



Mini-split Heat Pumps for Cooling and Heating

- ▶ Remarkably Efficient
- ▶ Increasingly Popular
- ▶ Still Misunderstood



Apr 30, 2020

MITSUBISHI ELECTRIC TRANE HVAC US

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)



Wall-mounted Model:



Ceiling-recessed,
Cassette Model:



Floor
Mounted



Horizontal-ducted Model:



Air Handler

Indoor Unit Style/Applications

Horizontal Ducted

Ceiling-recessed

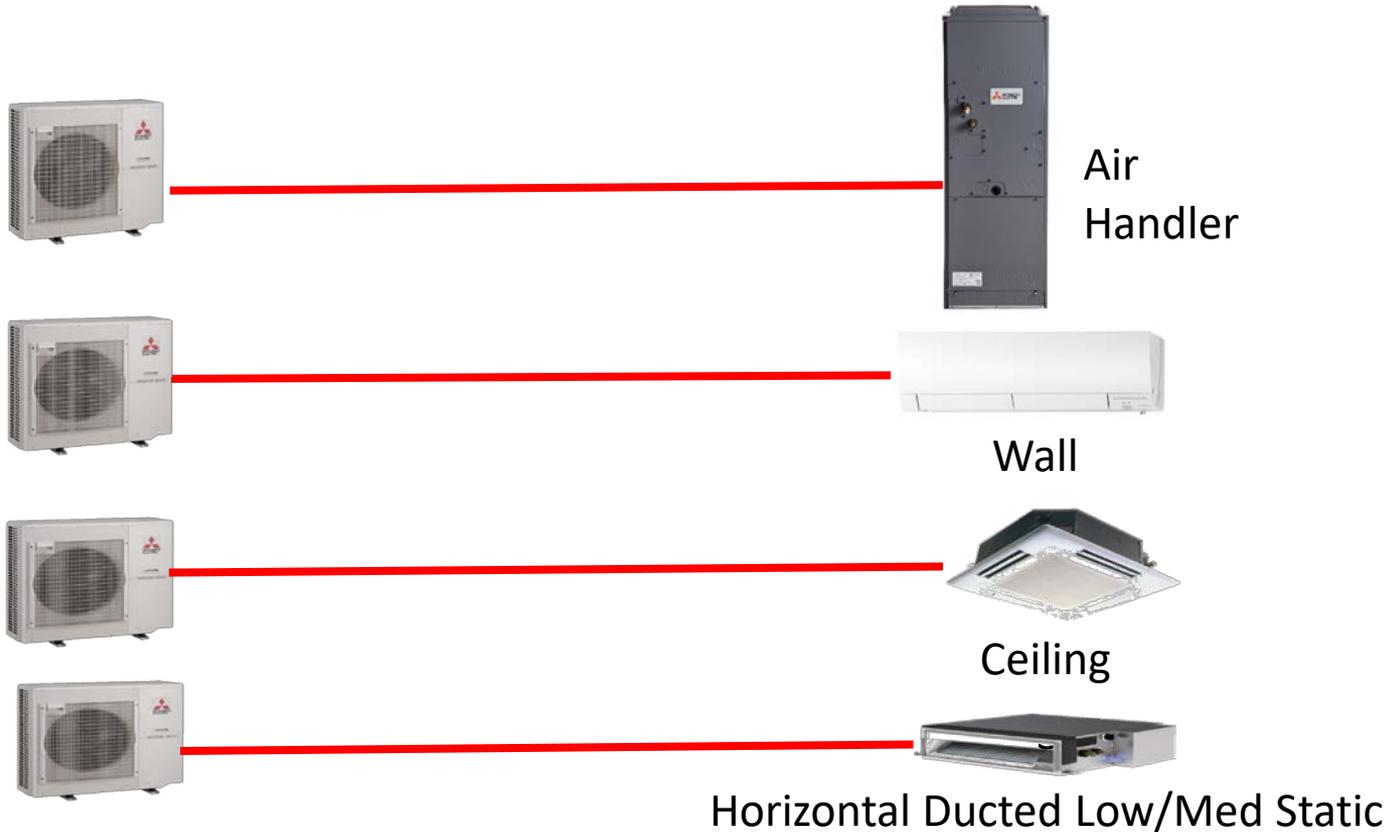
Floor-mounted

Wall-mounted

Multi-position air
handler



Single Zone (Capacity ½ to 3½ tons)



Multi-Zone Systems MXZ Series* (Capacity 1½ to 5 tons)

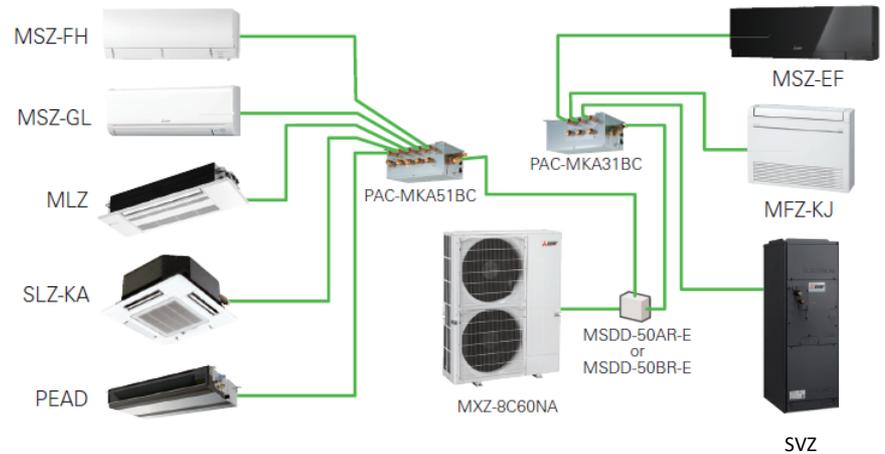
Up to 8 Zones

EXAMPLE SYSTEM

Smaller MXZ 2, 3, 4 and 5 ports
(example of MXZ-5C42NA2 system)



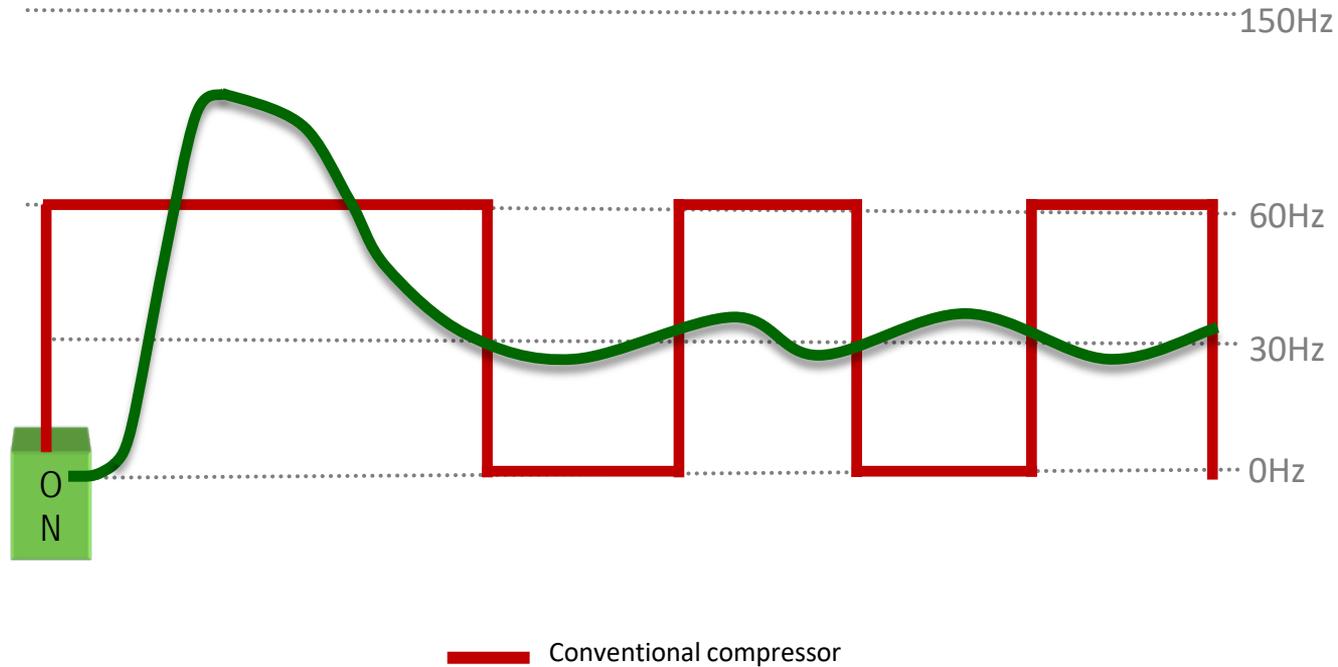
Power Multi MXZ-8C48/60NA



*Compatible with M-Series & P-Series Indoor Units
(Check compatibility table for details.)

Why Are they So Efficient?

INVERTER Technology



Energy Efficiency – Heat Pumps Not Created Equal



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



vs.



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



vs.



Heat Pumps AHRI 477,712 Listed.

319,637	67%
127,272	27%
16,092	3%

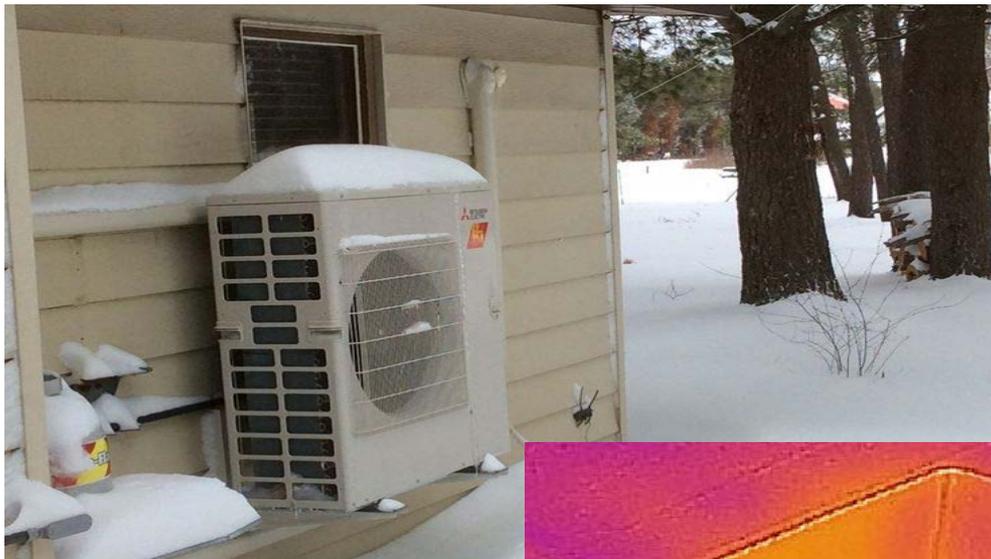
SEER

15
16
18

Variable Speed Heat Pumps AHRI 8,240

98%	8,095
96%	7,926
67%	5,555

Mini-Splits Great For Cold Weather Performance



mi COMMERCE
DEPARTMENT
ENERGY RESOURCES

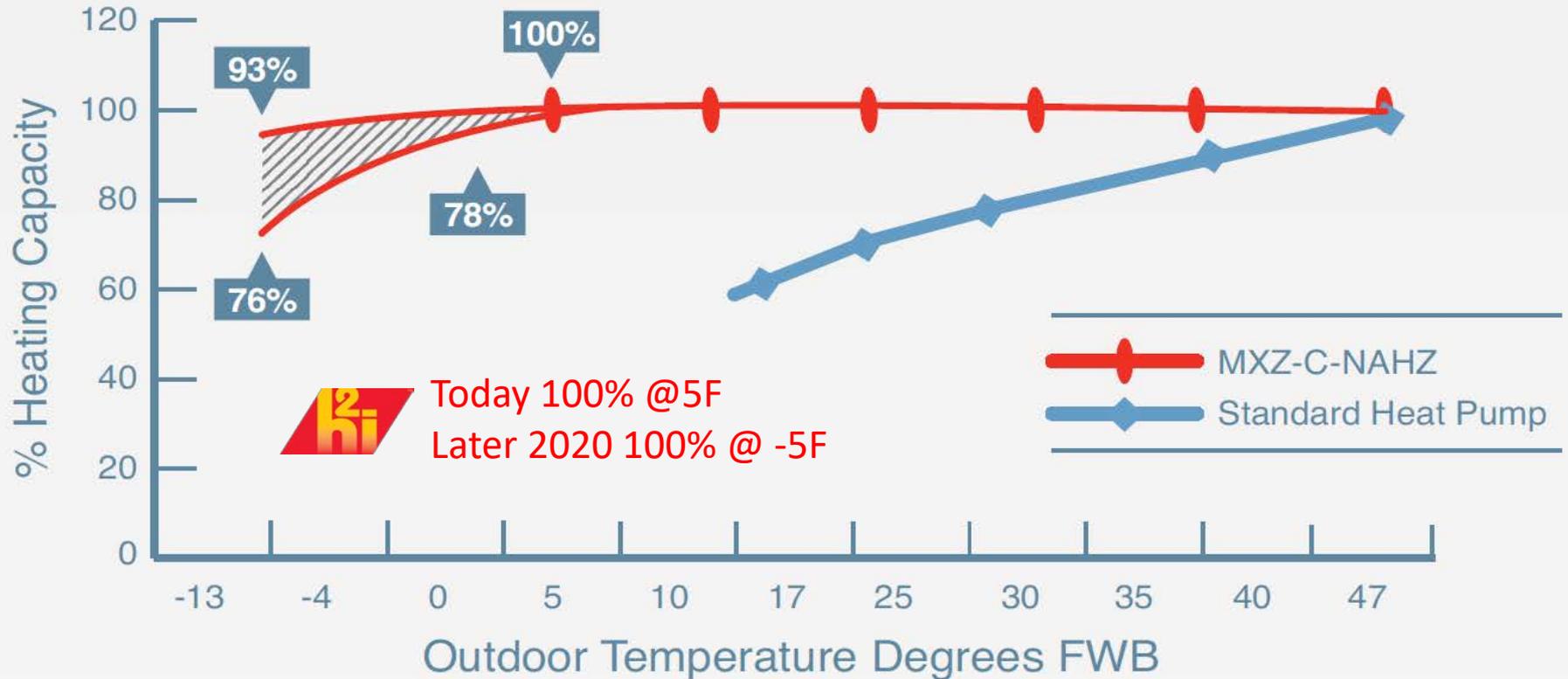
Cold Climate Air Source Heat Pump

11/1/2017

Contract # 86417

Conservation Applied Research and Development (CARD) FINAL Report
Prepared for: Minnesota Department of Commerce, Division of Energy Resources
Prepared by:
Ben Schoenbauer, Center for Energy and Environment
Nicole Kessler, Center for Energy and Environment
Marty Kushler, ACEEE

H2i MXZ HEATING CAPACITY AT LOW TEMPERATURES*



Cold Climate Heat Pump Specifications

Northeast Energy Efficiency Partnerships



Cold Climate Air-Source Heat Pump Specification (Version 3.0)

As facilitated by Northeast Energy Efficiency Partnerships (NEEP)

EFFECTIVE JANUARY 1, 2019

The following specification defines a set of performance requirements and reporting requirements to meet the voluntary "Cold-climate Air-Source Heat Pump Specification" (ccASHP 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 loads, equipment capacities at design temperatures, and other important factors before selecting equipment.

Scope

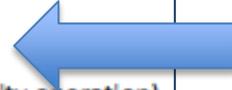
- Air-to-air, split system heat pumps
- Indoor and outdoor units must be part of an AHRI matched system, defined by federal regulation 10CFR 5430.2 as a *central air conditioning heat pump*
- Compressor must be variable capacity (three or more distinct operating speeds, or continuously variable)
- Non-ducted ASHP systems¹
 - Single-zone ASHP systems with non-ducted indoor units (i.e. wall, ceiling, floor, etc.)
 - Multi-zone systems rated with non-ducted indoor units
- Ducted ASHP systems²
 - 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

¹ Often referred to as "ductless" ASHP system. These systems do not utilize any air-ducts for distribution.

² System utilizes some form of air ducts for distribution.

Performance Requirements

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



NEEP'S GOLD CLIMATE AIR SOURCE Heat Pump List

Search Products: Brand: Mitsubishi Electric, Model #: AHRI #, Unit#: AHRI, Model or Ur, Ducting Configuration: All Configuratic, Heating Capacity (Rated Btu/hr @47°F): 0 to 80000, Heating Capacity (Max Btu/hr @5°F): 0 to 80000

Grid View | List View | Download Product List

Brand	Model #, AHRI #, Unit#	Ducting Configuration	Heating Capacity (Rated Btu/hr @47°F)	Heating Capacity (Max Btu/hr @5°F)
Mitsubishi Electric	M-Series H2i AHRI #: 204627044	Singlezone Ducted, "Compact Ducted"	15,000 Max Btu/hr @5°F 15,000 Rated Btu/hr @47°F 12,000 Rated Btu/hr @95°F	COP @5°F: 2.09 HSPF: 11
Mitsubishi Electric	P-Series H2i AHRI #: 204276767	Singlezone Ducted, "Compact Ducted"	25,000 Max Btu/hr @5°F 25,000 Rated Btu/hr @47°F 24,000 Rated Btu/hr @95°F	COP @5°F: 2.01 HSPF: 11
Mitsubishi Electric	M-Series H2i AHRI #: 204627045	Singlezone Ducted, "Compact Ducted"	18,000 Max Btu/hr @5°F 18,000 Rated Btu/hr @47°F 15,000 Rated Btu/hr @95°F	COP @5°F: 1.82 HSPF: 9.9

Cold Climate Heat Pump Specifications (Future)

Energy Star



DRAFT 6.0

Table 3: Energy-Efficiency Criteria for Certified Residential ASHPs

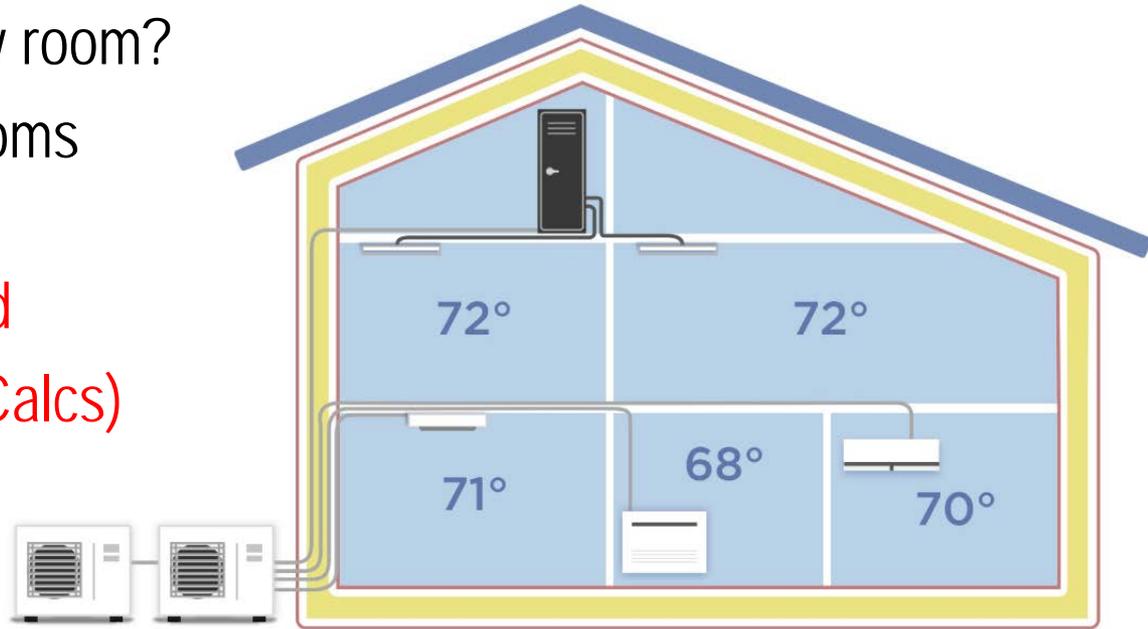
For purposes of ENERGY STAR certification, an ASHP model must be designated as either Moderate and Hot Climate or Cold Climate and meet the associated requirements in Table 3.



Product Type	Moderate and Hot Climate			Cold Climate				
	SEER	EER	HSPF	SEER	EER	HSPF	COP @ 5°F	Percentage of Heating Capacity @ 5°F
ASHP Split Systems	≥ 16.00	≥ 12.50	≥ 8.50	≥ 16.00	≥ 11.50	≥ 9.00	1.75	80%
ASHP Single Package Equipment ¹	≥ 16.00	≥ 12.00	≥ 8.20	≥ 16.00	≥ 11.00	≥ 9.00	1.75	80%

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

Best Practice

①

②

③



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

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ENERGY STAR[®]

HVAC Promotions



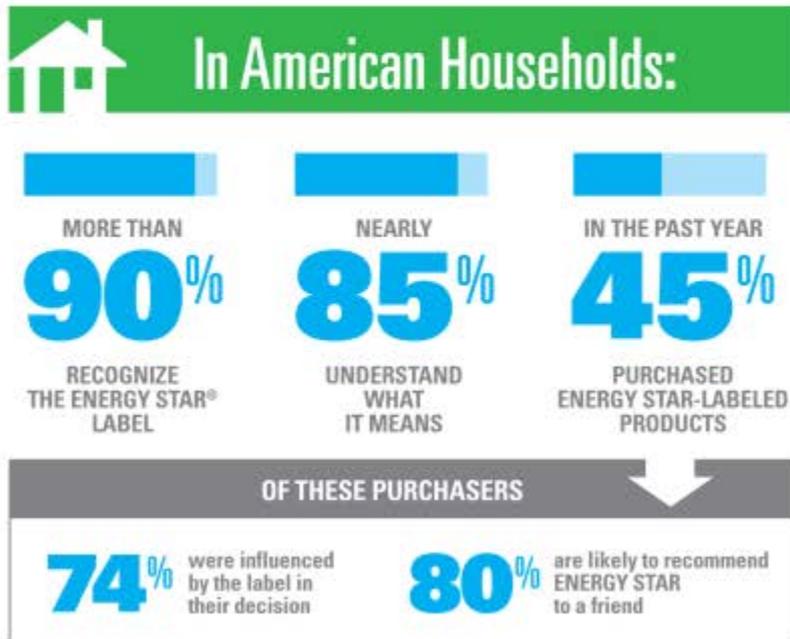


THE VALUE OF ENERGY STAR



SAVE TODAY. SAVE TOMORROW.
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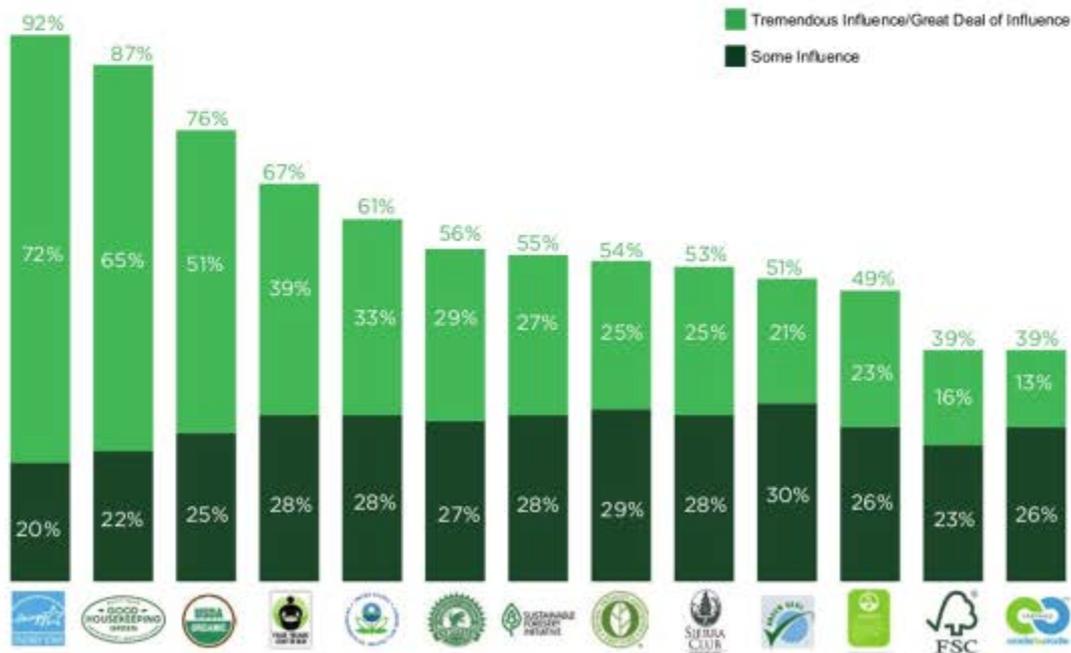
Strong Brand Identity & Awareness





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Clear, Functional Benefit





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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.**





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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**.



+



=





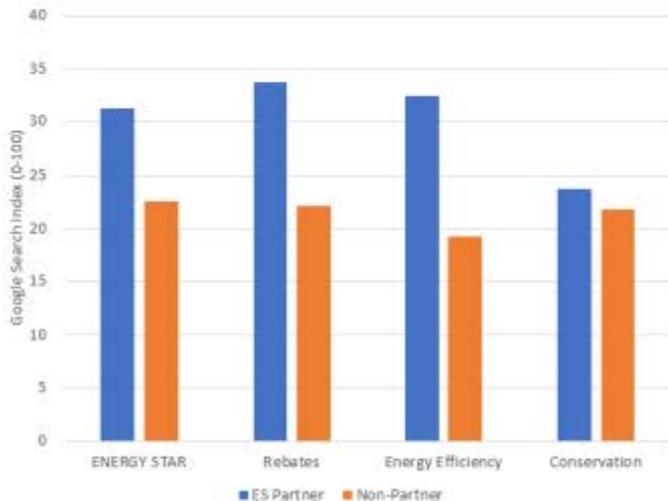
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Mutually Beneficial Relationship

- 2017 study demonstrates that when a utility partners with **ENERGY STAR**, it results in **increases in Google searches** for related items

Google

My local electric utility rebates





Increasing Demand: Getting Consumers to Ask for ENERGY STAR HVAC



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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.





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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

The screenshot shows the desktop version of the ENERGY STAR Heating and Cooling Guide website. The header includes the ENERGY STAR logo and navigation links for 'ENERGY EFFICIENT products', 'ENERGY SAVINGS at home', 'ENERGY EFFICIENT new homes', and 'ENERGY EFFICIENT FOR buildings & plants'. The main content area features a large purple banner with the title 'ENERGY STAR HEATING AND COOLING GUIDE' and a photo of a family. Below the banner are four colored buttons: 'LEARN THE SYMPTOMS' (blue), 'PURCHASE AND INSTALLATION GUIDANCE' (orange), 'ENERGY STAR REBATE FINDER' (green), and 'SAVINGS CALCULATOR' (teal). Each button is accompanied by a question and a 'LEARN MORE' link.





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Energy Efficient Products

The simple choice for energy efficiency

- ENERGY EFFICIENT PRODUCTS
- ENERGY SAVED AT HOME
- ENERGY EFFICIENT NEW HOMES
- ENERGY STAR QUALITY BUILDINGS & PLANTS

Products that earn the ENERGY STAR are independently certified to save energy, save money and protect the climate.

SYMPTOMS | **GUIDANCE** | SEE DEALS | SAVINGS



It may be time for a change if:

- Your equipment is more than 10 years old or it needs frequent repairs and your energy bills are going up.
- The age and condition of your heating or cooling equipment may have caused it to become less efficient. Oversized units tend to have shorter lives due to "short-cycling" or running on and off frequently which inflicts excessive wear and tear on the compressor. Consider replacing it with newer, more efficient ENERGY STAR certified equipment.
- Some of your rooms are too hot or cold. This could also be due to inadequate air sealing, air leaks or insulation. [Learn more →](#)
- Your system has humidity problems, excessive dust or noises that never seem to get comfortable (this could also be due to poorly insulated ductwork). [Learn more →](#)
- You tend to leave your thermostat set at one constant temperature. [Find more →](#)
- You could be missing a great opportunity to let an ENERGY STAR certified smart thermostat adjust the temperature to save energy while you are asleep or away. [Find more →](#)

[← Home](#) [Purchase and Installation Guidance →](#)

Energy Efficient Products

Products that earn the ENERGY STAR are independently certified to save energy, save money and protect the climate.

SYMPTOMS | **GUIDANCE** | SEE DEALS | SAVINGS

PURCHASE AND INSTALLATION GUIDANCE
GET THE BEST PERFORMANCE FROM YOUR HVAC SYSTEM

What type of heating and/or cooling system are you thinking of purchasing?

- Control cooling and/or heating delivered through duct work and air vents (i.e. forced air)
- No existing ductwork

[← Home](#) [Find Deals →](#)

Energy Efficient Products

Products that earn the ENERGY STAR are independently certified to save energy, save money and protect the climate.

SYMPTOMS | **GUIDANCE** | **SEE DEALS** | SAVINGS

SEE DEALS! FIND HVAC PRODUCTS AND RELATED

What type of heating and/or cooling system are you thinking of purchasing?

- Central air conditioning
- Heat pump (air conditioning and heat delivered through duct work and air vents (i.e. forced air))
- Gas furnace
- Geothermal heat pump (air conditioning and heat without ducts)
- Boiler

[← Home](#) [Energy Calculator →](#)

Energy Efficient Products

Products that earn the ENERGY STAR are independently certified to save energy, save money and protect the climate.

SYMPTOMS | **GUIDANCE** | SEE DEALS | **SAVINGS**

SAVINGS CALCULATOR
SEE HOW MUCH YOU CAN SAVE WITH ENERGY STAR

The average household spends more than \$200 a year on energy bills, with nearly half going to heating and cooling. HVAC equipment that earns the ENERGY STAR label is independently certified to save energy, save money and help protect the climate.

What type of heating and/or cooling system do you have in your home?

- Control cooling and/or heating delivered through duct work and air vents (i.e. forced air)

What type of heating and/or cooling system do you have in your home?

- Control air conditioning only
- Control air conditioning and heating delivered through duct work and air vents (i.e. forced air) using a heat pump

Split system or single package?

- Split System
- Single Package

Enter your zip code?

What is the furnace size (in tons or BTU's) of your existing system?

10,000 BTU's - 1 ton

If you are unsure, what is the approximate footage of the space you are heating/cooling?

What year was your existing system installed?

2010

Do you currently have a smart thermostat with your existing system?

- Yes
- No

[Search](#)

[← Home](#) [Learn the Symptoms →](#)





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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.



The screenshot shows the ENERGY STAR website interface for Heat Pumps (Ductless). At the top, there are navigation links for 'All Certified Products', 'View Product Cards by Label', 'Save Energy at Home', 'Join Our Members', and 'Product Specifications Search'. The main header features the 'ENERGY STAR Certified' logo and a 'Change Product' button. Below this, a large purple banner reads 'Heat Pumps (Ductless)' and states: 'ENERGY STAR certified ductless heat pumps are an energy-efficient, environmentally-friendly way to keep your home comfortable without the trouble or expense of adding ductwork.' A 'WATCH VIDEO' button is present. To the right, a graphic shows three stylized figures and the text 'How to Stay Warm in Cool Weather' and 'ASK THE EXPERT'. Below the banner are three buttons: 'BUYING GUIDANCE', 'CALCULATE SAVINGS', and 'WHEN IS IT TIME TO REPLACE?'. A text block explains: 'Use this tool to identify the brands that offer ENERGY STAR certified equipment. If you enter the zip range you want, you can see which model within the home ENERGY STAR options would work for you. Ask your contractor to confirm that the specific system you are getting is ENERGY STAR certified.' The search results section shows '4 Records Found' and a 'Filter Your Results' section with a search bar. The results are filtered by zip code '48077'. Two product listings are shown, both for 'Ductless Heat Pump (mini & multi split) Systems'. The first listing is for 'Mitsubishi Electric - S-Series' with a price of '\$100-\$150' and a link to 'View website to learn more'. The second listing is for 'Mitsubishi Electric - NULL' with a price of '\$100-\$150' and a link to 'View website to learn more'. Below the listings are two detailed product cards for Mitsubishi Electric. The first card is for the 'S-Series' with a cooling capacity of 36,000-60,000 BTU/h (3.0-5.0 tons), a heating capacity of 42,000-65,000 BTU/h (3.5-5.5 tons), and an EER of 13.5-11.7. The second card is for the 'NULL' series with a cooling capacity of 36,000-60,000 BTU/h (3.0-5.0 tons), a heating capacity of 42,000-65,000 BTU/h (3.5-5.5 tons), and an EER of 11.2-12.8. The bottom of the page shows the start of a third product card for the 'P-Series'.

SEER[®]

- 15.0+ (135)
- 16.0+ (135)
- 18.0+ (134)
- 20.0+ (129)
- Do not filter

EER[®]

- 12.5+ (135)
- 13.0+ (117)
- Do not filter

HSPF[®]

- 8.5+ (135)
- 9.0+ (135)
- 9.8+ (131)
- 10.0+ (130)
- Do not filter



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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

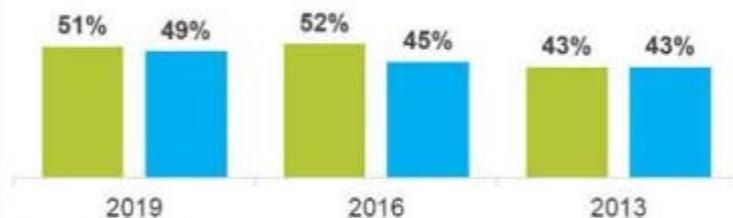
Sources of Information



Internet



Contractors



THE INTERNET

The internet has become an important source for consumers' HVAC purchase information.

Copyright © Decision Analyst 2019



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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.

A better way to 

A better way to heat
and 

A better way to heat
and cool your home
and help the 

A better way to heat
and cool your home
and help the planet.

Look no further.

Look no further.



**Get the Heating
& Cooling Guide** 

To Date: 5,717,678 Impressions, \$.38 CTC





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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





Fall 2020 Product Promotion Plans



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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

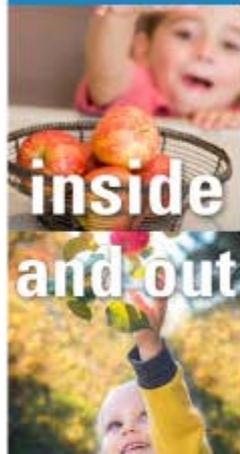
- Provide promotional materials and tools with compelling look and feel for effective consumer engagement and, ultimately, adoption.
 - ✓ Resources to support multiple media channels from online and social to more traditional advertising.

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.



The
Perfect
Climate



Look for the
ENERGY STAR®
label on smart
thermostats to
save energy
and money.



2020 Outreach Plan: ENERGY STAR® PRODUCTS



JAN | FEB | MAR | APR | MAY | JUN | JULY | AUG | SEPT | OCT | NOV | DEC | JAN

BRAND CAMPAIGNS

EARTH DAY

ENERGY STAR DAY

HOLIDAY

- APPLIANCES
- SMART THERMOSTATS
- ELECTRONICS
- LIGHTING

PRODUCT PROMOTIONS

POOL PUMPS FRIGES 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

MOTHER'S DAY

LABOR DAY

BLACK FRIDAY



 **Materials Available:**
energystar.gov/marketing_materials



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	Planning to Participate (as of 12/12)		2018 (Reference)
	Number of EEPS	Households Served	Households Served in 2018
Total	148	42,836,658	42,553,295
Pool Pumps	48	21,278,947	12,173,158
Refrigerators	37	17,289,297	14,355,889
LED Lighting	55	25,311,185	27,093,740
Smart Thermostats	20	21,997,806	23,440,072
Room AC	16	13,159,659	12,311,218
Laundry	37	20,405,506	24,507,452
Water Heaters	16	17,342,749	24,083,007





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SAVE TODAY. SAVE TOMORROW.
SAVE FOR GOOD.



Nest



The new degree of comfort.®



FRIEDRICH
1883





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2019 Campaign Impacts:



Promotional pages had more than
325,100
pageviews

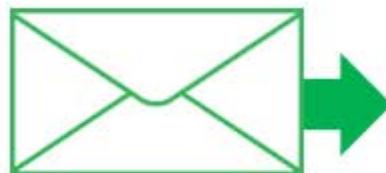
MORE THAN
732 MILLION
IMPRESSIONS in print,
social, and online
media in 2019

732000000

MORE THAN
17,900
PLACEMENTS
through NAPS
and Brandpoint



5 MILLION
VIDEO VIEWS



6.2 MILLION
newsletters delivered





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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.





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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.me.com
 - Jill Vohr, EPA, Vohr.Jill@epa.gov
 - Nate Jutras, EPA, Jutras.Nathaniel@epa.gov

