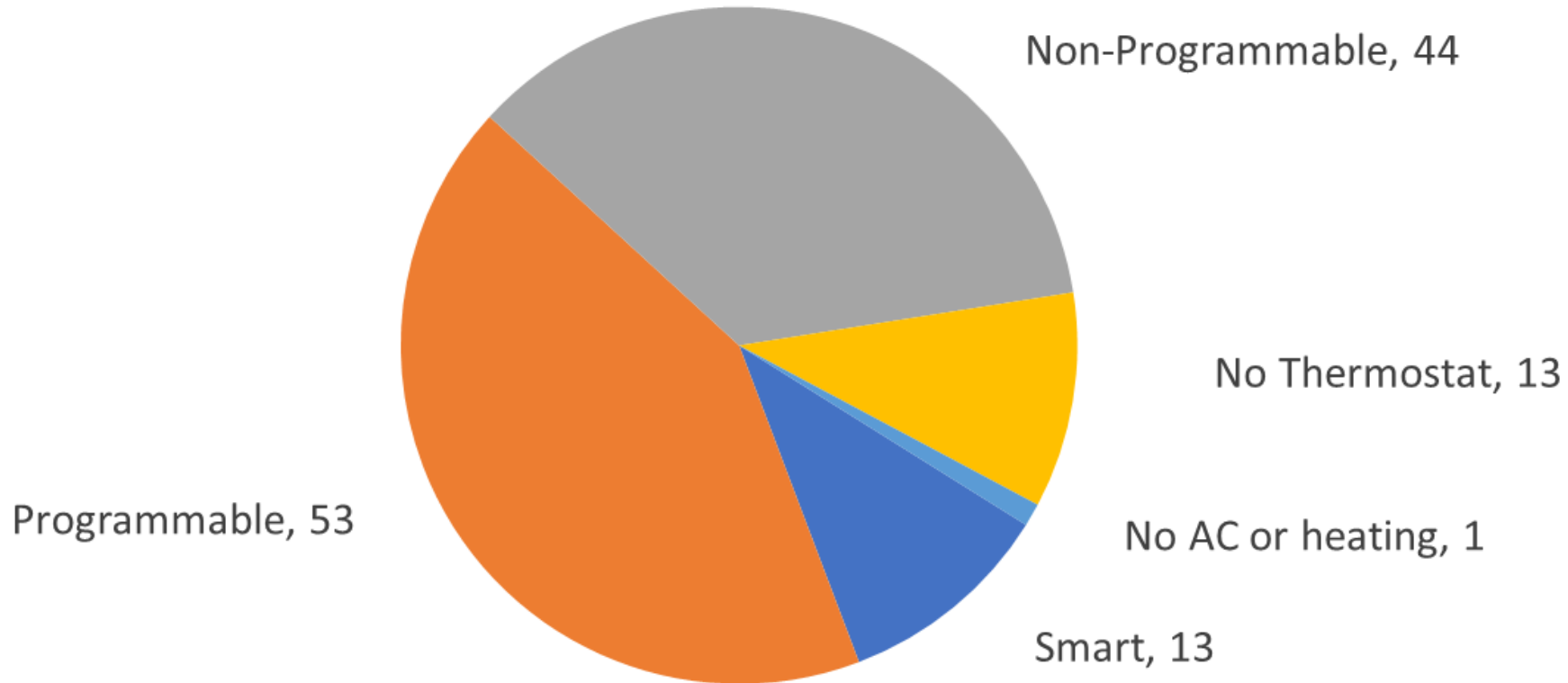


2020 RECS - Secondary Space Heating Type

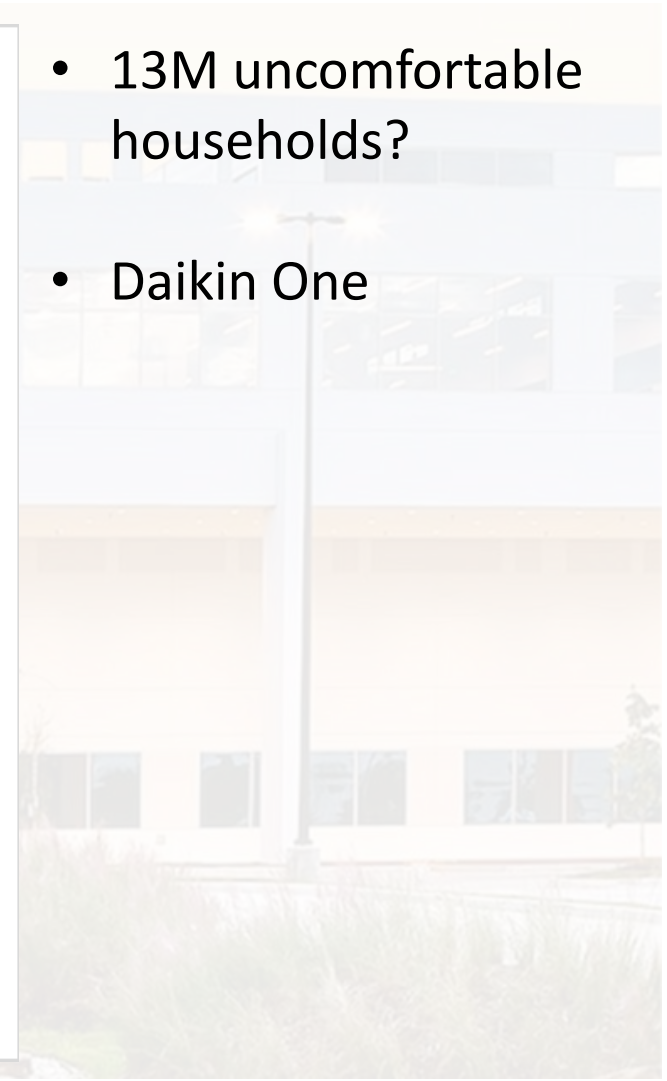


- Ductwork, air sealing, windows & doors
- Quality installation
- Commissioning

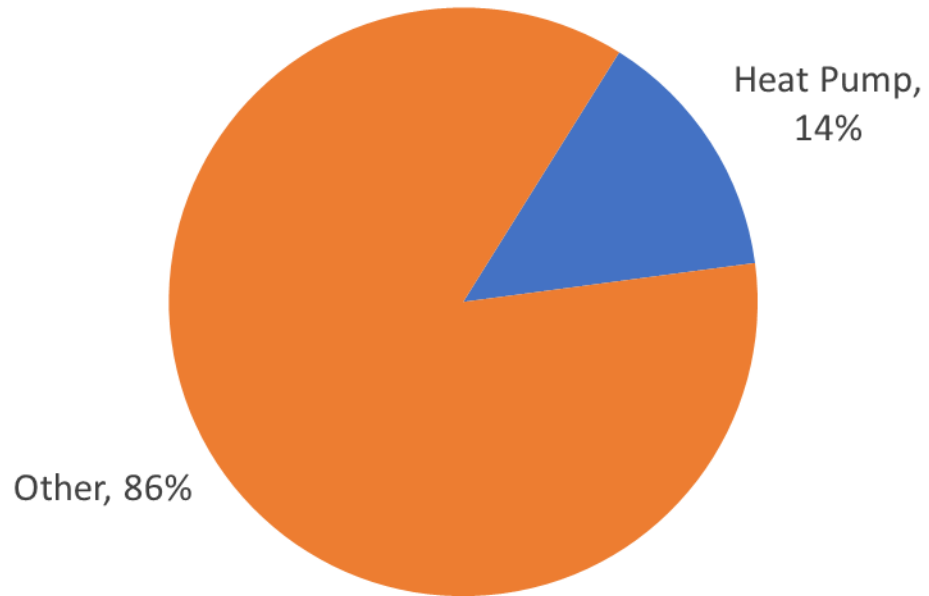
2020 RECS - Thermostat Type



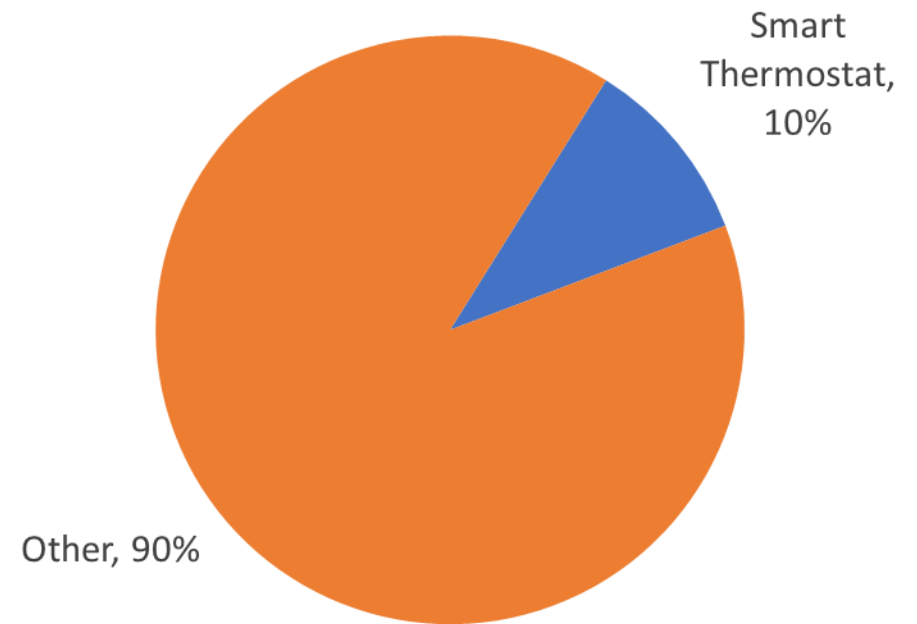
- 13M uncomfortable households?
- Daikin One



2020 RECS - Primary Heating



2020 RECS - Thermostat Type





# The path to decarbonization is lined with **All-Climate Heat Pumps**

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Energy Star Partners Meeting - Atlanta

September 2023

Dana Fischer

[dfischer@hvac.me.com](mailto:dfischer@hvac.me.com)





Outdoor units



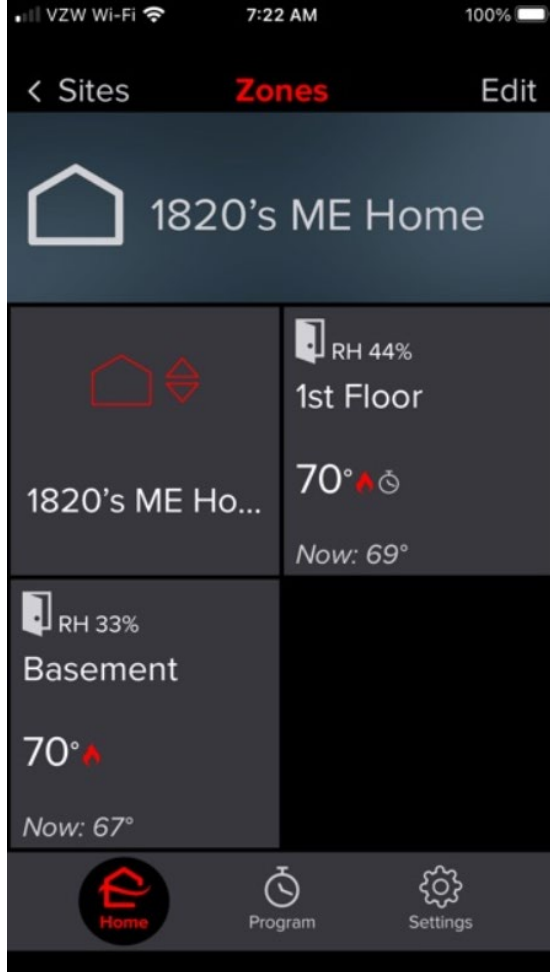
Indoor Units



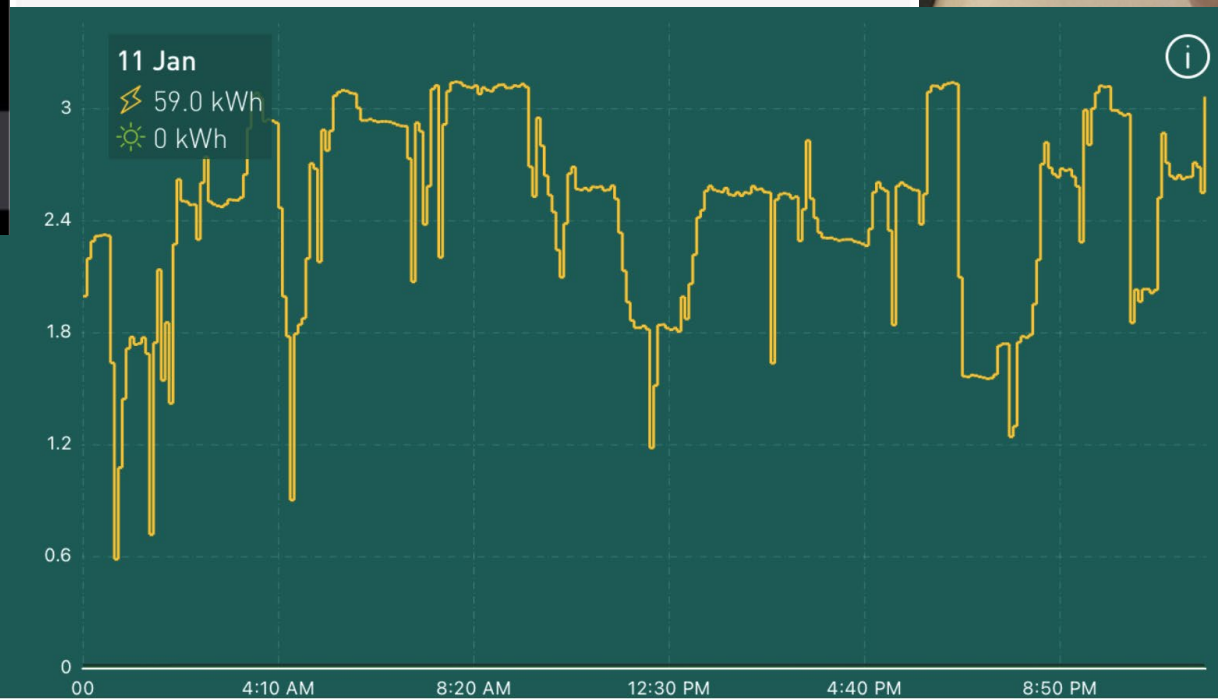
Heat pumps come in all shapes and sizes to meet your needs and aesthetics.

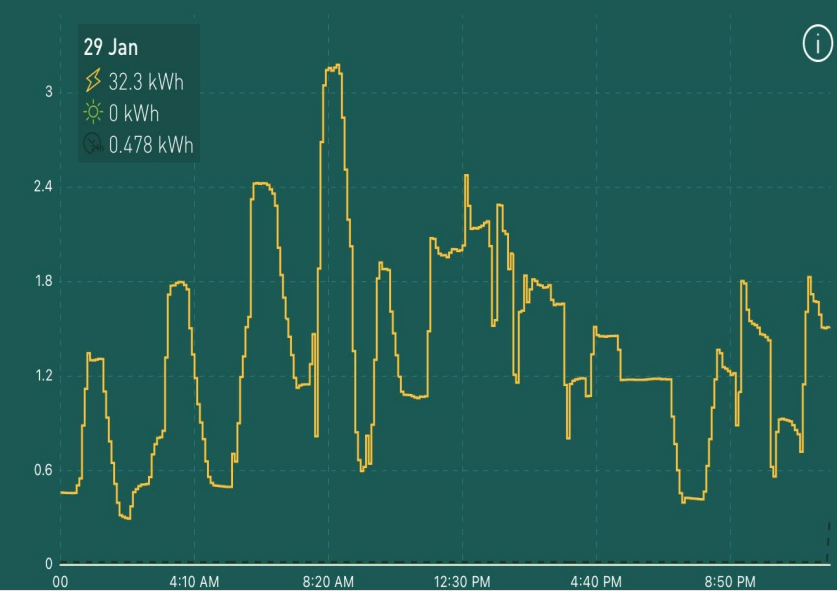






Portland ME, Jan 11<sup>th</sup>, 2022  
(2) FS12 systems  
1,500 sq ft heated space.  
Total operational usage:  
422 kWh November  
829 kWh December  
1,421 kWh January (v. cold)  
**All heat pump heat**





# All heat pump heat

Moderate winter days at top.

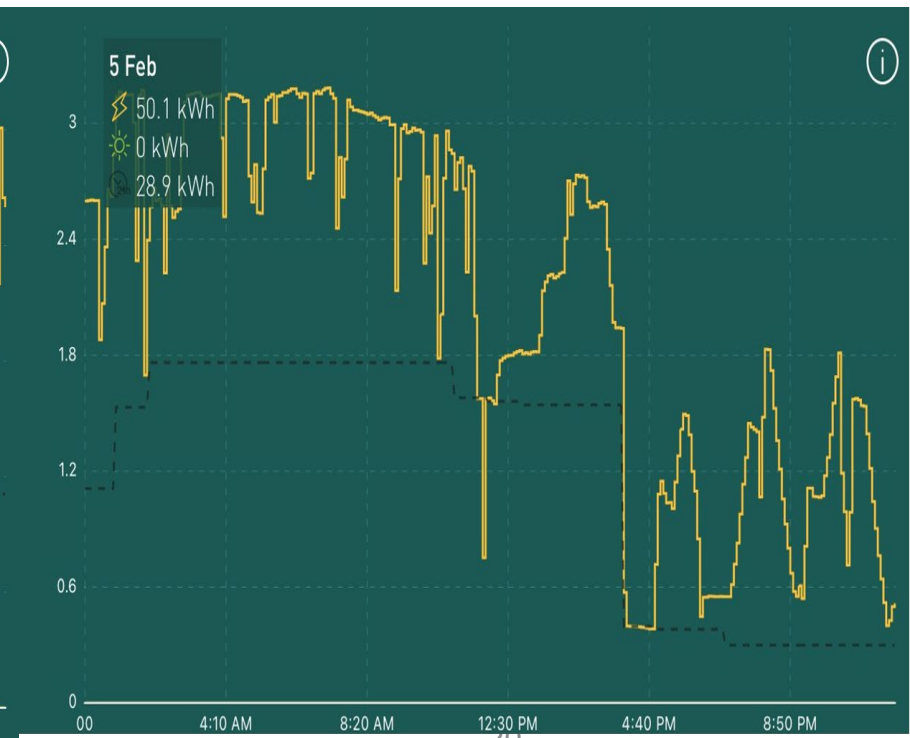
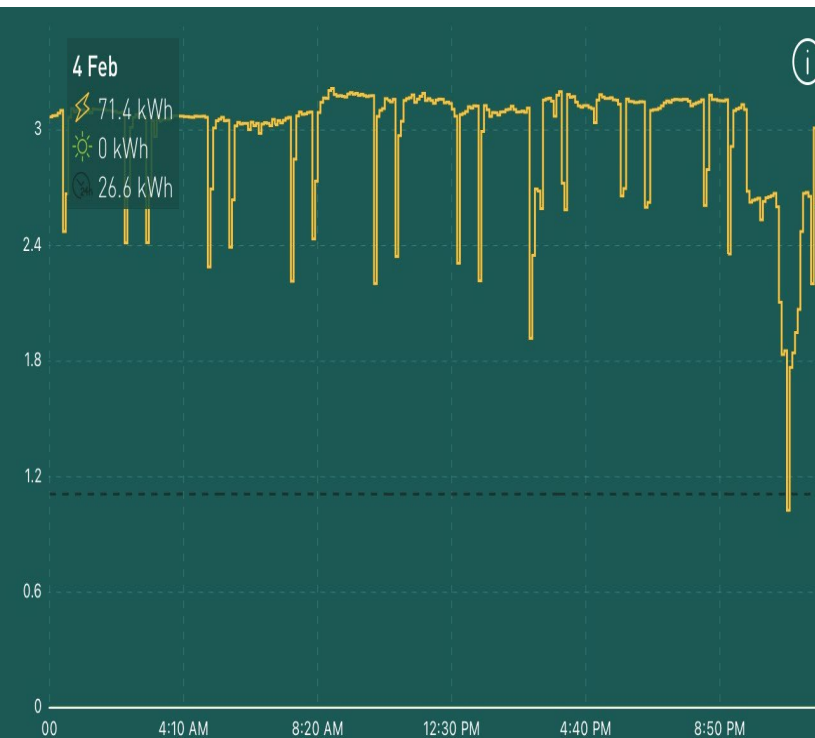
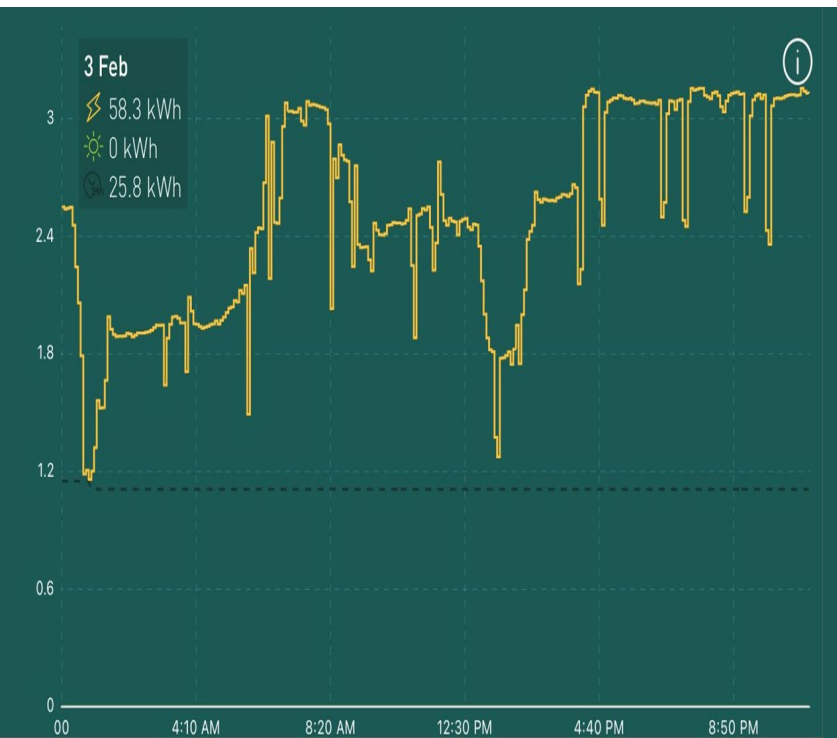
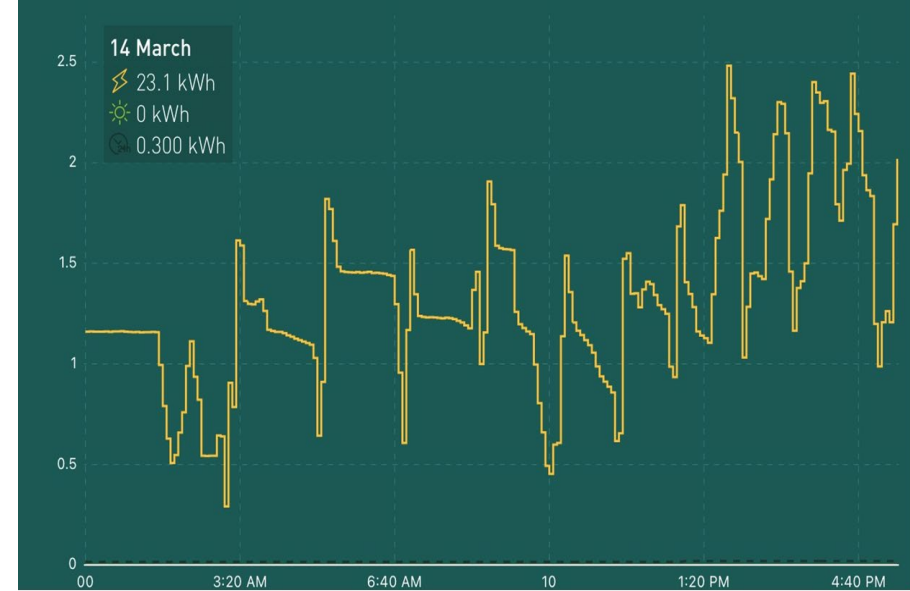
3-day polar vortex in Feb 2023 below.

Portland ME (2) FS12 “1-ton” systems  
1,500 sq ft heated space.

Top out at 3,150 watts combined – same  
as two hair driers.

System sized to 2F load, house did not  
drop below 64F after more than 24 hours  
below -12F with windchill temp below -30F.

Indoor temp recovered by 9 am on Feb 5<sup>th</sup>.





<https://www.iso-ne.com/isoexpress/web/charts>

New England Grid was not abnormally stressed even during super peak weather event on Feb 4<sup>th</sup> inclusive of hundreds of thousands of EVs and heat pumps installed over the past decade.

Date: 02/01/2023

Report Date	Wednesday, February 1, 2023					
	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	WED	THU	FRI	SAT	SUN	MON
	02/01	02/02	02/03	02/04	02/05	02/06
<b>Weather</b>						
High Temperature - Boston	31	39	33	14	42	45
Dew Point - Boston	8	14	20	-9	24	26
High Temperature - Hartford	34	39	32	17	42	46
Dew Point - Hartford	6	10	19	-7	20	23
<b>Generating Capacity position</b>						
Total Capacity Supply Obligation (CSO)	28509	28509	28509	28509	28509	28509
Anticipated Cold Weather Outages	-	-	-	-	-	-
Other Generation Outages	2006	2405	2999	3189	3407	3545
Anticipated De-List MW Offered	-	-	-	-	-	-
Total Generation Available	-	-	-	-	-	-
Import at Time of Peak	3295	3295	3295	3095	3095	3295
<b>Total Available Generation and Imports</b>	<b>32890</b>	<b>33007</b>	<b>28284</b>	<b>28927</b>	<b>31805</b>	<b>31867</b>
Projected Peak Load	-	-	-	-	-	-
Replacement Reserve Requirement	180	180	180	180	180	180
Required Reserve	-	-	-	-	-	-
Required Reserve including Replacement	-	-	-	-	-	-
<b>Total Load plus Required Reserve</b>	<b>19673</b>	<b>19263</b>	<b>21303</b>	<b>20953</b>	<b>18833</b>	<b>18973</b>
Projected Surplus/(Deficiency)	-	-	-	-	-	-
Available Demand Response Resources	-	-	-	-	-	-
Available Real-Time Emergency Generation	-	-	-	-	-	-
<b>Load Relief Actions Anticipated</b>						
Power Watch	NO	NO	NO	NO	NO	NO
Power Warning	NO	NO	NO	NO	NO	NO
Cold Weather Watch	NO	NO	-	-	-	-
Cold Weather Warning	NO	NO	-	-	-	-
Cold Weather Event	-	-	-	-	-	-

Updated: 09/20/2023 10:53 AM

## MORNING REPORT

Date: 02/04/2023

### Report Date

Saturday, February 4, 2023

### Peak Load

Friday, February 3, 2023 hour ending 19

(MW)

19529

### Operable Capacity Analysis

(MW)

#### A. Capacity Supply Obligation (CSO)

28509

#### B. Capacity Additions EcoMax Bid > CSO

2985

#### C. Generation Outages and Reductions

3505

#### D. Uncommitted Available Generation (non fast start)

6802

#### E. DRR Capacity

160

#### F. Uncommitted Available DRR

12

#### G. Capacity Deliveries: Net Purchases = (-) Net Sales = (+)

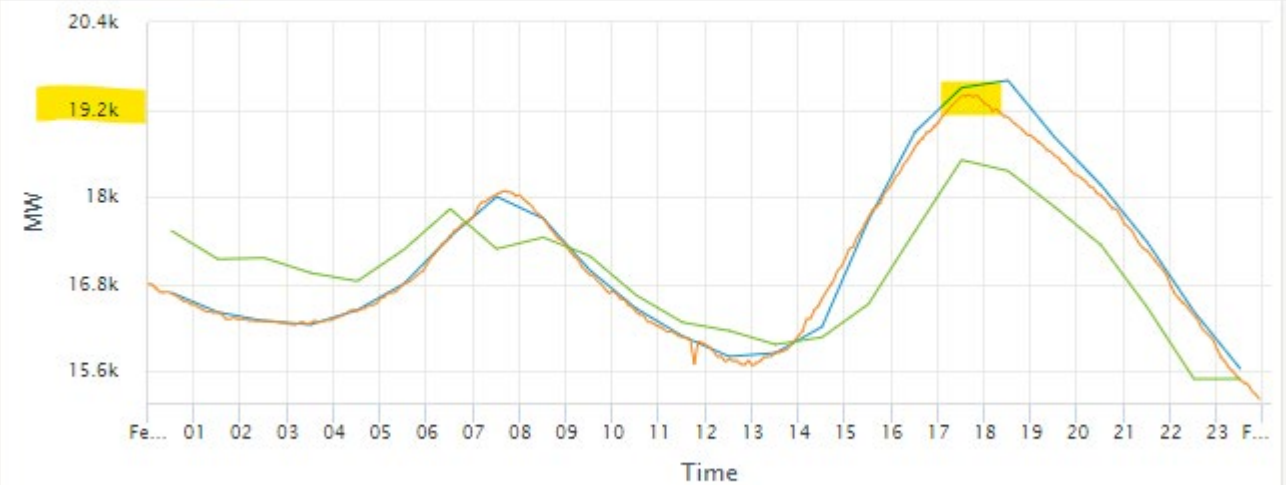
Highgate -225

NB -505

Updated: 09/20/2023 10:15 AM

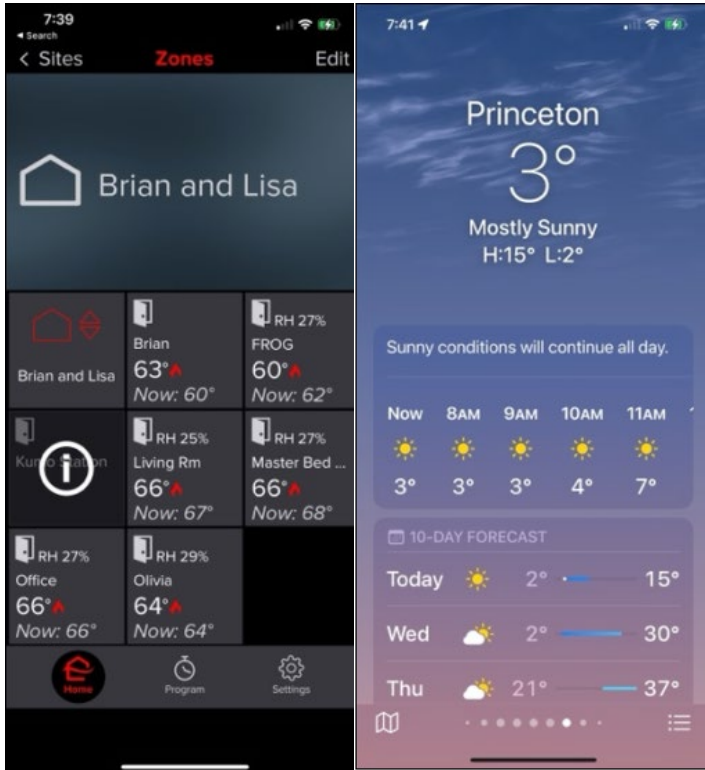
## SYSTEM LOAD GRAPH

Date: 02/04/2023



Updated: 09/20/2023 10:30 AM

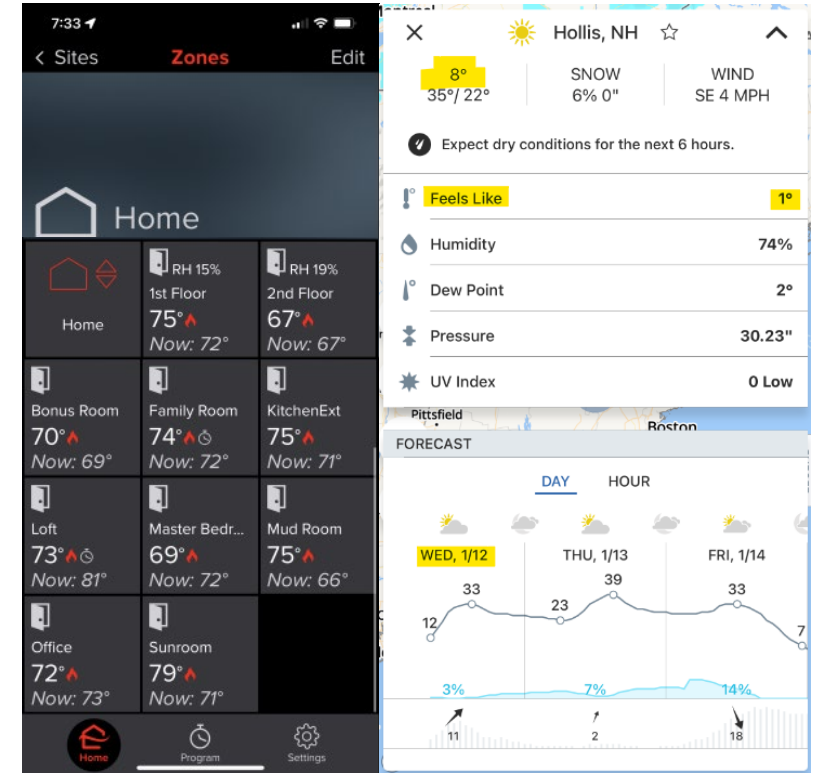
# Elsewhere on 01/11/2022 with heat pump only heat



Large home in Princeton MA with large multi-zone system. Heat pump delivering exactly what is being asked. Wind chill temperature at -14F.

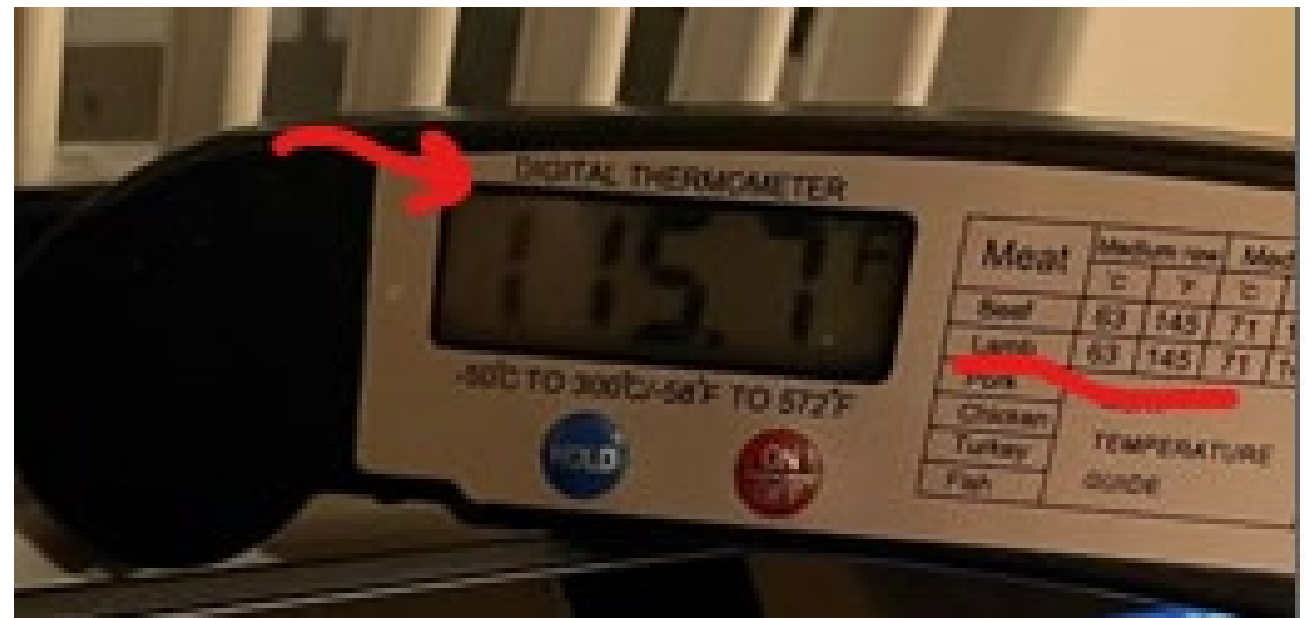
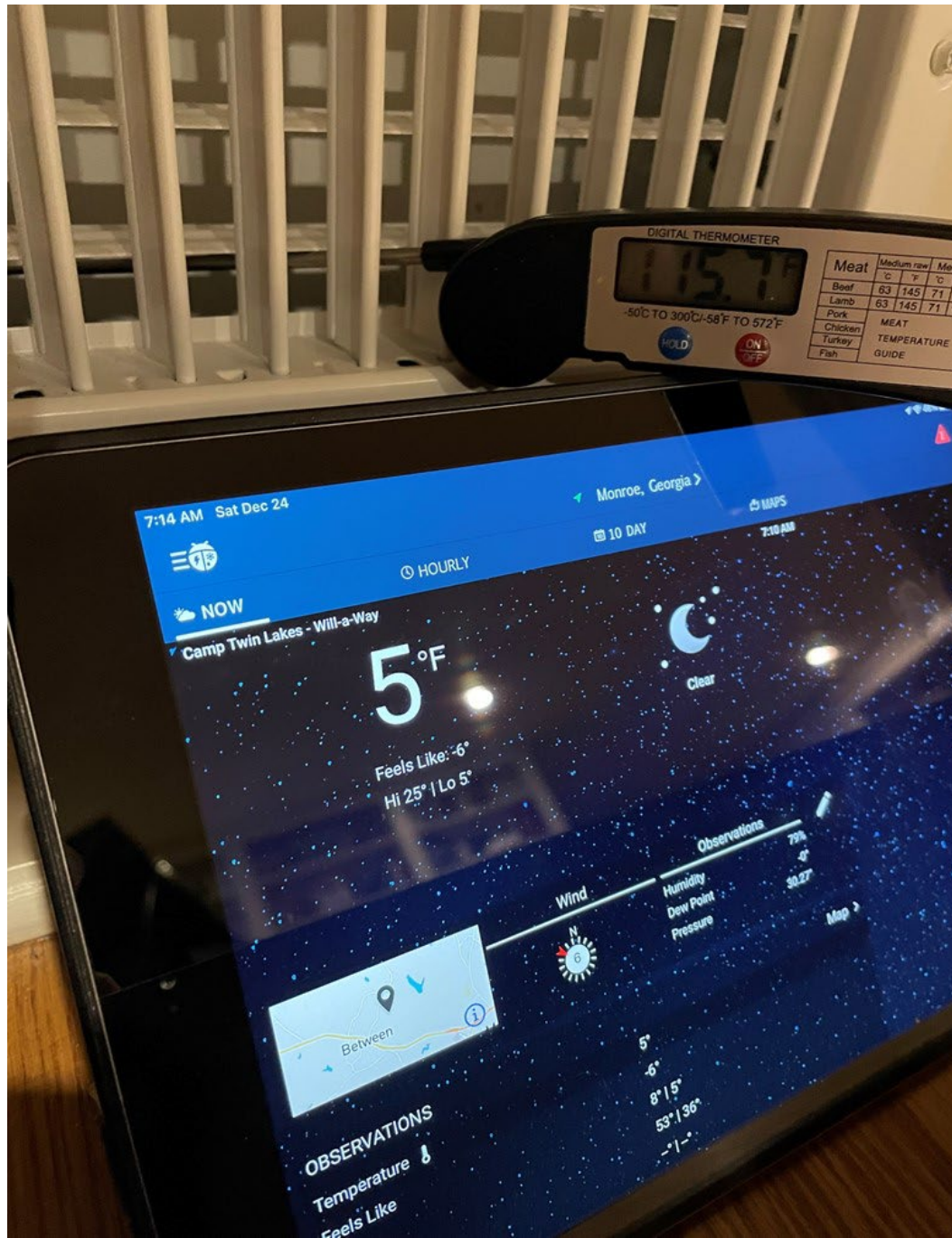


2 story colonial outside Bangor ME. Multiple condensers. Wind chill temperature at -21F.



Very large home in Hollis NH. 3 outdoor units, 2 PEADs, and 8 wall units January 12 snapshot. No problem maintaining temps on the 11th either.

# All heat pump heat



Snapshots from Atlanta Dec 24, 2022

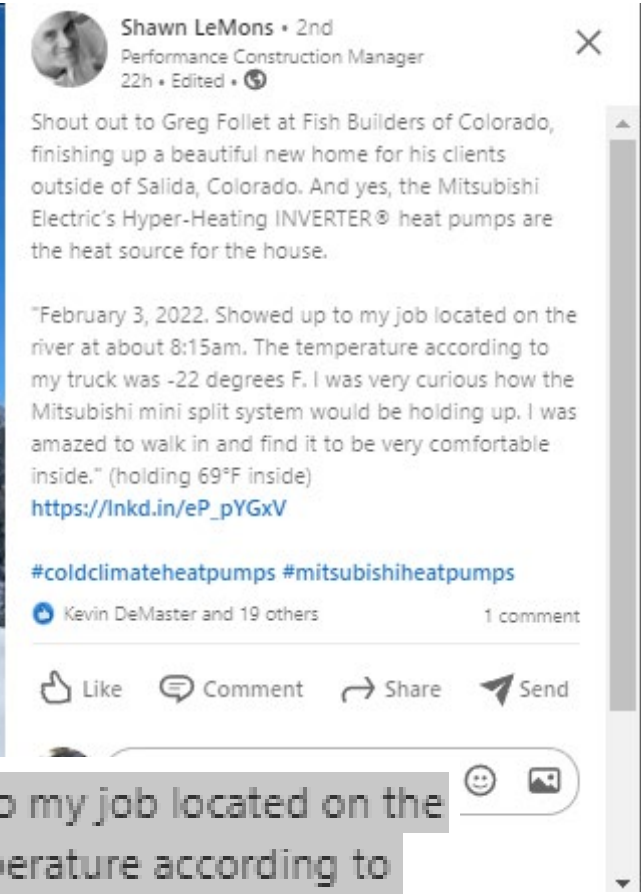
5F ambient. -6F with wind chill.

PUZ-HA42 with PVA

“Last year, I removed a conventional 4 ton heat pump on my 40 year old home and performed a basic window and attic insulation upgrade. At the time, I also removed a 100 amp (24 kW!) resistance heat strip, replacing them with a 3 -1/2 ton PUZ Hyper heat unit, no backup resistance heat. Here’s how it performed during last week’s “bomb cyclone...”

...energy usage at that time, which is recorded on my Span app. It peaked at just over 6000 watts, so a 75% demand reduction from the former, conventional heat pump system.”

# What happens when it is ridiculously cold?



Salida, Colorado  
Elevation 7,083

"February 3, 2022. Showed up to my job located on the river at about 8:15am. The temperature according to my truck was -22 degrees F. I was very curious how the Mitsubishi mini split system would be holding up. I was amazed to walk in and find it to be very comfortable inside." (holding 69°F inside)



# ONTONAGON VILLAGE HOUSING

PROJECT PERSPECTIVES

# COLD-CLIMATE PERFORMANCE



 **MITSUBISHI  
ELECTRIC**  
HEATING & AIR CONDITIONING



**CARLENE**  
RESIDENT | ONTONAGON VILLAGE HOUSING



## VERMOD HOME DESIGNS

View Standard Plans



### ONE BEDROOM

1 Level



### TWO BEDROOM

1 Level / 2 Levels



### THREE BEDROOM

1 Level / 2 Levels

Located in Vermont, Vermod manufactures hundreds of high-performance homes per year using small 1:1 heat pumps to satisfy heating and cooling needs. Ductless in some cases, but ducted systems are incorporated into a central plenum in most single level applications.

<https://vermodhomes.com/>

# Whole-Home Heat Pump Pilot

We know heat pumps work in Maine. This pilot seeks to determine if they can work as the sole heating source in Maine.

To test this, existing fossil fuel furnaces were removed or disabled and replaced with heat pump units.

- Some, but not all, homes received a small amount of electric resistance for backup heat

## 19 homes are participating throughout the state

- 10 mobile homes
  - No other study has retrofitted mobile homes entirely to heat pumps
- 9 stick-built homes

Found eligible equipment across 4 different manufacturers

# Ducted Mobile Home Solution



Indoor Unit

- Heat pumps replace the Miller furnace and use the existing ductwork
- Manufacturer claims this heat pump maintains full capacity down to  $-5\text{F}$  and it has been seen to still produce heat at temperatures lower than that.
  - Temperatures have hit as low as  $-10\text{F}$  outside homes this year, with the heat pump able to maintain interior temperature without supplemental heat
- First known instances of retrofitting an existing mobile home's heating entirely with heat pumps.

## Participant Quotes

- “The heat seems more even with the HP.”
- “We are very happy. The heat pumps worked so well we didn’t turn on the furnace at 0 F. Our pipes [under the home] did not freeze.”
- “At -9F we had no idea it was so cold outside. With the oil furnace we had large variation [in temperatures]. This is a much more even heat. We had no issues at -20 F.”



# Electrification = Opportunity

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Dana Fischer

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**Questions?**

