Mini-split Heat Pumps for Cooling and Heating

- Remarkably Efficient
- Increasingly Popular
- Still Misunderstood

Apr 30, 2020
What is an Inverter Compressor (Mini-split) Heat Pump

- Single Device to Provide Cooling & Heating

- Components
  - Outdoor Unit
  - Indoor Unit
  - Refrigerant Lines
  - Controls
Indoor Unit Options (Not Everything is “Ductless”)

- Offer flexible designs to suit any space
- Feature a return air sensor that constantly monitors and maintains room temperature
- Provide continuous fan operation, IAQ
- As quiet as 19 dB(A) (Whisper)
Indoor Unit Style/Applications

- Horizontal Ducted
- Ceiling-recessed
- Floor-mounted
- Wall-mounted
- Multi-position air handler
Single Zone (Capacity ½ to 3½ tons)
Multi-Zone Systems MXZ Series* (Capacity 1½ to 5 tons)

Up to 8 Zones

*Compatible with M-Series & P-Series Indoor Units
(Check compatibility table for details.)
Why Are they So Efficient?

INVERTER Technology

INVERTER compressor

Conventional compressor
Energy Efficiency – Heat Pumps Not Created Equal

Energy Star Requirements (15 SEER, 12.5 EER, 8.5 HSPF)

Heat Pumps AHRI 477,712 Listed.
- Energy Star - 200,101 – (42%)
- Increase to 16 SEER – 91,298 (19%)
- Increase to 18 SEER – 12,034 (<3%)

Variable Speed Heat Pumps AHRI 8,240
- Energy Star - 3,292 – (40%)
- Increase to 16 SEER – 3,287 (40%)
- Increase to 18 SEER – 3,224 (39%)
## Energy Efficiency – Heat Pumps Not Created Equal

### Utility Program Reality

<table>
<thead>
<tr>
<th>Heat Pumps AHRI 477,712 Listed</th>
<th>SEER</th>
<th>Variable Speed Heat Pumps AHRI 8,240</th>
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<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>319,637</td>
<td>15</td>
<td>98%</td>
</tr>
<tr>
<td>127,272</td>
<td>16</td>
<td>96%</td>
</tr>
<tr>
<td>16,092</td>
<td>18</td>
<td>67%</td>
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</table>

- 98% 8,095
- 96% 7,926
- 67% 5,555
Mini-Splits Great For Cold Weather Performance
H2i MXZ HEATING CAPACITY AT LOW TEMPERATURES*

Today 100% @5F
Later 2020 100% @ -5F
Cold Climate Heat Pump Specifications
Northeast Energy Efficiency Partnerships

Performance Requirements
- For Non-Ducted systems: HSPF ≥10
- For Ducted systems: HSPF ≥9
- COP @5°F ≥1.75 (at maximum capacity operation)
- SEER ≥15

Heat Pump List

Mitsubishi Electric
M-Series H2
AHRI: 2046276765
Outdoor Unit: SUZ-HA124HA
Indoor Unit: PEAD-A224A7
Single Phase Ducted: Compact Ducted
- 12,000 Max Btu/H @5°F
- 12,000 Rated Btu/H @5°F
- COP @5°F: 2.09
- HSPF: 11

Mitsubishi Electric
M-Series H2
AHRI: 2046276765
Outdoor Unit: SUZ-HA124HA
Indoor Unit: PEAD-A224A7
Single Phase Ducted: Compact Ducted
- 18,000 Max Btu/H @9°F
- 18,000 Rated Btu/H @9°F
- COP @9°F: 1.82
- HSPF: 5.9

Mitsubishi Electric
M-Series H2
AHRI: 2046276765
Outdoor Unit: SUZ-HA124HA
Indoor Unit: PEAD-A224A7
Single Phase Ducted: Compact Ducted
- 20,000 Max Btu/H @12°F
- 20,000 Rated Btu/H @12°F
- COP @12°F: 1.92
- HSPF: 5.0

Cold Climate Air-Source Heat Pump Specification (Version 3.0)
As facilitated by Northeast Energy Efficiency Partnerships (NEEP)

Effective January 1, 2023

The following specification defines a set of performance requirements and reporting requirements to meet the voluntary “Cold-climate Air-Source Heat Pump Specification” (CASHP specification). The specification was designed to identify air-source heat pumps that are best suited to heat efficiently in cold climates (IECC climate zone 4 and higher). The specification is intended as a model equipment specification to be used broadly by energy efficiency program administrators in cold climates as a minimum requirement for program qualification. It also is intended for engineers, contractors, and other practitioners who need assurance that the equipment they select will have the required heating capacity at design temperature without unnecessary oversizing, and will serve the load efficiently throughout the ambient temperature range.

Stakeholders should be aware that simply meeting the performance requirements does not necessarily mean a product is appropriate for all cold-climate applications. Consumers, contractors, and designers should review building codes, equipment capacity at design temperatures, and other important factors before selecting equipment.

Scope
- Air-to-air, split system heat pumps
- Indoor and outdoor units must be part of an AHRI matched system, defined by federal regulation 10CFR 806.2 as a central air conditioning heat pump
- Compressor must be variable capacity (three or more distinct operating speeds, or continuously variable)
- Non-ducted AHRI systems
  - Single-zone AHRI systems with non-ducted indoor units (i.e. wall, ceiling, floor, etc.)
  - Multi-zone systems rated with non-ducted indoor units
- Ducted AHRI systems
  - Centrally ducted
  - Single-zone systems with compact ducted indoor unit
  - Multi-zone systems rated with all ducted or mixed (ducted and non-ducted) indoor units
- Does NOT include ground-source, water-source, or air-to-water heat pump systems

Northeast Energy Efficiency Partnerships
50 Hartwell Avenue Lawrence, MA 01841 781.338.3071 www.neep.org
Cold Climate Heat Pump Specifications (Future)

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Moderate and Hot Climate</th>
<th>Cold Climate</th>
<th>Percentage of Heating Capacity @ 5°F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEER</td>
<td>EER</td>
<td>HSPF</td>
</tr>
<tr>
<td>ASHP Split Systems</td>
<td>≥ 16.00</td>
<td>≥ 12.50</td>
<td>≥ 8.50</td>
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<tr>
<td>ASHP Single Package Equipment1</td>
<td>≥ 16.00</td>
<td>≥ 12.00</td>
<td>≥ 8.20</td>
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</table>
Designing with Mini-Split Heat Pumps

- Creating comfort zones
- Do we need one in every room?
- What about small bedrooms and bathrooms?
- Heating vs. Cooling Load
- Sizing is Critical! (Load Calcs)
Beneficial Electrification (80% x 2050)

Two Primary Solutions to Meet Goals
To Support our increasing Program Development requests:

Best practices Manual

Lays out recommendations on successful Heat Pump program design
Questions?

Kevin DeMaster
Mitsubishi Electric Trane HVAC
Manager, Utility & Efficiency Programs
kdemaster@hvac.mea.com
ENERGY STAR®

HVAC Promotions
THE VALUE OF ENERGY STAR
Strong Brand Identity & Awareness

In American Households:

- MORE THAN **90%** recognize the ENERGY STAR® label
- NEARLY **85%** understand what it means
- IN THE PAST YEAR **45%** purchased ENERGY STAR-labeled products

Of these purchasers:
- **74%** were influenced by the label in their decision
- **80%** are likely to recommend ENERGY STAR to a friend

EPA
Clear, Functional Benefit

- Tremendous Influence/Great Deal of Influence
- Some Influence

Percentage breakdown:
- 92%: 72%
- 87%: 65%
- 76%: 51%
- 67%: 39%
- 61%: 28%
- 56%: 28%
- 55%: 27%
- 54%: 27%
- 53%: 25%
- 51%: 25%
- 49%: 21%
- 43%: 23%
- 39%: 39%
- 39%: 39%

Logos and certifications:
- EPA
- ENERGY STAR
- Organic
- Sustainable
- FSC
- Green
- Green Seal
- Sierra Club
- National Forests
- Great Outdoors
- World Wildlife Fund
- Sierra Club
- National Forests
- Great Outdoors
- World Wildlife Fund
Significant Enhancement to Partner Brand

- A 2017 study found partners’ JD Power Customer Satisfaction indexes for ENERGY STAR partners increased significantly over time compared to non-partners, particularly in the areas of Corporate Citizenship, Communications, and Customer Service.
Significant Enhancement to Partner Brand

- Recent A/B testing conducted by Focus on Energy shows that using ENERGY STAR logo on ads drove a **60% increase in click-through-rate**.
Mutually Beneficial Relationship

- 2017 study demonstrates that when a utility partners with ENERGY STAR, it results in increases in Google searches for related items.
Increasing Demand: Getting Consumers to Ask for ENERGY STAR HVAC
Address Barriers to Consumer Demand

1. Complexity and Cost
   - Product/technology complexity and cost along with navigating the marketplace.

2. Product/Contractor Information
   - Limited access to the right product and contractor information.

3. Consumer Awareness
   - Lack of general awareness among consumers around the benefits of ASHPs vs traditional HVAC.
HVAC Campaign

Goal: Overcome barriers to generate consumer demand and adoption of ENERGY STAR certified HVAC systems, with a focus on ducted and ductless air source heat pumps

1. Complexity and Cost Barrier
   - Develop an ENERGY STAR Heating & Cooling Guide to give consumers access to the replacement guidance they need:
     - Information on equipment replacement
     - Purchase and installation guidance
     - Available Rebates
     - Replacement savings calculator
HVAC Campaign

2. Product/Contractor Information Barrier
   - Developed a Product Finder that connects customers to brands and ENERGY STAR certified product lines that facilitate contractor support.
   - Updated CEE/AHRI links on existing product finder with an ENERGY STAR-focused experience that caters more to the end-use consumer.
HVAC Campaign

3. Consumer Awareness Barrier
   - Implement awareness campaign that drives traffic to the HVAC Guide and Product Finder.
     - Campaign highlights benefits of ENERGY STAR certified HVAC:
       - Energy bill savings
       - Comfort
       - Rebates & Tax Credits
       - Environmental benefits

Sources of Information

<table>
<thead>
<tr>
<th>Year</th>
<th>Internet</th>
<th>Contractors</th>
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<tbody>
<tr>
<td>2019</td>
<td>51%</td>
<td>49%</td>
</tr>
<tr>
<td>2016</td>
<td>52%</td>
<td>45%</td>
</tr>
<tr>
<td>2013</td>
<td>43%</td>
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THE INTERNET
The internet has become an important source for consumers’ HVAC purchase information.

Copyright © Decision Analyst 2019
Spring 2020 HVAC Promotion Plan

Goal
- Educate and encourage consumers in the market for HVAC to choose ENERGY STAR certified models for energy-savings, increased comfort, and environmental benefits.

Call to Action
- Drive consumers to the new Heating and Cooling Guide on energystar.gov.

To Date: 5,717,678 Impressions, $.38 CTC
Summer 2020 HVAC Promotion Plan

Goal
- Educate consumers about ENERGY STAR certified cooling options.
  - Includes RAC, smart thermostats and NEW! HVAC

Call to Action
- Click to the new Heating and Cooling Guide on energystar.gov

Media Mix
- Social - Facebook
- :15 video and digital banners on Google Display Network
What Are the Annual Product Promotions?

- Bring together partner efforts across the country in united, product-focused, co-branded, campaigns – timed with product seasonality.
  - Reward ENERGY STAR partners by promoting their ENERGY STAR programs among our key audiences to drive mutual customer engagement and loyalty.

Co-Marketing Opportunities

- Facilitate and leverage promotional support from manufacturing and retail partners.
  - Point-of-sale, social media, and other co-marketing efforts.

Resource Leveraging and Co-branding Opportunities

- Provide promotional materials and tools with compelling look and feel for effective consumer engagement and, ultimately, adoption.
  - Resources to support multiple media channels from online and social to more traditional advertising.

What EPA Will Be Doing in the Market

- Push out through a variety of media channels that drive impressions and traffic to ENERGY STAR Product Finder featuring utility-branded program incentives.
  - Unites customer with products and deals to effect conversion.
2020 Outreach Plan: ENERGY STAR® PRODUCTS

BRAND CAMPAIGNS
- EARTH DAY

PRODUCT PROMOTIONS
- POOL PUMPS
- FRIDGES
- LAUNDRY
- WATER HEATERS
- LIGHTING
- COOLING
  - ROOM A/C, SMART THERMOSTATS, HVAC
- HEATING
  - SMART THERMOSTATS, HVAC

SEASONAL OUTREACH
- NEW YEAR'S DAY
- PRESIDENT'S DAY
- VALENTINE'S DAY
- MEMORIAL DAY
- FATHER'S DAY
- INDEPENDENCE DAY
- LABOR DAY
- MOTHER'S DAY
- BLACK FRIDAY

Materials Available: energystar.gov/marketing_materials
<table>
<thead>
<tr>
<th></th>
<th>Planning to Participate (as of 12/12)</th>
<th>2018 (Reference)</th>
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<tbody>
<tr>
<td></td>
<td>Number of EEPS</td>
<td>Households Served</td>
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<tr>
<td>Total</td>
<td>148</td>
<td>42,836,658</td>
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<tr>
<td>Pool Pumps</td>
<td>48</td>
<td>21,278,947</td>
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<td>Refrigerators</td>
<td>37</td>
<td>17,289,297</td>
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<td>LED Lighting</td>
<td>55</td>
<td>25,311,185</td>
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<td>Smart Thermostats</td>
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<td>Room AC</td>
<td>16</td>
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<tr>
<td>Laundry</td>
<td>37</td>
<td>20,405,506</td>
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<tr>
<td>Water Heaters</td>
<td>16</td>
<td>17,342,749</td>
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2019 Campaign Impacts:

- Promotional pages had more than 325,100 pageviews
- More than 732 million impressions in print, social, and online media in 2019
- More than 17,900 placements through NAPS and Brandpoint

5 million video views

6.2 million newsletters delivered
HVAC Promotion Plan

- Work with Nate to identify how all market players can come together to create synergies around increasing demand for ENERGY STAR certified HVAC: Get to the “Ask”.
  - Utilities programs and rebates
  - Manufacturer marketing support
  - Distribution and contractor support
- Target combination of markets with active programs and homes with potential for mini splits.
- Drive traffic to Heating and Cooling Guide.

START SAVING!

HVAC Guide and Product Finder

Learn about Options

Ask Contractor for ENERGY STAR

1  2  3  4  5

Find Products
Purchase & Install
Questions?

• If you have not submitted questions for Jill or Kevin, please use the chat to do so now.

• If you would like to be connected to an ENERGY STAR Account Manager, please email eeaccountmanager@energystar.gov

• Thank you to our presenters:
  – Kevin DeMaster, Mitsubishi, kdemaster@hvac.mea.com
  – Jill Vohr, EPA, Vohr.Jill@epa.gov
  – Nate Jutras, EPA, Jutras.Nathaniel@epa.gov