COMMERCE DEPARTMENT
ENERGY RESOURCES

Welcome

Conservation Applied Research & Development (CARD) Webinar

April 1, 2020

Understanding the Market Barriers & Opportunities for Cold Climate Air Source Heat Pumps in Minnesota Residential Households

Market Barriers & Opportunities for Cold Climate Air Source Heat Pumps in Minnesota

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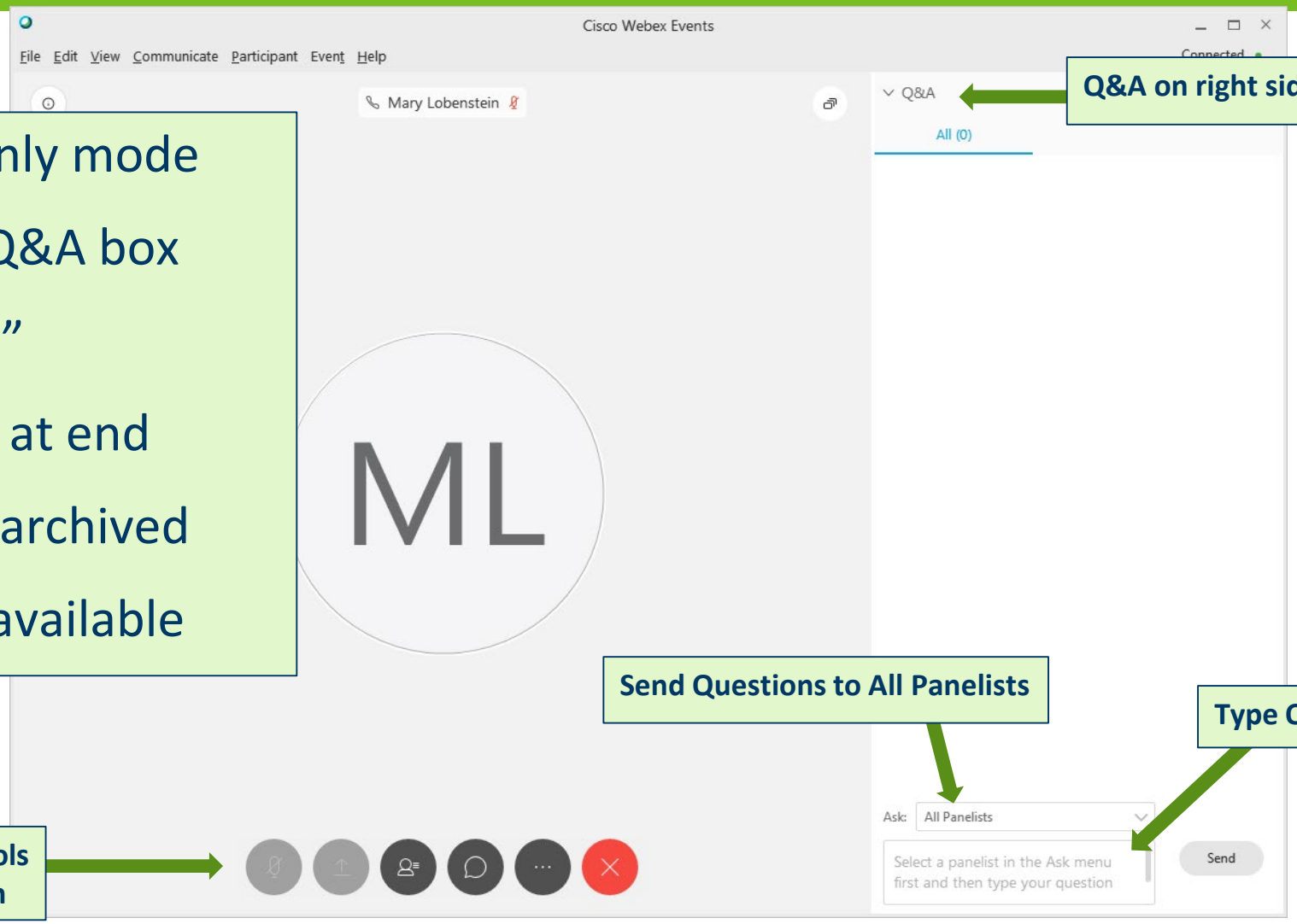
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Webinar Basics

- Attendees in listen-only mode
- Type questions into Q&A box
- Send to “All Panelists”
- Questions addressed at end
- Webinar recorded & archived
- Slide set will also be available



Q&A on right side of WebEx panel

Send Questions to All Panelists

Type Questions in Q&A box

Additional WebEx Controls at Bottom of Your Screen

Minnesota Applied Research & Development Fund

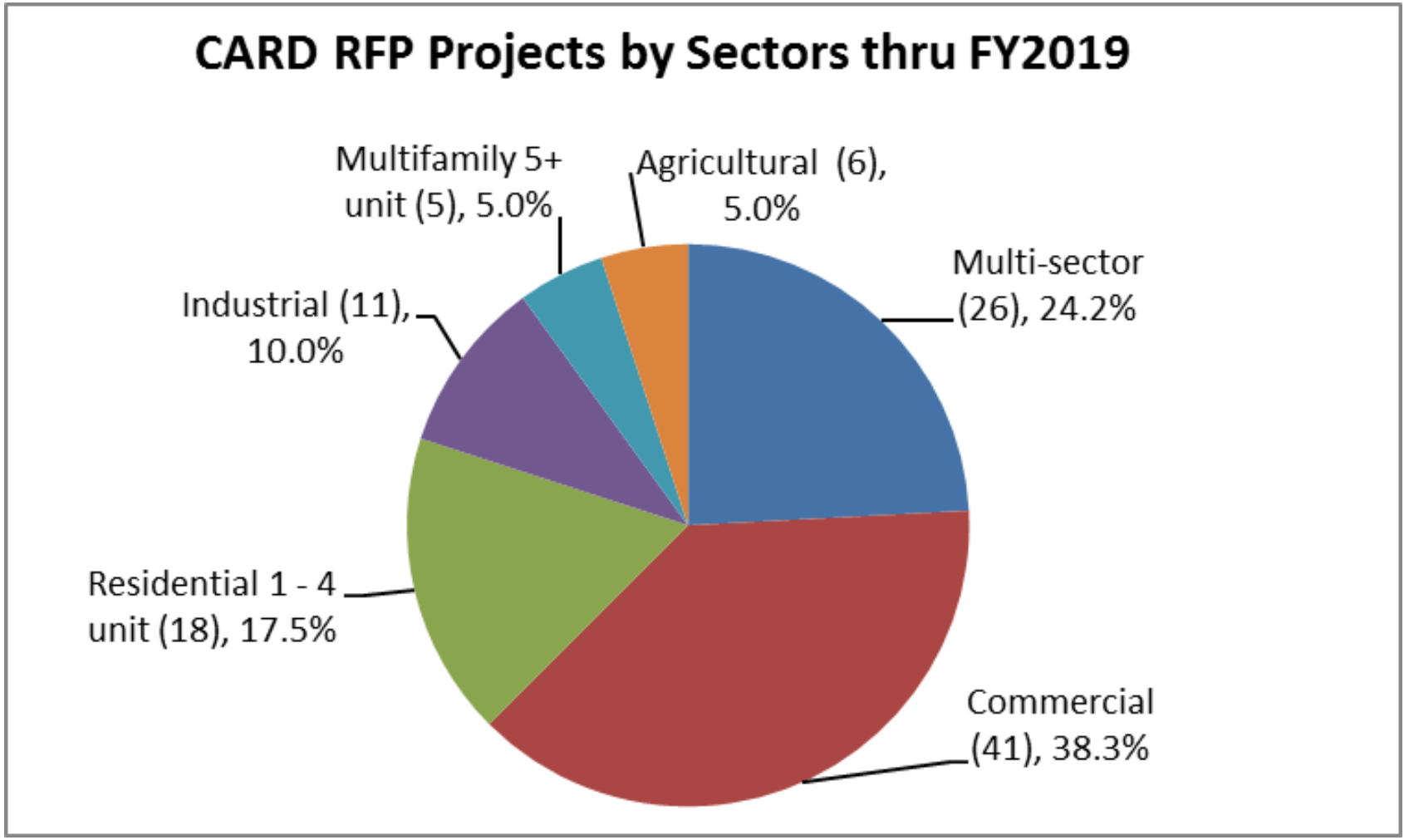
- **Purpose to help Minnesota utilities achieve 1.5% energy savings goal by:**
  - ***Identifying new technologies or strategies to maximize energy savings;***
  - ***Improving effectiveness of energy conservation programs;***
  - ***Documenting CO_2 reductions from energy conservation programs.***

Minnesota Statutes §216B.241, Subd. 1e

- **Utility may reach its energy savings goal**
  - **Directly through its Conservation Improvement Program (CIP)**
  - **Indirectly through energy codes, appliance standards, behavior, and other market transformation programs**

State Capitol Image: Courtesy Minnesota Department of Administration

CARD RFP Spending by Sector thru FY2019



RFP Summary

- 10 Funding Cycles
- 472 proposals
- 121 projects funded
- $27.4 million in research

Agenda

- Research Objectives and Research Activities
- Air Source Heat Pump Overview
- Key Findings
- Conclusions and Recommendations



Research Objectives

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Purpose

Moving **cold climate ASHPs** from an emerging technology to a leading technology in Minnesota energy-efficiency, **market barriers and opportunities must be understood**







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Objective:

Conduct a market research study to assess the following:

- **Awareness of and attitudes toward ccASHPs**
- **Perceived benefits that resonate with consumers**
- **Consumer willingness to purchase ASHPs and contractors willingness to recommend**
- **Challenges and opportunities for manufacturers, distributors, and installers for promoting and installing ccASHPs**

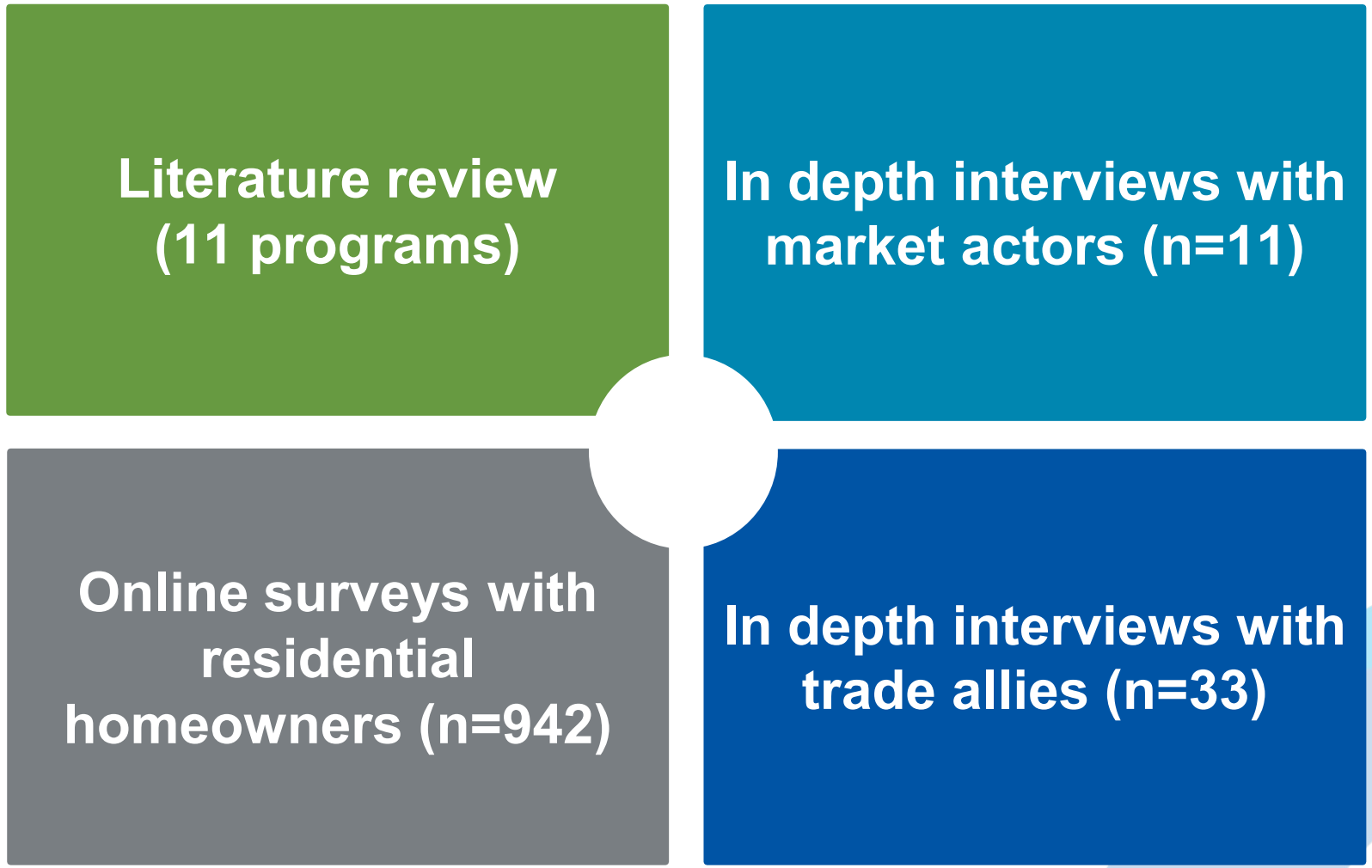


Research Activities

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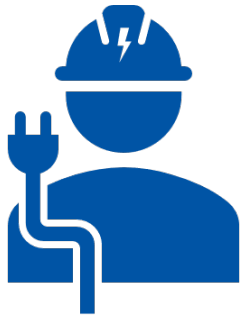
Activities

Market research included four activities



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Contractor and Builder Interviews



- **9 high-volume contractors**
- **5 low-volume contractors**



- **8 high-volume builders**
- **3 low-volume builders**

Online Residential Surveys



Learn about attitudes toward ASHP technologies



942 eligible online residential surveys



Stratified random sample design, based on urban and rural geographic identities



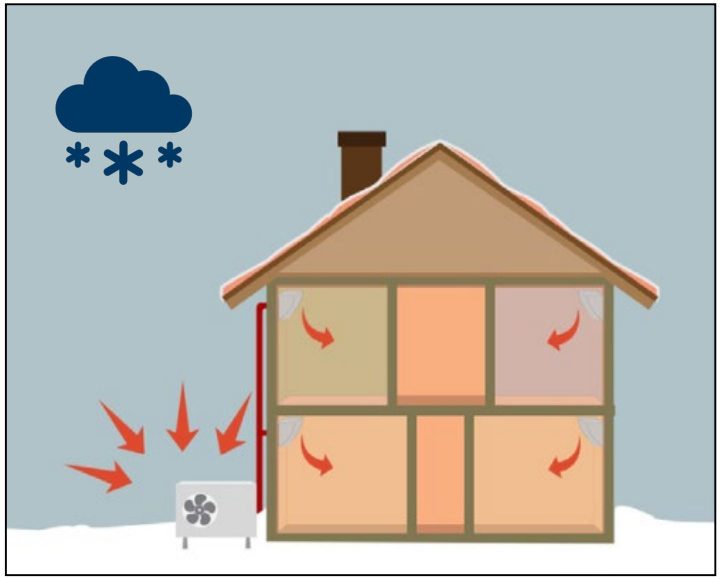
ASHP Overview

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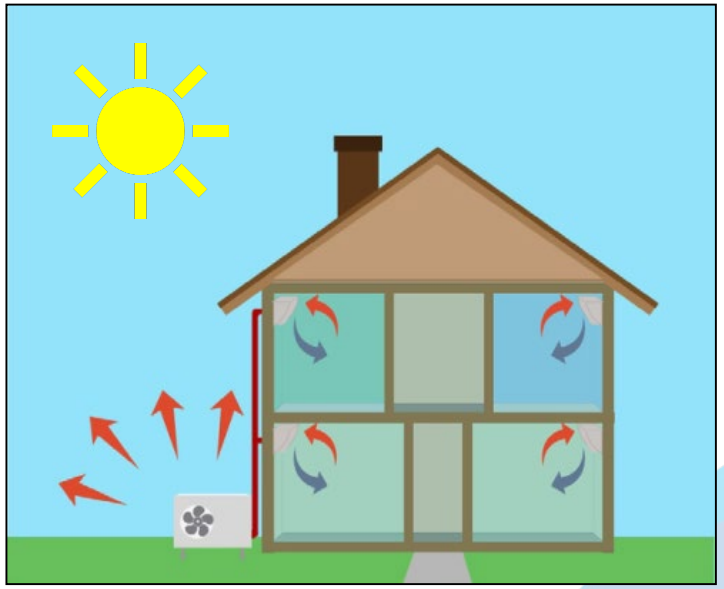
Air Source Heat Pumps (ASHPs)

ASHP's move heat around rather than generate heat

Heating Season



Cooling Season





Key Findings

Cold-Climate Specifications

NEEP and NEEA publish specifications for cold-climate ASHPs

Similarities

- Both organizations use the same heating seasonal performance factor for ductless equipment
- Indoor and outdoor units must be part of an AHRI matched system

Differences

- NEEA specifications do not include ductless systems
- NEEA states that equipment must maintain 80% of the load it was designed to carry at 5°F without backup heating

Current ccASHP Rebate Programs

Most ccASHP rebate programs meet or exceed NEEP's cold-climate specifications

Incentive levels vary from $150 to $2,000

Most are downstream programs

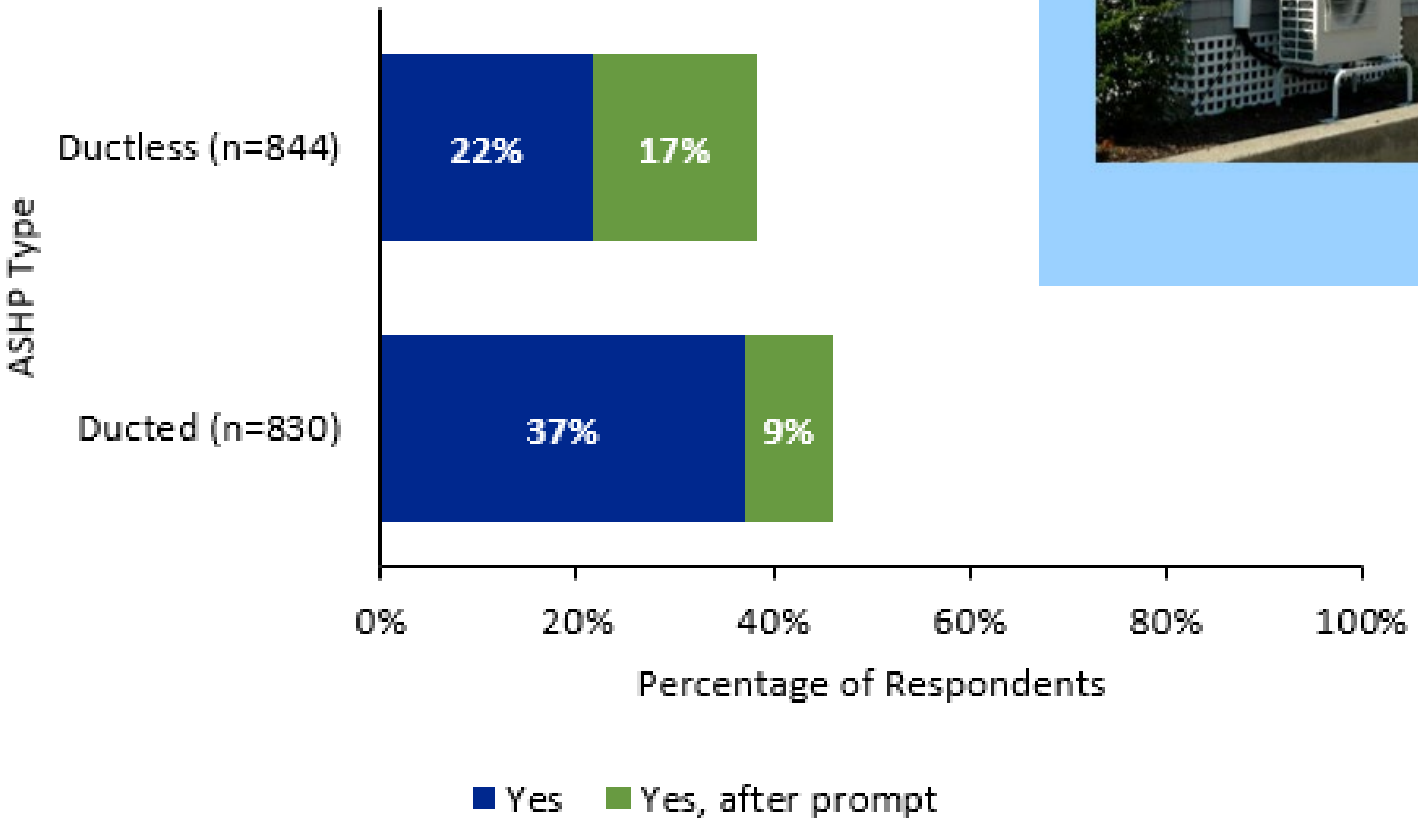
Installations of ductless systems are more common than ducted systems

Trade Ally Awareness and Promotion

Awareness and Promotion of ccASHPs	Concerns
High-volume installers are aware Low-volume are not	Contractors may not understand the technology
High-volume installers are promoting but not installing often	Contractors may not trust the technology works in cold climates
Distributors and manufacturers are aware of and promoting ccASHPs	No industry standards about performance standards

Consumer Awareness

Fewer than half of consumers are aware of air source heat pumps



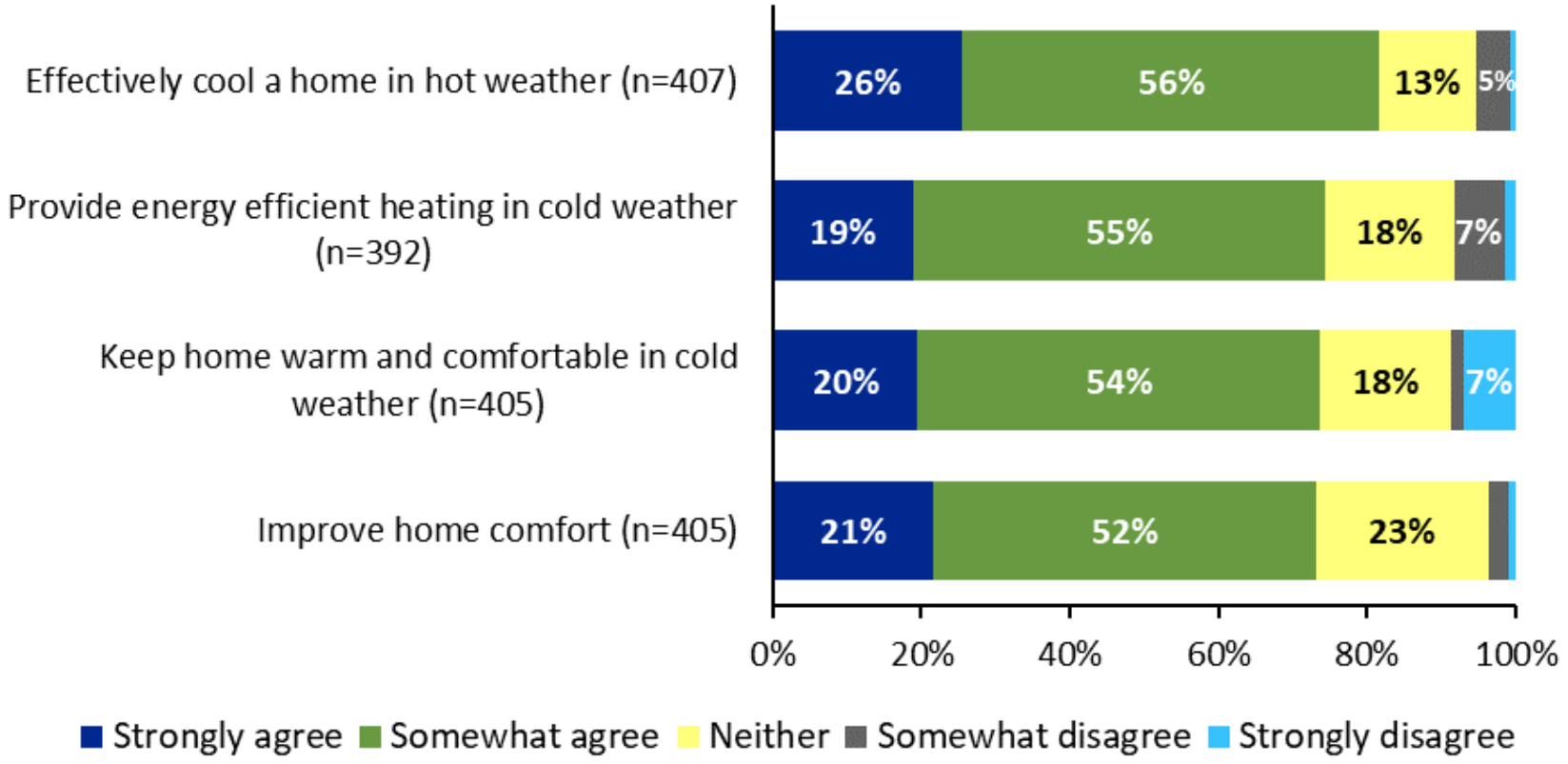




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ASHP Statement Agreement

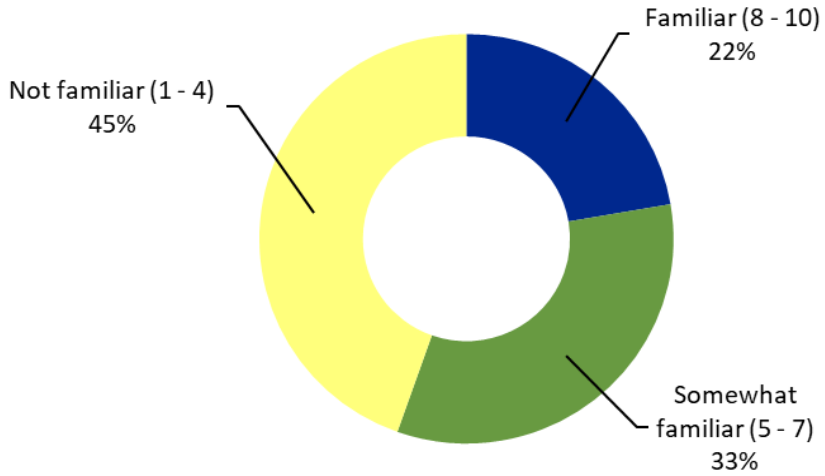
ASHP-aware respondents generally agreed that ASHPs can keep their homes comfortable



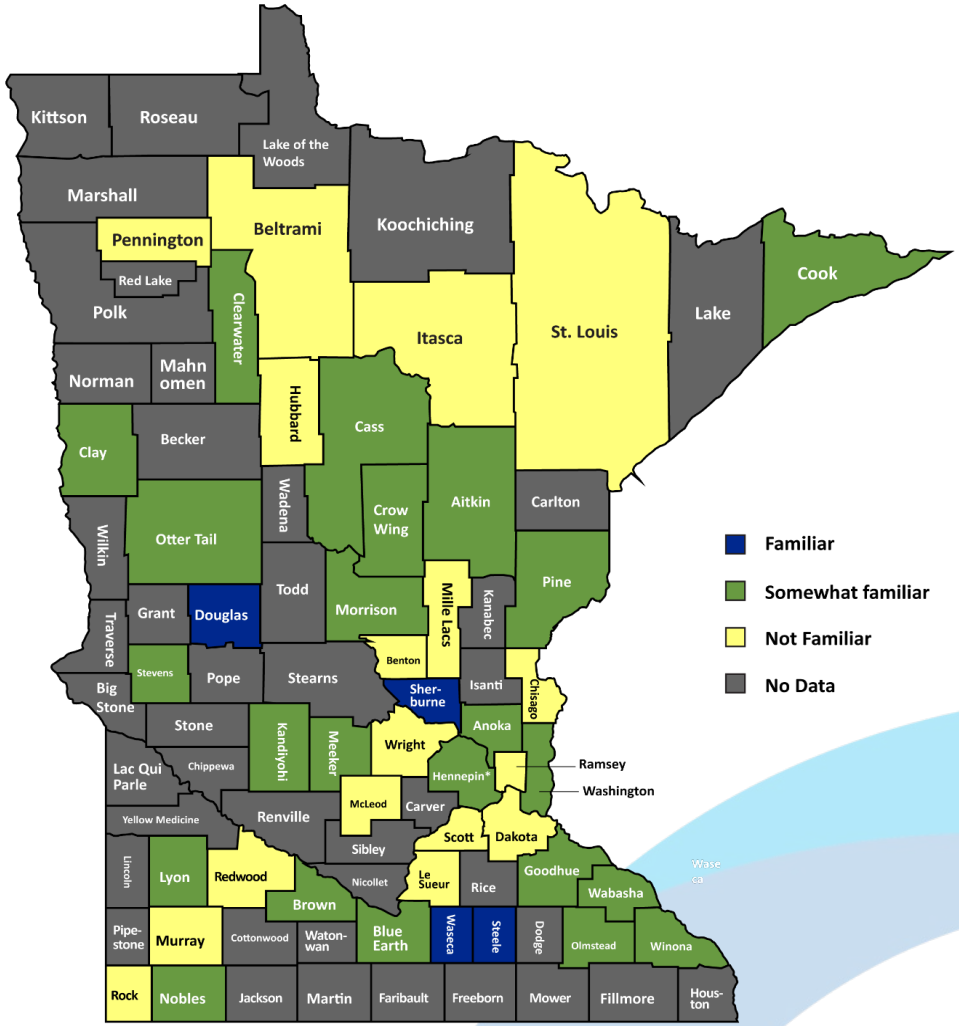
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Customer Awareness and Familiarity with ccASHPs

Only 22% of respondents aware of ccASHPs describe themselves as familiar with the technology



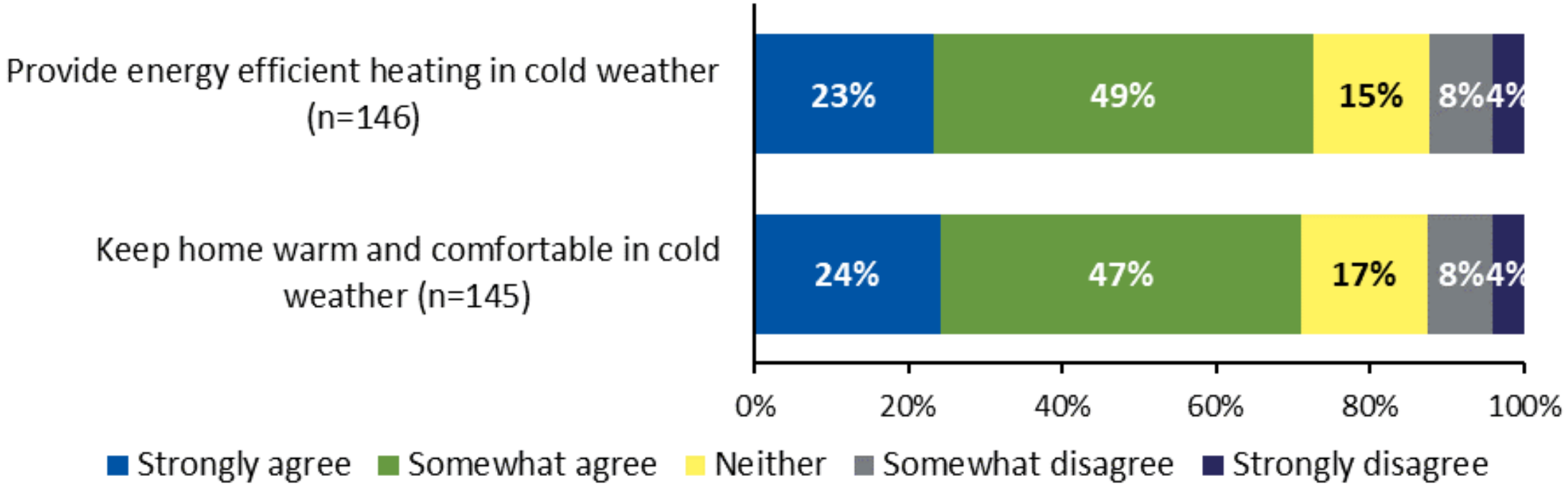
(n=157, mean= 5.1)



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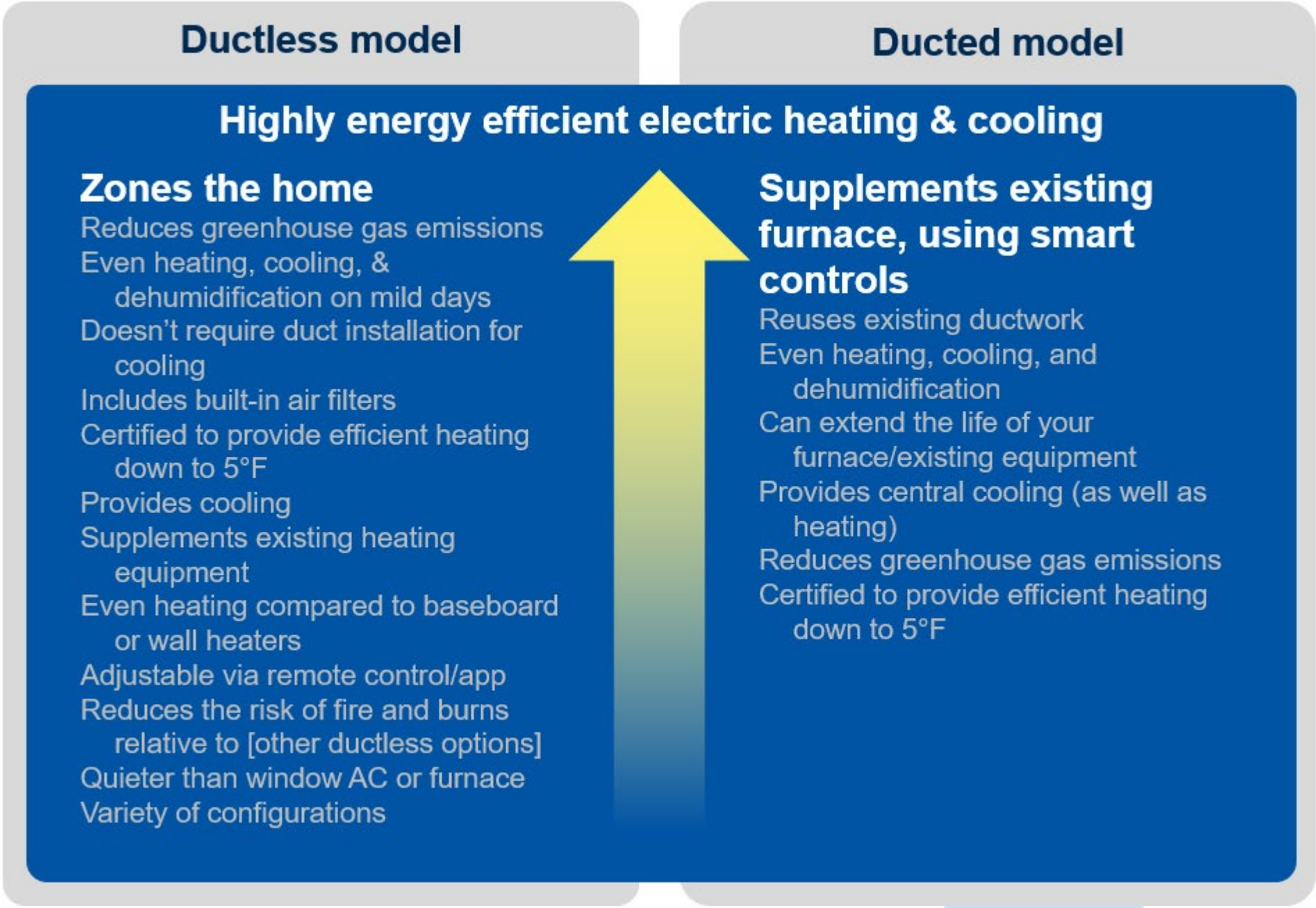
ccASHP Messaging

Most ccASHP-aware respondents agreed that ccASHPs could provide energy-efficient heating in cold weather and keep homes warm and comfortable during the same period



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ASHP Benefits



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ASHP Benefits

Differences

Ductless model

- Highly energy efficient electric heating & cooling
- Zones the home
- Reduces greenhouse gas emissions
- Even heating, cooling, & dehumidification on mild days
- Doesn't require duct installation for cooling
- Includes built-in air filters
- Certified to provide efficient heating down to 5°F
- Provides cooling
- **Supplements existing heating equipment**
- Even heating compared to baseboard or wall heaters
- Adjustable via remote control/app
- Reduces the risk of fire and burns relative to [other ductless options]
- Quieter than window AC or furnace
- Variety of configurations

Ducted model

- Highly energy efficient electric heating & cooling
- **Supplements existing furnace, using smart controls**
- Reuses existing ductwork
- Even heating, cooling, and dehumidification
- Can extend the life of your furnace/existing equipment
- Provides central cooling (as well as heating)
- Reduces greenhouse gas emissions
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Cost Perceptions

Trade allies and program administrators cited upfront costs and the cost of natural gas as barriers

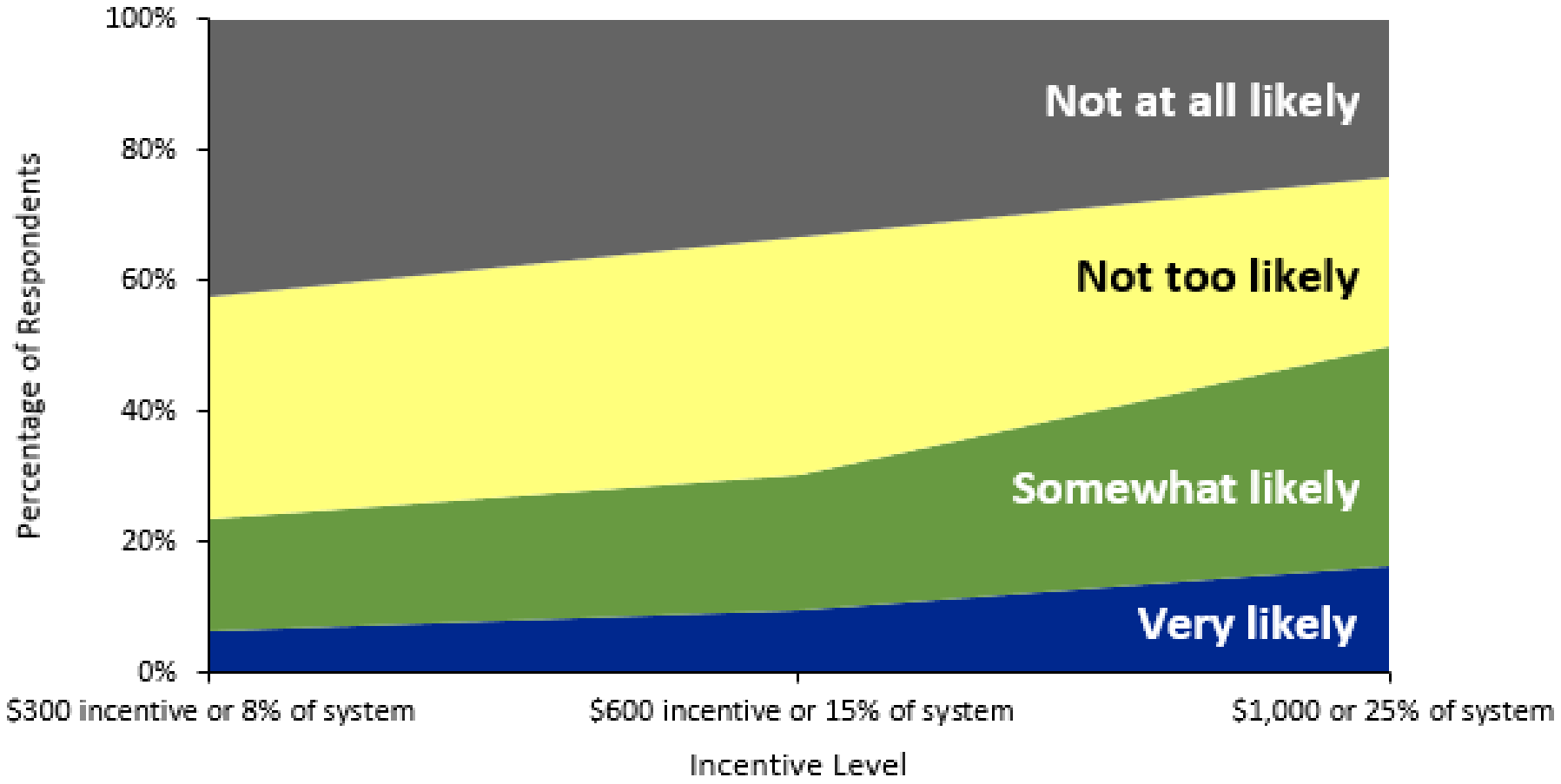
Upfront Costs

- Contractors and builders cited incremental costs
- Manufacturers recognized that ccASHPs tend to be priced higher than standard ASHPs

Cost of Natural Gas

- Natural gas and propane prices influence whether contractors promote ASHPs or ccASHPs

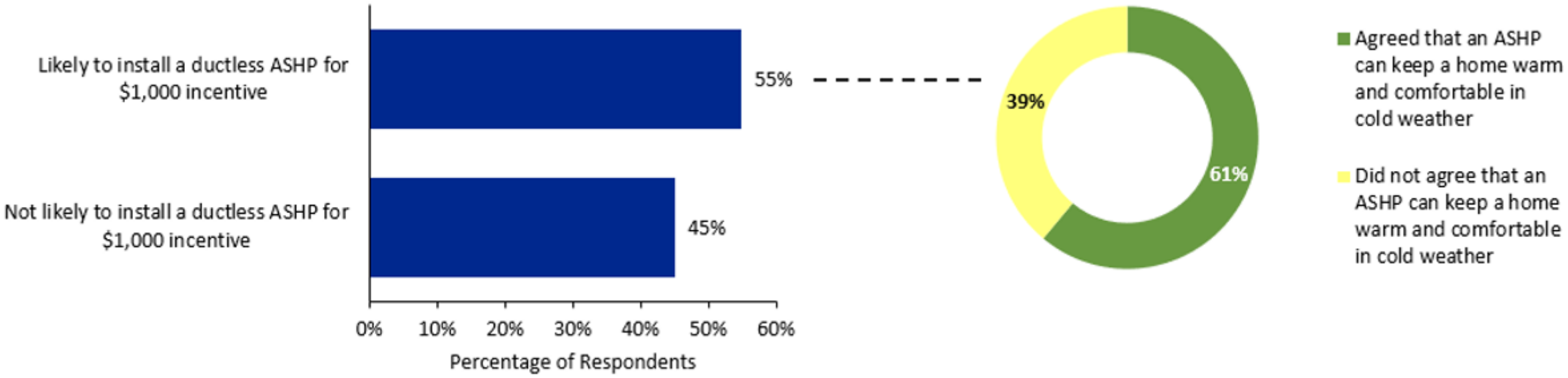
Willingness to Purchase Ductless ASHPs



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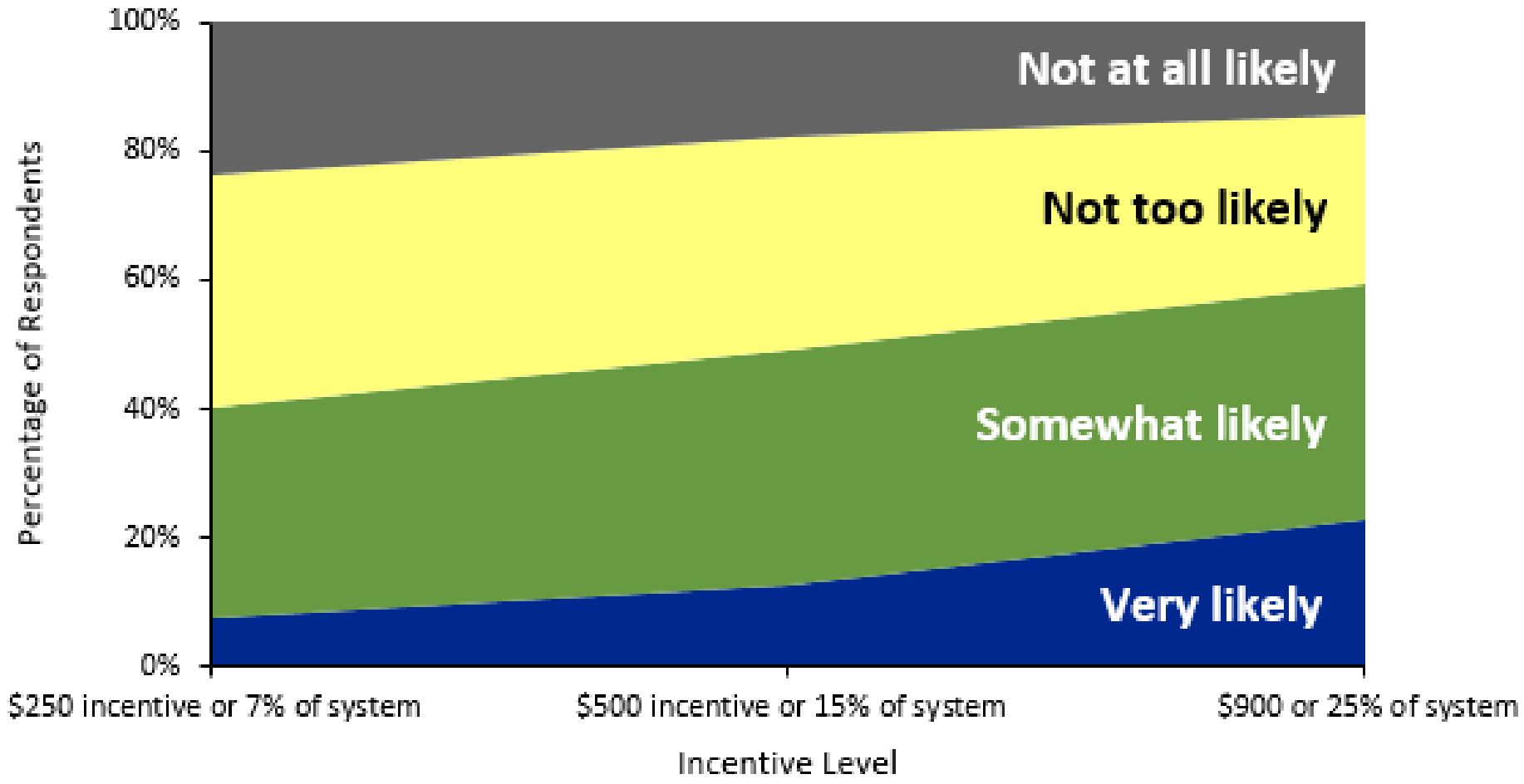
Messaging and Willingness to Pay (Ductless ASHPs)

Attitudes towards the equipment correlated with interest in installing a ductless ASHP



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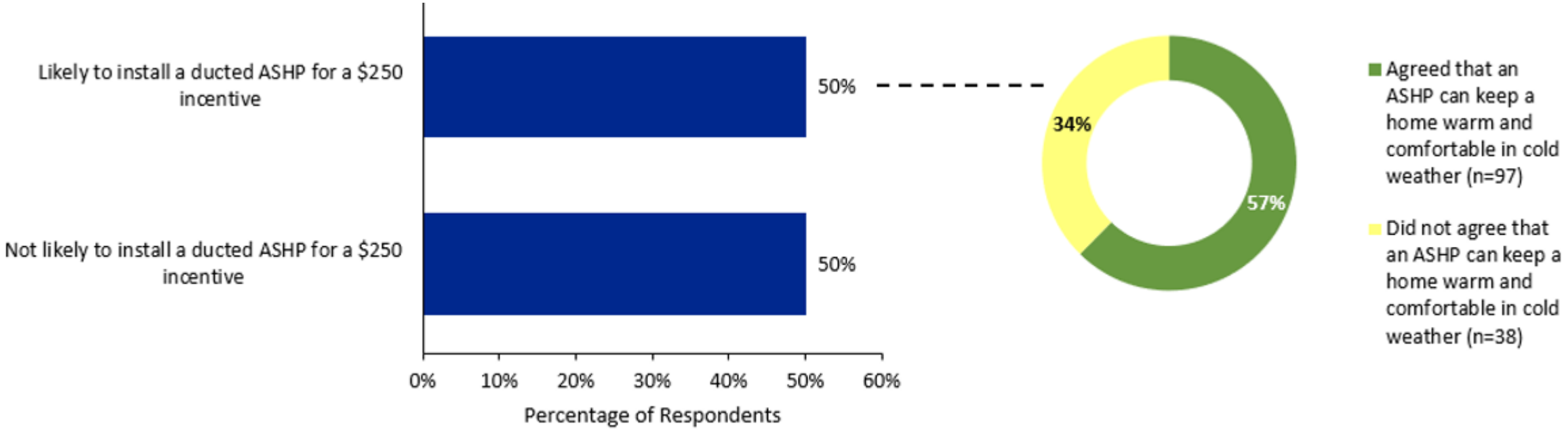
Willingness to Purchase Ducted ASHPs



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Messaging and Willingness to Pay (Ducted ASHPs)

Attitudes about ducted ASHPs influenced respondents willingness to install the equipment



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Program Delivery and Promotion

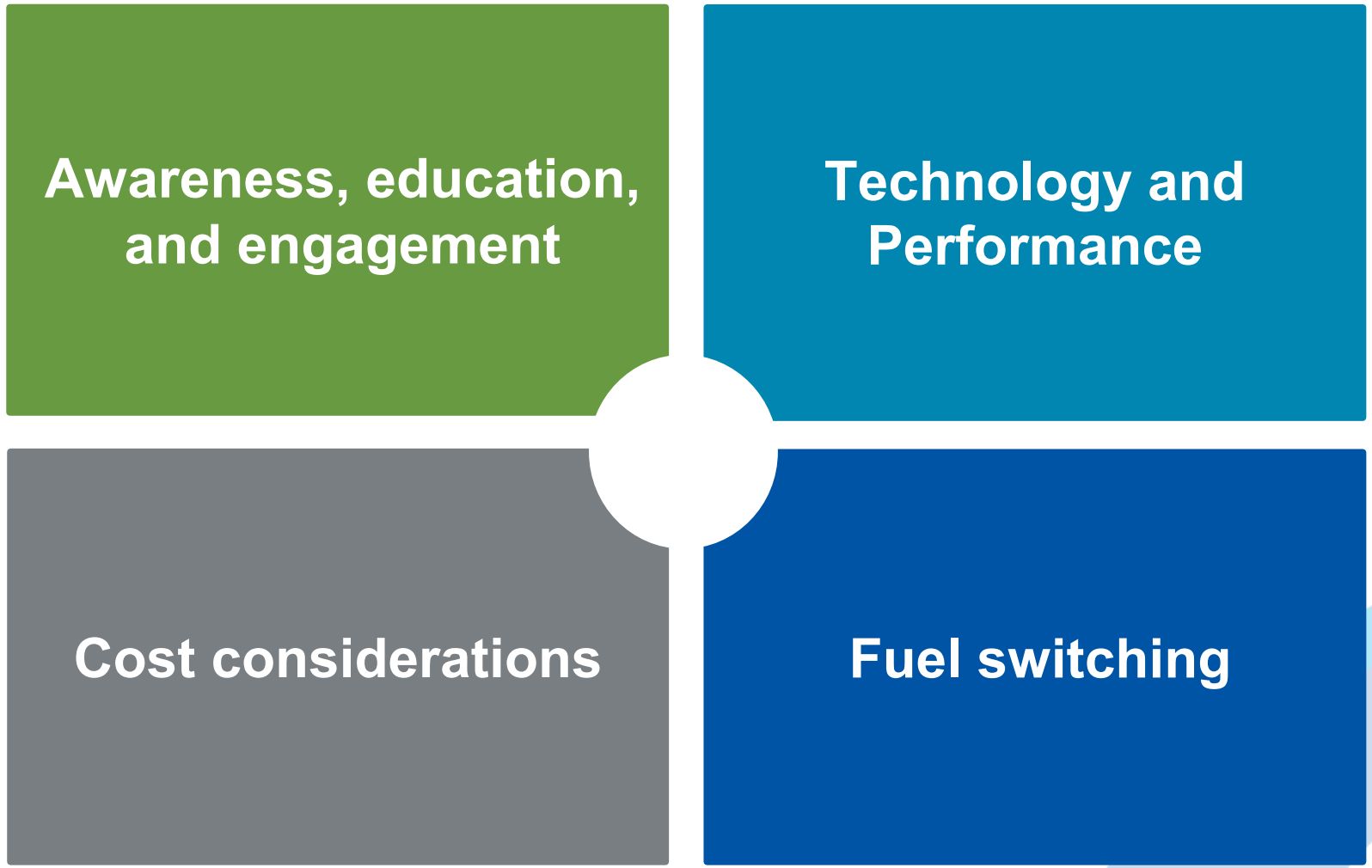
Manufacturers provide equipment to distributors or wholesalers and contractors purchase and install equipment



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Barriers

Barriers to ASHP adoption can be divided into several main areas



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Awareness, Education, and Engagement

- Residential customers lack awareness of ccASHPs
- Some market actors are aware of ccASHPs but their awareness about benefits is lacking
- Some contractors do not feel comfortable sizing or installing ccASHPs

Technology and Performance

- Negative perceptions of heat pumps exist
- Some trade allies and residential households are not sure the equipment will perform in cold weather
- Programs do not widely agree on best-practice guidelines for sizing, selecting, and installing equipment
- No industry-standard test procedure exists for ASHPs below 17 degrees

Cost Considerations

- Contractors, builders, and distributors said high upfront costs hindered greater ccASHP adoption
- Contractors, manufacturers, and distributors said low natural gas and/or propane prices hinder ccASHP adoption
- Incentives are necessary for adoption

Fuel Switching

- Regulations against fuel switching poses a primary barrier for ccASHP adoption according to program administrators



Conclusions and Recommendations

Utilities play an important role in growing contractor and consumer awareness of ASHPs and ccASHPs

- **High priority:** Directly market ccASHPs to customers; outreach should be educational and emphasize non-energy benefits
- **Medium priority:** Tailor marketing and messaging to customers based on existing heating system types and fuel types
- **Medium priority:** Consider a community-based outreach campaign, with messages focusing on cooling benefits to serve as a gateway to technology adoption

Mixed perceptions of ccASHP capabilities indicate a need for additional education and training

- **High priority:** Partner with manufacturers and local training institutes to offer ccASHP-specific training for Minnesota's contractors
- **High priority:** Provide multiple opportunities by combining webinars and in-person training
- **High priority:** Offer in-person training at multiple locations and provide reimbursement when needed
- **Medium priority:** Establish a standard installation process and include contractors in this discussion
- **Low priority:** Promote training as a way to gain continuing education credits

State and regional entities can advance the market through knowledge-sharing, offering technical guidance, and facilitating collaboration

- **Medium priority:** Identify a state or regional entity that can champion ccASHP technology and create working groups for ccASHPs stakeholders

- **Medium Priority:** Participate in established regional heat pump working groups to stay abreast of current issues and innovations in the heat pump market

Standardized use of and messaging about climate-appropriate technology is needed

- **High-priority:** Establish a consistent message regarding the technology's cold-climate performance among all Minnesota program administrators
- **High-priority:** Offer tiered incentives for ASHPs and ccASHPs
- **High-priority:** Establish common cold-climate specifications for ASHPs
- **Medium-priority:** Engage manufacturers and distributors early when making efforts to increase ccASHP adoption

Varying operating costs can make it difficult to justify the higher upfront equipment costs for ccASHPs over other heating equipment options

High-priority: Encourage similar requirements for off-peak demand response programs statewide

Medium-priority: Train contractors and builders to promote equipment benefits other than cost savings for non-electrically heated households,

Decarbonization goals may offer the best way to overcome perceived barriers set by fuel-switching standards

- **Medium-priority:** Incorporate ccASHPs into an action plan designed to illustrate how to achieve goals set by the Next Generate Act.

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Questions?

Market Barriers & Opportunities for ccASHP in Minnesota



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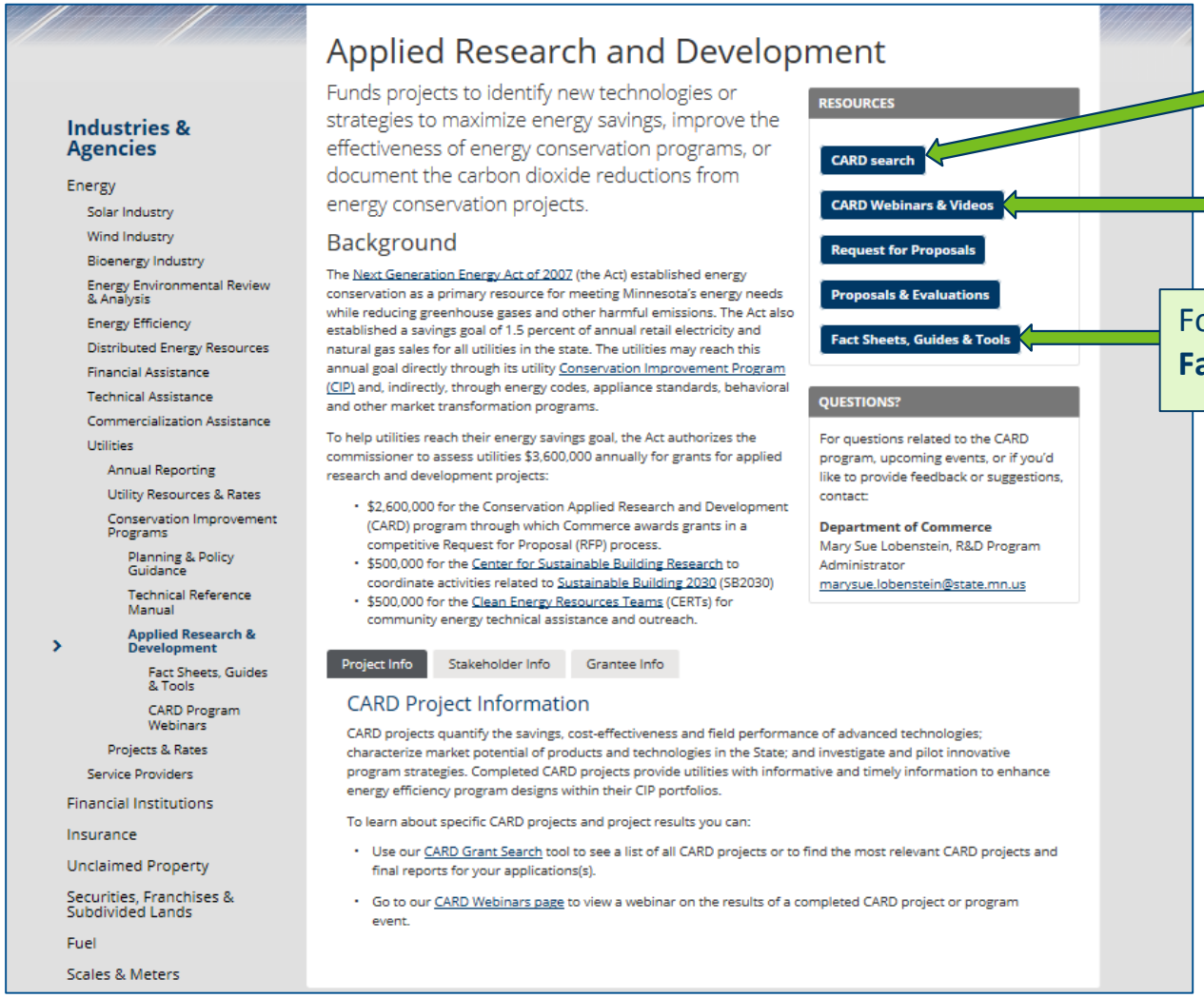
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Webinar Recording
available in couple weeks

White Paper
available in couple months

R&D Web Page (https://mn.gov/commerce/industries/energy/utilities/cip/applied-research-development/)

Thanks for Participating!

Upcoming CARD Webinars:

- **May 27 –** Economic Impact of CIP
- **TBD** - Reconsidering Cooling Loads in Minnesota
- **TBD** – Residential Energy Baseline and Market Characterization Study
- **TBD** – Commercial Energy Baseline and Market Study Characterization Study

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If you have questions or feedback on the CARD program contact:

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