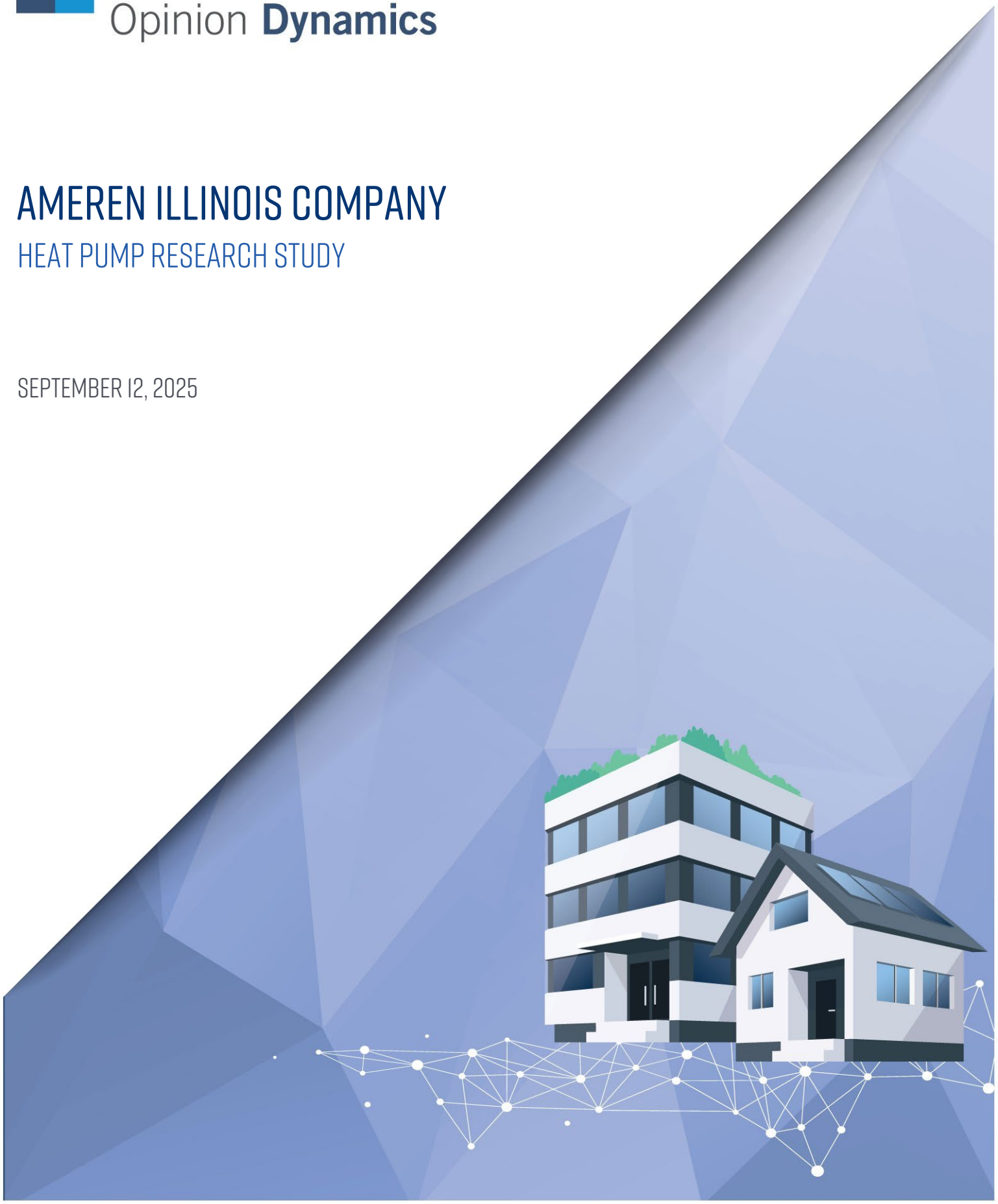
Opinion Dynamics

AMEREN ILLINOIS COMPANY

HEAT PUMP RESEARCH STUDY

SEPTEMBER 12, 2025



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I. EXECUTIVE SUMMARY

Heat pumps, including ducted and ductless air source heat pumps and dual fuel systems of air source heat pumps paired with fossil fuel furnaces, are a priority measure for the Ameren Illinois Company (AIC) and its stakeholders. This is due to a range of factors, including but not limited to the passage of Illinois Public Act 102-0662 (the Climate and Equitable Jobs Act or CEJA), increased market focus on electrification, and stakeholder commitments AIC made as part of its 2022-2025 energy efficiency plan.

In 2021, Opinion Dynamics completed HVAC market characterization research to support AIC's increased focus on heat pumps and transition to a new residential HVAC program model. This research has since been used to support several program evaluation questions.[1] AIC expressed interest in further research to capture rapid market changes and address several open questions regarding the implementation of heat pumps through the AIC portfolio. As part of our 2024 evaluation, we conducted market research to follow up on previous research and address topics of interest, including in-depth interviews with HVAC contractors and a literature review of publicly available materials.

The objectives for this study were to (1) better understand HVAC contractors' decisions and practices for heat pump sales and installations, and (2) understand customers' and HVAC contractors' familiarity with heat pump technologies. To achieve these objectives, we sought to answer the primary research questions in Table 1.

Table 1. Primary Research Questions and Activities

Key Research Topics	RQ #	Primary Research Questions
HVAC Contractor Sales Decisions and Practices	1	What are contractors telling customers they should or should not be doing in terms of replacing their systems? What are the implications for how the program should be trying to intervene with contractors and installers?
	2	How comfortable are installers with recommending a heat pump be installed in place of a gas furnace? Do installers recommend leaving the gas furnace as backup heat?
	3	What decisions do contractors make before promoting hybrid systems?
HVAC Contractor Installation Decisions and Practices	4	When heat pumps are installed with other systems, are they set up to communicate with those other systems? If so, how do they communicate?
	5	What switchover temperature do installers use when installing dual-fuel systems?
	6	What percentage of heat pumps are replacing gas heating systems, are installed with existing gas heating systems, and are installed with new gas heating systems?
	7	How often are cold climate heat pumps (ccHPs) included in hybrid systems?
	8	What fraction of ductless heat pump installations are partial vs. full displacement?
Customers' and HVAC Contractors' Familiarity with Heat Pump Technologies	9	Are contractors in AIC territory familiar with the latest cold climate heat pump technology? How does this knowledge affect their recommendations to customers?
	10	Are customers familiar with heat pump technology? If yes, do they consider installing one? If not, why not?

The AIC team was also interested in information related to eight supplemental research questions:

1. How effective are incentives or tax credits at influencing fuel switching compared to bill savings or environmental concerns?
2. How are contractors engaging customers in the sales process? Are they pitching across the spectrum of fuel choices?
3. What fuel is being replaced when fuels are switched?

[1] Opinion Dynamics, *Ameren Illinois' Market Effects Pilot – HVAC Market Characterization Report* (September 15, 2021). https://www.ilsag.info/wp-content/uploads/AIC-Market-Effects-2021-HVAC-Market-Characterization-Report-FINAL-2021-09-15.pdf

4. What are all the heating and cooling systems in residences?
5. Are customers interested in switching completely away from gas?
6. Do customers understand how using one system over another affects their billing?
7. Are customers informed by their installers on heat pump best practices?
8. What are the details for partial displacement installations, such as the average area served, whether they are additional or supplemental, whether the heat pump is used only for cooling or for heating and cooling?

Although the research team focused on the primary research questions, we have inserted findings into the supplemental research questions alongside other relevant information as it arose in the findings section below. However, we did not find published reports with the information needed to address Supplemental Research Question 8, but rather found a data set that could be analyzed to answer the question based on housing stock in the Pacific Northwest, if desired by AIC.

I.I CONCLUSIONS AND RECOMMENDATIONS

We derived the following conclusions and recommendations from this research, categorized by the key research topics: HVAC contractor sales decisions and practices, HVAC contractor installation decisions and practices, and customers' and HVAC contractors' familiarity with heat pump technologies.

HVAC CONTRACTOR SALES DECISIONS AND PRACTICES

- **Conclusion**: In states like Illinois, where natural gas heating is the primary way customers heat their homes, contractors still favor recommending and installing natural gas furnaces to their customers as replacements for their current natural gas systems. All 15 interviewed contractors said they would recommend a natural gas furnace 50% of the time or more; 10 of them said they would recommend a natural gas furnace 80% of the time or more. However, all 15 HVAC contractors indicated that they sell heat pumps. Only two contractors said they would likely not recommend a heat pump to a customer with an existing natural gas furnace (13%; 2 of 15). Five contractors also explicitly said that they would recommend a heat pump to a customer who is on natural gas and shows interest in switching from natural gas to electricity. In addition to what Illinois contractors shared during interviews, our literature review found that HVAC tradespeople generally view heat pumps positively and expect continued market growth.
- **Conclusion**: Contractors increasingly consider heat pumps for their customers, but they typically feel more comfortable doing so when backup heat, like a natural gas furnace, is an option. This is an attractive equipment option for customers, too, as research has found that both contractors and customers in colder regions worry more about a heat pump malfunctioning in extremely cold weather or the fact that they are relying solely on one fuel source for their heating. As a result, single-family homeowners in Illinois who have heat pumps recommended to them will likely still have natural gas heat as a backup, either as an existing furnace left as backup heat or a brand new natural gas furnace installed as backup heat.
  - **Recommendation**: Considering the prevalence of natural gas heating in the state, program implementers, policymakers, and other relevant stakeholders interested in promoting heat pumps should consider bolstering marketing, education, and outreach (ME&O) and workforce, education, and training (WE&T) on heat pumps and dual fuel systems, even for seasoned HVAC contractors who have participated in programs like AIC's Midstream HVAC program.
  - **Recommendation**: Engage contractors regarding gas furnaces and central heat pumps by promoting and considering dual fuel systems. This could facilitate the adoption of heat pumps in contractors' sales practices and customers' homes. This approach may be particularly relevant for HVAC contractors who remain hesitant to

sell and recommend heat pumps overall. Additionally, evaluate whether replacing central air conditioners (CAC) with heat pumps presents an attractive sales strategy for HVAC contractors, given that the incremental cost between a CAC and a dual fuel heat pump is relatively low compared to the cost of adding a heat pump in the absence of an existing CAC.

- **Conclusion**: Before promoting any type of heating system, including hybrid systems, HVAC contractors collect essential information from their customers, including budget, home size and layout, general preferences (e.g., comfort, noise level), available fuel sources in the home, feelings around energy efficiency, and the presence and condition of existing ductwork. This information helps to determine whether customers meet the circumstances in which HVAC contractors will recommend a heat pump or hybrid system.

HVAC CONTRACTOR INSTALLATION DECISIONS AND PRACTICES

- **Conclusion**: Interviewed contractors said the main points of communication between a heat pump and another system in a dual-fuel or hybrid heating system are switchover temperature and emergency shutoff controls. Most of this communication occurs via an advanced thermostat that is programmed appropriately. However, our literature review found that contractors do not universally implement automated controls for dual-fuel systems. There does not appear to be a universally accepted switchover temperature or mode for selecting one, and some HVAC contractors do not automate dual fuel systems to switch from one system to another, leaving it up to the customer to do it manually. There are also additional challenges with setting up communication for hybrid systems with a ductless heat pump and existing electric baseboard heating.
  - **Recommendation**: Consider leveraging existing contractor education and training avenues to help increase awareness of and familiarity with dual fuel system best practices around integrated controls and switchover temperature. To the greatest extent possible, partner with industry experts that HVAC contractors trust, like distributors.
- **Conclusion**: HVAC contractors varied widely in what switchover temperatures they select for the dual fuel systems they install. Temperatures ranged from −5°F to 40°F.
- **Conclusion**: Interviewed contractors said they most frequently install heat pumps as part of dual fuel systems, either with an existing natural gas furnace or with a brand new natural gas furnace; most did not install a heat pump to completely replace a gas furnace with no source of gas backup heat. Our literature review revealed the same to be true in other cold regions of the United States, where natural gas furnaces as backup heat were commonplace.
- **Conclusion**: Nine of the fifteen HVAC contractors we interviewed said they sell and install ducted cold climate heat pumps. Four said they only sell and install cold climate heat pumps whenever a heat pump is recommended or installed, including all applications, such as hybrid systems. The remaining contractors said they rarely install cold climate heat pumps as part of hybrid systems.
- **Conclusion**: Most of the time, contractors use ductless heat pumps to partially displace other HVAC systems, such as adding a ductless heat pump to a “trouble spot” in the home that needs additional heating or cooling. This has been the case across the United States for the last decade. Determinants for partial versus full displacement usually hinge on ductwork, customer budget, and home size and layout. However, our literature review suggests that ductless heat pumps may be used in full displacement applications more in the future.

HVAC CONTRACTORS’ FAMILIARITY WITH HEAT PUMP TECHNOLOGIES

- **Conclusion**: Contractors are familiar with heat pump technology, including cold climate heat pumps. Despite this familiarity with higher-efficiency and higher-capacity equipment, contractors in colder regions of the United States are still inclined to install gas backup heating, even when it may not be necessary, such as when the contractor is

installing a cold climate heat pump. The most common reason is to ensure customers can still heat their homes if the heat pump malfunctions or the outdoor temperature is extremely cold.

- **Recommendation**: Develop new education programs and enhance existing training for contractors regarding cold climate heat pump technology and its ability to heat homes, even during subfreezing and subzero temperatures. Options could include (1) creating case studies to demonstrate cold climate heat pump performance in homes across various climate zones, thereby giving contractors more confidence in the technology's effectiveness in low temperatures. If possible, case studies should show how often electric strip heat backup is utilized and under what circumstances, as well as document operating costs compared to other backup systems. (2) Offer ongoing support through weekly call-in "office hours" where contractors can ask questions about heat pumps and receive immediate answers from AIC implementation team experts and peers who also join the virtual "office."
- **Recommendation:** Consider options to support contractors' use of dual fuel in ways that are relatively affordable for consumers. One option is to partner with trusted experts like major distributors to provide training about appropriate use of heat and cold climate heat pumps in Illinois' climate zones so contractors are clear about when there is a need for gas backup, when the heat pump alone is sufficient, how more affordable heat pumps can be paired with gas furnaces instead of cold climate heat pumps, among other topics.

- **Conclusion**: Customers may be aware of heat pump technology in general, but they remain unfamiliar with more nuanced information, such as how a heat pump works and the different types of heat pumps available. Interviewed HVAC contractors sometimes get questions directly from their customers about heat pumps, but not very often. This may change in the short term as the market for heat pumps continues to grow and customers become more familiar with heat pumps. Even as the market grows, up-front cost remains a primary barrier for customers adopting heat pump technology.
  - **Recommendation**: Contractors work to bridge the knowledge gap between HVAC systems and customers, as customers heavily rely on professionals like them to recommend and install HVAC equipment. Consider if AIC can support contractor efforts to sell heat pumps and dual fuel HVAC systems with customer education tools like leave-behind summaries of heat pumps and dual fuel systems, their benefits, and available incentives. Additional information about best practices for heat pump use (e.g., "set it and forget it" instead of using overnight setbacks or changing indoor temperature settings often) could also help contractors and consumers alike.

2. METHODOLOGY

Our research consisted of two qualitative research activities: (1) a literature review of existing information available in HVAC market assessments, building stock assessments, emerging technology briefs, and evaluation reports, and (2) in-depth interviews with HVAC contractors in and around AIC's service territory.

2.1 LITERATURE REVIEW

We conducted a systematic literature search of publicly available materials across multiple information platforms, including academic and journal hubs (e.g., Google Scholar®, ResearchGate®, and ScienceDirect®),[2] university research centers (e.g., Wisconsin Energy Institute, UC Davis Energy and Efficiency Institute), industry associations and organizations (e.g., American Society of Heating, Refrigerating, and Air-Conditioning Engineers [ASHRAE] and Air-Conditioning, Heating, and Refrigeration Institute [AHRI]), utility websites (e.g., exelon®, Xcel Energy, Alliant Energy), state environmental and energy departments and commissions in Illinois and surrounding states, and relevant nonprofit organization websites (e.g., American Council for an Energy Efficient Economy [ACEEE], Northwest Energy Efficiency Alliance [NEEA], and Northeast Energy Efficiency Partnership [NEEP]). These materials included evaluation reports, scientific papers, market research studies, news articles, and policy documents.

To conduct our search, we curated a list of key search terms and phrases that we used across all the aforementioned information platforms. Our initial search yielded 150 candidate publications. A closer review of the candidate publications to ensure they included information directly relevant to the primary research questions reduced our pool to 84 studies and one publicly available dataset.

After collecting relevant sources, we analyzed the documents using NVivo® qualitative analysis software. We used a combination of deductive and inductive coding to identify information that directly addressed the research questions and to develop emergent themes. We also created and used search queries to streamline our review of each source.

2.2 HVAC CONTRACTOR INTERVIEWS

To gather primary data, we completed 15 in-depth interviews with HVAC contractors in and around AIC's service territory from January 2025 to March 2025. Our contractor population included two key market segments: program allies (contractors currently participating in an AIC energy efficiency program) and non-program allies (contractors not currently participating in an AIC energy efficiency program). Each interview lasted 30–45 minutes and was recorded via Microsoft Teams.

Our outreach consisted of two rounds of email outreach over two separate periods, as well as two LinkedIn InMail campaigns. Initially, we planned to speak with 30 HVAC contractors in the state. However, given the difficulty in reaching this target population, especially non-program allies, we stopped outreach after 15 interviews were completed.

Interviews were transcribed using an online transcription service. We analyzed the resulting transcripts using NVivo qualitative analysis software, using deductive and inductive coding to identify data that directly addressed the research questions and identify emergent themes.

There are a couple of noteworthy limitations to the interview data. First, given the small number of respondents, we cannot be sure their opinions and ideas are representative of the entire population of HVAC contractors in AIC's service

[2] All product or company names that may be mentioned in this publication are tradenames, trademarks, or registered trademarks of their respective owners.

territory. Second, some interview respondents completed the interview during their workday, such as by making time while driving between installation jobs or while completing office-based tasks. In a few cases, interviews were interrupted by respondents' work obligations; they took calls, responded to questions from colleagues, or arrived at a job site and needed to end the interview. These interruptions prevented interviewers from fully completing some interviews. In the findings section, we indicate the number of respondents who supplied data for specific topics.

3. FINDINGS

In this section, we provide integrated findings from the HVAC contractor in-depth interviews and literature review to answer the research questions. Our findings are split into three distinct sections based on the key research topics in Table 1: HVAC contractor sales decisions and practices, HVAC contractor installation decisions and practices, and customers' and HVAC contractors' familiarity with heat pump technologies. Each section is divided into subsections that answer the relevant research questions.

3.1 HVAC CONTRACTOR SALES DECISIONS AND PRACTICES

3.1.1 RESEARCH QUESTION 1

What are contractors telling customers they should or should not be doing in terms of replacing their systems? What are the implications for how the program should be trying to intervene with contractors and installers?

INTERVIEW FINDINGS

All contractors reported that they sell natural gas furnaces and heat pumps. Most of them also sell dual fuel systems, specifically a ducted heat pump combined with a natural gas furnace (13 of 15). **However, most contractors reported that, 80% of the time or more, they will recommend a natural gas furnace to a customer (10 of 15).** The remaining five contractors said they will recommend a natural gas furnace to a customer at least half the time. While heat pumps have continued to penetrate the American heating market, natural gas furnaces in Illinois appear to be the dominant residential heating system recommended and installed by HVAC contractors.

Contractors typically recommend heat pumps to customers interested in transitioning away from natural gas, propane, or oil heating (5 of 13) or customers who want to lower their energy bills (4 of 13). We present the other circumstances cited by contractors in Table 2 and elaborate on them below. Please note that contractors occasionally mentioned multiple circumstances in which they would recommend heat pumps.

Table 2. Circumstances Where Contractors Recommend Heat Pumps to Customers (n = 14)[a]

Circumstances to Recommend	Number of Contractors
Customer shows interest in switching from gas, propane, or oil	5
Customer wants to lower their energy bill	4
Customer is already all-electric	3
Availability of rebates and incentives	3
Customer already has a heat pump	2
Customer has or will install solar	2
Other	2

[a] One contractor did not provide circumstances where they would recommend a heat pump to a customer.

- **Customer shows interest in switching from gas, propane, or oil (5 of 14).** These five contractors said that if their customer shows interest in or has a strong desire to switch from fossil fuels to electric for their heating, they will typically recommend a heat pump. Sometimes, customers decide to switch from fossil fuels to all-electric after speaking with their contractor. For instance, one contractor emphasized that they like to educate customers with gas heating to let them know about a better system alternative.

> *"Most heat pumps are good quality. They're a little more expensive, but they're usually a little more efficient. I let them [the customer] know how they can have a better-quality system overall and get off of natural gas."*

- **Customer wants to lower their energy bill (4 of 14).** Contractors will recommend a heat pump to a customer who mentions high energy bills. Two contractors expressed that this has been especially true for customers with natural gas heating systems, as natural gas prices have increased in recent years. Another contractor said bills can be even higher for customers on propane because Illinois does not regulate propane pricing like it does for natural gas.
- **Customer is already all-electric (3 of 14).** These three contractors said that if their customers' heating is already all-electric (e.g., electric resistance heating), they would recommend a heat pump for that customer.
- **Availability of rebates and incentives (3 of 14).** Given the availability of rebates and incentives for heat pumps at the utility, state, and federal levels, these contractors will recommend a heat pump to their customers if they are amenable to the up-front cost of the equipment and are fine with receiving money back later. One contractor emphasized letting customers know this will be cheaper in the long run.

> *"I'm going to recommend a heat pump because of Ameren's rebates and the tax credits that are available to them [the customer]. It makes the price even cheaper after all is said and done, and most people are open to the idea."*

- **Customer already has a heat pump (2 of 14).** If a customer already has an earlier-generation heat pump, these two contractors will recommend a new one, as the latest technology is much more efficient.
- **Customer has or will install solar (2 of 14).** These two contractors said they automatically recommend a heat pump to a customer if they have solar or are planning to install solar. One contractor said that, without solar, a heat pump tends to cost customers a lot in utility bills. With solar, they are very likely to save on their energy bills.
- **Other (2 of 14).** One contractor said they would recommend a heat pump to a customer if they lived in a milder region of Illinois (i.e., southern Illinois). Another contractor said they are likely to recommend a heat pump to a customer who plans to live in their home longer than five years, since they are likely to realize a return on their investment.

Contractors highlighted certain heat pump characteristics to customers when they recommend a heat pump. **Most often, contractors said they inform customers about potential bill savings from installing a heat pump (10 of 14).** They emphasized reductions in monthly utility bills and a positive return on the investment. One contractor mentioned they do on-the-spot bill analyses for their customers to show estimated savings based on their energy usage if they install a heat pump. Another contractor shared that a customer said their utility bill went down as much as $100 per month since installing their heat pump.

Aside from bill savings, contractors mentioned additional characteristics of heat pumps they share with customers:

- **General mechanics of how a heat pump works (5 of 14)**. Contractors walk customers through the basics of heat pumps to help them feel more comfortable with the technology. One contractor explained the importance of doing this for any customer because most customers are not familiar with how HVAC systems work in general, let alone how a heat pump works.

> *"I go from the ground up explaining how a heat pump works. The vast majority of people are not familiar with how HVAC systems work – they go to the thermostat, push the temperature up, and expect the house to get warmer."*

- **The efficiency of heat pumps compared to less efficient systems (4 of 14)**. These contractors emphasized the high efficiency of heat pump systems, especially compared to the less efficient systems most customers currently use. One contractor mentioned that, in addition to the overall efficiency of the equipment, they inform customers that a heat pump can also deliver efficient cooling in the summer, making it a worthwhile investment.
- **The many incentives available (2 of 14).** Two contractors said they tell their customers heat pumps often come with various incentives, including utility program rebates and potential state and federal tax credits. One contractor noted that these incentives can benefit customers looking to install a heat pump and customers looking to install a dual-fuel system.

> *"The federal government is offering a $2,000 tax credit for certain systems, as well as utility rebate programs. It can make a dual fuel system almost as affordable as just replacing an air conditioner or furnace. For a high-efficiency dual fuel system, it's only $600–$800 more than it would be to replace a system with a furnace."*

- **Heat pump reliability (2 of 14).** Two contractors tell customers that heat pumps are very reliable systems. One contractor said they make sure customers know they only recommend systems that they feel are trustworthy and durable. The other contractor said they would inform customers that heat pumps can reliably heat their homes during cold weather.
- **Benefit to the environment (1 of 14)**. One contractor said they tell customers that heat pumps are the way of the future and are a "green" technology that will benefit homeowners in the long term.

> *"This is the direction the United States is going in. We're trying to make everything as green and as energy saving as possible. Whether you agree or not, it's happening. It's going to better us [as a society] in the long run."*

Contractors did not recommend heat pumps to customers with budget constraints (6 of 14) or unsuitable home configurations or specifications (5 of 14). We provide the other circumstances mentioned by contractors in Table 3 and elaborate on them all below.

Table 3. Circumstances When Contractors Did Not Recommend Heat Pumps to Customers (n = 14)

Circumstances to Recommend	Number of Contractors[a]
Budget constraints	6
Unsuitable home configurations or specifications	5
Concern about performance in cold weather	4
Already has a gas furnace	2
Customers are elderly	2
Other	3

[a] One contractor did not provide circumstances where they would not recommend a heat pump to a customer.

- **Budget constraints (6 of 14).** While heat pumps have become more affordable due to incentives, rebates, and tax credits, the up-front cost of them (and other high-efficiency equipment) remains high.[3] Six contractors said they hesitate to recommend a heat pump to a customer with budget constraints that limit them from taking on the initial up-front cost of the system. This is especially true for customers considering a heat pump in addition to any potential natural gas backup heat. One contractor shared that not all customers in Illinois have access to the same incentives, especially if they do not receive electricity from AIC. They explained that this creates a hurdle for customers who need more than just a tax credit to make installing a heat pump financially accessible.

> *"Where I live here in Springfield, the city does not have generous heat pump incentives. When you're dealing with different utilities, the recommendation towards a heat pump is really going to be based upon what incentives are available to help offset the initial customer cost. When there's limited to no incentives from a utility to offset the cost, then you're only looking at the federal tax credit."*

- **Unsuitable home configurations or specifications (5 of 14).** Five contractors said they do not recommend heat pumps to customers with unfavorable home configurations or specifications for heat pump operation, such as poor home insulation, weatherization (2 of 5), or electrical limitations (1 of 5). The contractor who mentioned electrical limitations said that some homes do not have enough power to take on a heat pump, especially homes with other electrified equipment. Two additional contractors said they do not recommend heat pumps to customers in rental or condominium properties, as installation is usually trickier or not feasible due to building codes or rules.
- **Concern about performance in cold weather (4 of 14).** Two contractors said they would not recommend heat pumps to customers in extremely cold climates, with the caveat that they do not consider this a problem in Illinois. Another two contractors said they would likely not recommend a heat pump to a customer in a typically colder region of Illinoiswithout some form of backup heat, whether electric resistance heating or a natural gas furnace.
- **Already has a gas furnace (2 of 14).** Two contractors said they are far less likely to recommend a heat pump to a customer with an existing natural gas furnace.

[3] Antonopoulos, Chrissi, et al. Pacific Northwest National Laboratory. *Regional assessment of household energy decision-making and technology adoption in the United States* (2024). Accessed here.

- **Customers are elderly (2 of 14).** These two contractors explicitly mentioned they would not recommend a heat pump to elderly customers because the heating discharge from a heat pump will not feel as hot as the discharge from a gas furnace.
- **Other (3 of 14).** These contractors shared additional circumstances when they would not recommend a heat pump, including a homeowner who is not planning to stay in their home for more than five years, the customer does not plan to install solar, or the price of electricity, which remains and will remain high.

Supplemental Research Question

How effective are incentives or tax credits at influencing fuel switch versus bill savings versus environmental concerns?

Illinois HVAC contractors shared during interviews that they view rebates and incentives as useful tools for their customers to relieve the cost burden of heat pumps. They also highlighted the potential of heat pumps to significantly lower a customer's energy bills, which is an attractive selling point. Contractors in the Northwest shared a similar sentiment on incentives, highlighting that incentives also catch the attention of customers who may otherwise not consider heat pumps.[4] Utility incentives appear to be the most influential incentive on customer decision-making around heat pumps. However, Northwest contractors acknowledged that incentives may not always be enough to persuade customers already put off by high up-front costs.[5]

LITERATURE REVIEW FINDINGS

We discovered few publications that specifically outline what contractors communicate to customers regarding system replacements. However, we did identify several sources that discuss contractors' opinions and insights on heat pumps.

Northwest HVAC contractors interviewed for a NEEA 2022 market research study had several viewpoints on ducted variable-speed heat pumps, dual fuel systems, and mini-split systems.[6] Contractors believed that ducted variable-speed heat pumps were great for customers who wanted high-efficiency equipment and to decarbonize their heating for environmental reasons, but shared that up-front costs were the largest barrier to the uptake of these systems, and the fact that some homeowners may never realize a return on their investment. Contractors viewed hybrid systems (e.g., dual-fuel systems) more favorably. These systems are usually easier to sell to customers who are hesitant to switch away from natural gas completely, as they operate extremely efficiently and minimize electric costs by switching to natural gas in the coldest temperatures. Contractors also highly rated ductless heat pump systems, as they do not need ductwork, are easy to install, and can offer homeowners zoned heating.

A 2022 building electrification study reported that interviewed HVAC contractors in Massachusetts and New York felt positively about heat pumps and intended to continue to sell and install them.[7] Nearly two-thirds of the same contractors (20 of 32; 63%) also said they believe heat pumps can adequately heat an entire home, but several of them added that heat pumps operate best in well-insulated homes and, in the coldest regions of Massachusetts and New York, may need backup heat. Wisconsin-based HVAC contractors and distributors interviewed as part of the 2024 *Focus on Energy® Calendar Year 2023 Evaluation Report* said their companies are investing in further research and training opportunities around heat pumps to prepare to effectively meet customer demand and market heat pumps.[8] This

[4] NEEA. *Residential HVAC Contractor Market Research* (2022). Accessed here.
[5] NEEA. *Study of Influences on Northwest Variable Speed Heat Pump Adoption* (2022). Accessed here.
[6] NEEA. *Residential HVAC Contractor Market Research* (2022). Accessed here.
[7] Cadmus. *Residential ccASHP Building Electrification Study* (2022). Accessed here.
[8] Cadmus. *Focus on Energy® Calendar Year 2023 Evaluation Report*. Accessed here.

signals both an acceptance of heat pumps as a viable HVAC technology and an anticipation that customers will be amenable to them.

On a national level, a survey of 220 HVAC contractors from across the country found that contractors generally viewed heat pumps positively and wanted to sell them to their customers.[9] Nearly four-fifths of contractors reported that selling heat pumps was positive for their businesses (78%; 172 of 220); two-thirds said they would like to install heat pumps more frequently (66%; 145 of 220). Most of these contractors also reported that, to keep selling heat pumps to their customers, it is important that they remain financially viable for their customers, are cost-competitive with other HVAC equipment, and can be installed as easily as non-heat pump alternatives.

Supplemental Research Question

How are contractors engaging customers in the sales process? Are they pitching across the spectrum of fuel choices?

Contractor interviews revealed that Illinois HVAC contractors limit their proposals to customers based on the fuels available in the house, with most contractors staying focused on the fuels the customer is currently using (e.g., natural gas). However, HVAC tradespeople typically engage with their customers closely, often recommending a specific equipment type. This usually involves getting to know the customer and their home, assessing customer needs, guiding customers to select the appropriate equipment, and moving forward with installation.[10]

3.1.2 RESEARCH QUESTION 2

How comfortable are installers with recommending a heat pump be installed in place of a gas furnace? Do installers recommend leaving the gas furnace as backup heat?

INTERVIEW FINDINGS

Figure 1 illustrates contractors' estimated percentages for three recommendation scenarios: installing a heat pump with a brand-new gas furnace ("brand new dual fuel"), leaving a furnace as backup heat with a new heat pump ("leave as backup heat"), and installing a heat pump to completely replace an existing furnace ("completely replace existing furnace").[11] These percentages served as broad estimates. When we inquired about the percentage of time they suggest a specific system configuration, we requested contractors' best guesses. Some contractors provided estimates across configurations that were over 100%; interviewers made no effort to modify or correct these estimates.

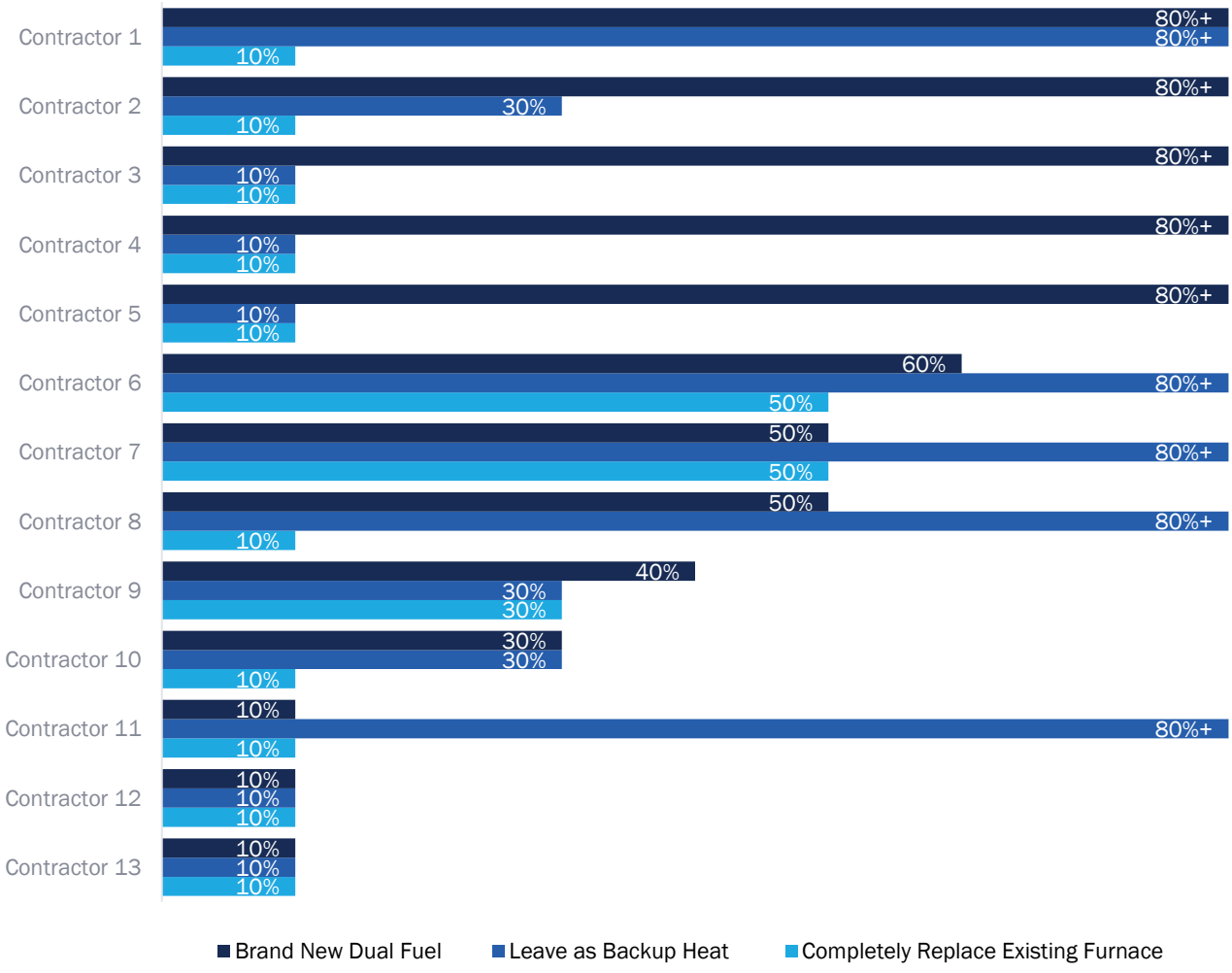
Most contractors (9 of 13) showed a preference in what they would recommend, with five contractors recommending a new dual-fuel system most frequently and four recommending leaving the furnace to provide backup heat most frequently. The four remaining contractors reported they recommend brand new dual fuel or keeping backup heat equally often, though only one of these respondents reported high frequency (80%+) for either of these scenarios. Contractors infrequently recommended completely replacing an existing gas furnace with a heat pump; 10 of 13 said they recommend this only 10% of the time.

Most contractors also said they would recommend leaving a customer's existing gas furnace as backup heat less than 50% of the time (8 of 13); however, five said they would recommend leaving the existing furnace as backup heat 80%

[9] Pacific Northwest National Laboratory (PNNL). *PNNL 2025 Field Research with HVAC Contractors*. Accessed here.
[10] NEEA. *Residential HVAC Contractor Market Research* (2022). Accessed here.
[11] Please note that contractors were arbitrarily assigned a number one through 13 in order to preserve anonymity.

of the time or more. In terms of recommending an entirely new dual fuel system, seven contractors reported they would recommend this configuration 50% of the time or more, with five recommending it 80% or more.

Figure 1. Contractors' Estimated Percentages for Recommendations on How Heat Pumps are Installed (n=13)



Note: Two contractors had trouble giving percentages as answers and were excluded from this analysis.

Based on the percentages that contractors provided, we calculated averages for each recommendation scenario. These are rough averages based on a small sample and general estimates from contractors. These frequencies suggest relative preferences and practices rather than precise estimates and should be treated as directional information only. On average, contractors said they recommend installing a heat pump with a brand-new gas furnace 51% of the time, recommend leaving a furnace as backup heat with a new heat pump 42% of the time, and recommend installing a heat pump to replace a gas furnace completely 18% of the time.

Contractors provided several reasons for their recommendations of the installation scenarios. Five contractors provided reasons why they recommended leaving a furnace as a backup heat source:

- **Guaranteed heating if heat pump malfunctions (3 of 5).** Two of these three contractors said they will likely recommend leaving an existing gas furnace as backup heat to avoid a potential scenario when a customer's heat pump breaks and the customer is left with no other heating source. These two contractors both provided potential

scenarios for when a heat pump may not work, including during a power outage[12] or from being overworked in the summertime. The third contractor said they recommended leaving an existing furnace as backup heat in case a customer's heat pump could not perform in extremely cold temperatures.

> *"If you have a heat pump, the machine is working year-round, where a furnace is only working half the time… it gets a break during the cooling season. So, you've got two options there because there's a possibility something can go wrong [with the heat pump], then you're out of heat."*

- **Other (2 of 5).** One contractor explained they would leave a natural gas furnace as backup heat for a customer's general comfort, specifically if a customer ever felt their home was not warm enough from a single heating system alone. Another contractor said if they felt the heat pump was not capable of being the home's primary heat source, they would leave the customer's natural gas furnace as backup heat.

Seven contractors provided reasons they would recommend a brand-new dual-fuel system:

- **Availability of incentives (2 of 7).** These two contractors highlighted the availability of incentives as drivers for recommending a brand-new dual-fuel system to their customers. Both contractors mentioned taking advantage of utility rebates, while one also mentioned state and federal tax credits.
- **Old furnace not as efficient (2 of 7).** Both contractors said they recommend installing a new high-efficiency gas furnace as part of a dual-fuel system. One contractor added that it gives customers peace of mind knowing they have brand-new equipment. The other contractor highlighted both the efficiency of the equipment and of a system using electricity and natural gas to heat a home.

> *"Some customers have a furnace that is actually 10 to 15 years old, and you're upgrading to a high efficiency model with a heat pump that can reduce energy bills. And new hybrid systems are designed to switch between electric and gas, which maximizes efficiency."*

- **Other (3 of 7).** One contractor would only recommend a brand-new dual-fuel system if the customer's existing furnace was extremely old. Another contractor said they do not usually see the value in installing a completely new dual-fuel system, as most customers would be unlikely to see savings that outweigh the up-front cost of installing the system in the first place. The third contractor said that while they usually recommend a brand-new dual-fuel system instead of leaving an existing furnace, it comes down to what the customer wants.

LITERATURE REVIEW FINDINGS

We found few publications pinpointing HVAC installers' comfort recommending heat pumps instead of gas furnaces. However, we identified several studies with relevant information, such as recommendations for and sales of heat pumps relative to gas furnaces and other heating systems. This section highlights the key relevant findings from our literature review.

[12] These contractors may have perpetuated the common misconception that fossil fuel systems continue working during electric outages.

The distribution and sale of heat pumps have remained steady or increased in the last several years across several key regional markets, including the Northwest,[13] California, [14] the Northeast,[15] and the upper Midwest.[16] This may be partly driven by HVAC contractors embracing heat pumps and recognizing them as viable options for their customers. We found this to be especially true in the Northwest and Upper Midwest. In a 2022 study, NEEA reported that ducted heat pumps are no longer in the early adoption stage, as contractors frequently recommend and sell them to their customers.[17] In the Upper Midwest, a recent survey of 147 Wisconsin HVAC contractors, both energy efficiency program-participating and non-participating contractors, found that most contractors reported selling ductless heat pumps (126 of 147; 86%) as well as central (ducted) heat pumps (116 of 147; 79%).[18] More than half of the 30 HVAC contractors who participated in a 2022 Minnesota study believed that sales of ducted heat pumps would increase due to customer interest and awareness of the technology. Most contractors also reported that they have recommended ducted heat pumps to customers with an existing furnace, especially those using propane.[19]

Despite the increased presence of heat pumps in the HVAC market across the Upper Midwest since 2020, natural gas furnaces continue to be the primary source of residential heating in cold and mixed-humid climate zones.[20] **Sources from our literature review indicate that natural gas heating remains an essential component of many customers' heating systems, both with and without heat pumps.** A 2022 study by the Center for Energy and Environment reported that over 1.2 million single-family homes across Minnesota were heated by natural gas furnaces, and contractors were generally unlikely to recommend heat pumps to those customers.[21] While most contractors interviewed in the same study indicated they have recommended heat pumps to customers replacing their furnaces (25 of 30; 83%), they typically only did so for customers using propane as a fuel source or those with incentives available to them that would make a heat pump cost competitive with a standard AC or furnace. Many also mentioned the high cost of electricity, which likely made keeping a natural gas furnace even more financially attractive to customers.

Opinion Dynamics' 2021 market characterization study of the AIC service territory found a similar situation in Illinois. HVAC installers said they were most likely to recommend natural gas equipment to customers with natural gas heating.[22] For context, almost half of households in the AIC service territory had natural gas heating during this study, signaling a large portion of the market potentially unlikely to adopt heat pumps. Like the Minnesota contractors, HVAC installers in Illinois were more likely to recommend heat pumps to customers with propane heating and electric heating. Additionally, four of the ten installers said natural gas would be cheaper than electricity to heat customers' homes.

Recent studies in Wisconsin and Illinois show heat pumps are becoming more common options for customers with natural gas heating in the region. A 2024 study reported that 81% of the 147 contractors surveyed in Wisconsin were at least somewhat likely to recommend a heat pump to a customer upgrading their existing heating system, regardless of the existing fuel type.[23] In addition, the study also reported that 65% of households where these contractors installed new heat pumps had natural gas furnaces. While this study did not ask contractors what they specifically recommended as backup heating options, contractors reported replacing existing natural gas furnaces with new furnaces the majority of the time and leaving existing natural gas furnaces the rest of the time when installing a heat pump.

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[13] Northwest Energy Efficiency Alliance (NEEA). *Residential HVAC Contractor Market Research* (2022). Accessed here.
[14] Opinion Dynamics. *TECH Initiative Baseline Market Assessment* (2022). Accessed here.
[15] Northeast Energy Efficiency Partnership (NEEP). *Market Transformation Progress Report* (2022). Accessed here.
[16] Center for Energy and Environment (CEE). *Messaging strategies to drive heat pump adoption in Minnesota* (2024). Accessed here.
[17] NEEA. *Residential HVAC Contractor Market Research* (2022). Accessed here.
[18] Cadmus. *Focus on Energy Calendar Year 2023 Evaluation Report – Volume III Appendices* (2024). Accessed here.
[19] Center for Energy and Environment (CEE). *Investigation of Air Source Heat Pumps as a Replacement of Central Air Conditioning* (2022). Accessed here.
[20] National Renewable Energy Laboratory (NREL). *NREL Residential Building Stock Analysis* (2024). Accessed here.
[21] Center for Energy and Environment (CEE). *Investigation of Air Source Heat Pumps as a Replacement of Central Air Conditioning* (2022). Accessed here.
[22] Opinion Dynamics. *Ameren Illinois Market Effects Pilot – HVAC Market Characterization Report* (2021). Accessed here.
[23] Cadmus. *Focus on Energy Calendar Year 2023 Evaluation Report – Volume III Appendices* (2024). Accessed here.

As described above, the Illinois HVAC contractors we interviewed for an AIC market characterization study were much more likely to recommend a heat pump if it would be installed as part of a hybrid system, paired with an existing or brand-new natural gas furnace. According to a housing stock analysis conducted by the National Renewable Energy Laboratory (NREL), as of October 2024, most single-family attached and detached homes in Illinois were using natural gas as their primary heating fuel,[24] demonstrating a large market opportunity to install heat pumps as part of dual-fuel systems with natural gas.

Supplemental Research Question

What fuel is being replaced when fuels are switched?

Contractor interviews suggest customers are switching from more expensive fuels, usually propane, to less expensive fuels (natural gas or electricity). A minority of contractors mentioned some customers switching from gas to electricity to benefit from solar power or reduce their carbon footprints. Recent research in Minnesota,[25] as well as Michigan,[26] also found that contractors recommended customers switching from propane to gas or electricity because of propane's high cost.

3.1.3 RESEARCH QUESTION 3

What decisions do contractors make before promoting hybrid systems?

INTERVIEW FINDINGS

Contractors described collecting a wide variety of information from customers before recommending the type of heating system to install (Table 4). Contractors most frequently cited a customer's budget (8 of 15), a home's size, shape, and layout (7 of 15), the customer's existing system (7 of 15), presence and quality of existing ductwork (6 of 15), and customer preferences (6 of 15) as key information they need before they can recommend a heating system. We present the other information provided by contractors in Table 4 and elaborate on them below.

[24] National Renewable Energy Laboratory (NREL). *NREL Residential Building Stock Analysis* (2024). Accessed here.
[25] Center for Energy and Environment (CEE). *Investigation of Air Source Heat Pumps as a Replacement of Central Air Conditioning* (2022). Accessed here.
[26] Slipstream. *Michigan Heat Pump Collaborative Market Characterization* (2022). Accessed here.

Table 4. Information Needed for Contractors to Recommend a Heating System (n = 15)

Type of Information Needed	Number of Contractors
Customer budget	8
Home size, shape, and layout	7
Existing system	7
Existing ductwork	6
Customer preferences	6
Importance of energy efficiency to the customer	5
Insulation and weatherization of home	2
Fuel sources available	2

Note: Contractors often mentioned more than one type of information needed; their responses have been counted across multiple categories.

- **Customer budget (8 of 15).** Contractors most frequently mentioned needing to know a customer's budget before they can recommend a heating system. Three contractors said this was particularly important when recommending high-efficiency equipment such as a heat pump. One of these contractors said they would not even consider a heat pump for a customer if they signaled they were on a tight budget.

> *"If they're somebody more on a budget, then I'm not really going to sell a high-efficiency heat pump because those are more expensive. I know it's just going to be a lot of wasted time for me quoting something that the customer ultimately doesn't want."*

- **Home size, shape, and layout (7 of 15).** Seven contractors mentioned needing specific details about a home's general shape, layout, and size before recommending a heating system. Three contractors specifically said they like to understand the different types of rooms in the home and their location in the home, such as any office spaces, sunrooms, bedrooms, and other key living spaces, as well as whether they were originally part of the home or are part of additions to the home. Another contractor mentioned they need to know about rooms positioned to receive more sunlight or with windows than others. One contractor emphasized the size of the home as essential to load calculations, which helps determine the type and size of system to recommend.
- **Existing system (7 of 15).** Contractors typically looked at a customer's existing system to indicate which type of new system to recommend. All seven contractors provided various details they looked for from an existing system, including the fuel type, the type of system, the system's age, when the system was installed, the size of the system, and whether the system was a home's primary heating system or supplemental heating system.
- **Existing ductwork (6 of 15).** Six contractors highlighted the importance of whether the home had ductwork before deciding what type of heating system to recommend. Each contractor provided additional considerations around ductwork, including the condition of the ductwork (e.g., any repairs needed), the degree the existing ductwork was insulated, how much of the home the existing ductwork covered, whether the existing ductwork was sized appropriately for a new system, and whether the ductwork was suited for adequate air flow.
- **Customer preferences (6 of 15).** While contractors may recommend systems based on their assessments of a home, they also consider a customer's individual preferences. These preferences included the type of equipment a customer says they want (e.g., a furnace or a heat pump), general comfort needs in the home, the noise level of a system, and the complexity of a system (e.g., simple or more complicated operation).

> *"Biggest thing I look at – why did they call me there? Am I there because of a program? Am I there because they have a specific comfort problem? Am I there because they have high utility bills and are interested in going green? It's really tailoring the solution to the needs of the homeowner."*

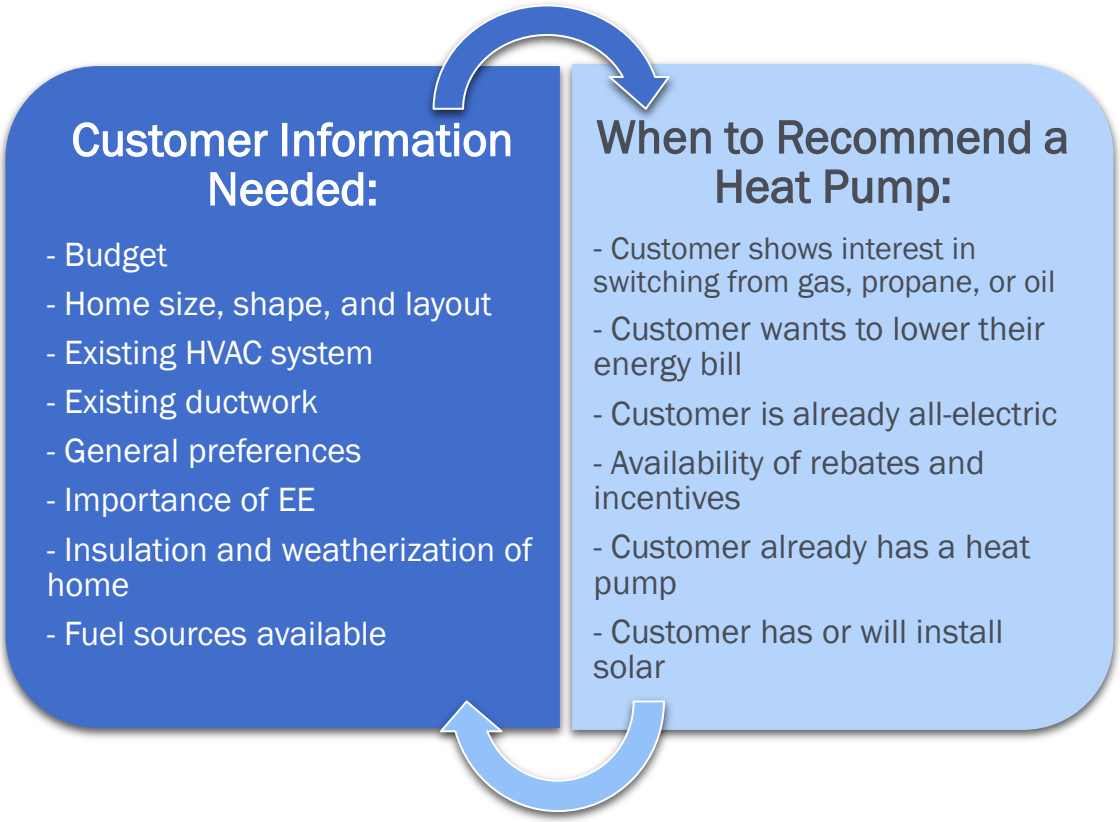
- **Importance of energy efficiency to the customer (5 of 15).** Five contractors mentioned customer interest in energy efficiency as a determining factor in recommending a heating system. This can greatly influence what a contractor recommends, especially regarding heat pumps, given that these systems prioritize energy efficiency compared to other non-heat pump systems. One contractor emphasized that they will not recommend a heat pump to a customer if the customer has a negative attitude towards efficiency. Another contractor said getting a customer's perspective on efficiency was helpful when selling a system with "extra efficiencies."
- **Insulation and weatherization of home (2 of 15).** These two contractors mentioned needing to know how well insulated and weatherized a home is before determining what heating system to recommend. One contractor said this helps determine whether certain rooms need updated insulation before recommending a certain type of system. Another contractor said this information is essential to ensure a heat pump will operate successfully.

> *"We make an assessment of the structural quality of the home, like insulation and ductwork. We make sure that the home meets these requirements for a heat pump, and that also ensures the heat pump will be successful."*

- **Fuel sources available (2 of 15).** Two contractors mentioned needing to know what heating fuel is available in the home. One contractor said this is usually secondary information to size and price. The other contractor said it is important to know if a customer has a natural gas hookup, even if their heating is currently all-electric, because it might mean they do not have access to natural gas, and a dual-fuel system would not be an option.

In addition to the information above, contractors consider various circumstances like the ones listed in Table 3 to determine whether a heat pump is appropriate for a customer. Figure 2 demonstrates the relationship between the information contractors need from their customers to determine what type of system to recommend and whether the customers are ideal candidates for a heat pump.

Figure 2. Information Respondents Needed From Customers and Circumstances They Recommend a Heat Pump

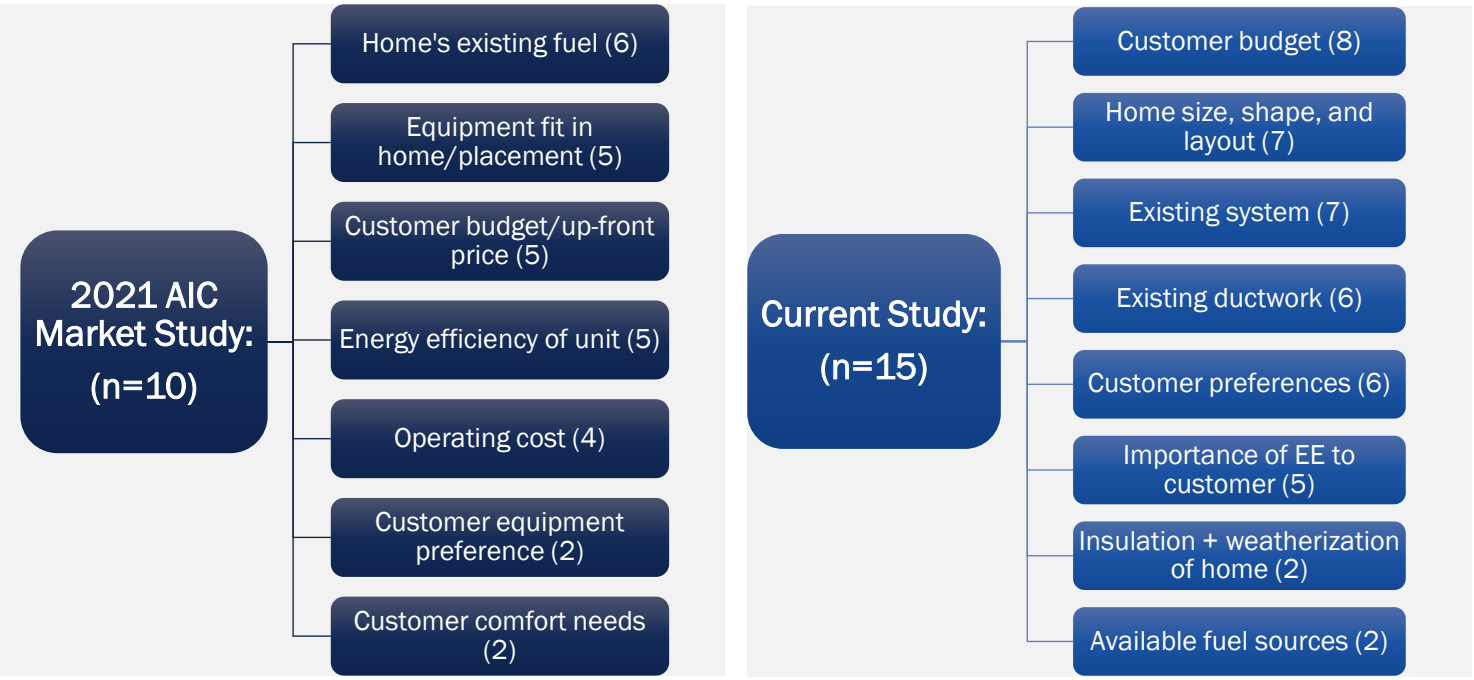


LITERATURE REVIEW FINDINGS

As noted above, Opinion Dynamics' 2021 market characterization study for AIC also included interviews with HVAC installers in Illinois. Figure 3 compares the information contractors and installers said they need to recommend a heating system from the 2021 interview respondents and the current study respondents with the information most frequently mentioned at the top and information least frequently mentioned at the bottom of each column. While the information these HVAC tradespeople collected is generally consistent over time, the importance of the information may have changed. For example, customer budget is relatively more important than before. Conversely, the home's existing or available fuel source is less important than in 2021. In addition, ductwork was not previously mentioned, which could be because ducted heat pumps are more common now than in 2021.[27] Similarly, insulation and weatherization were not previously mentioned, which might be related to the shift from ductless systems that only heat problem areas of homes to ducted heat pumps serving the whole home. However, the objectives for our current research were more focused on heat pumps and hybrid or dual-fuel systems, which could partially explain why HVAC contractors more frequently mentioned certain information during interviews.

[27] Northwest Energy Efficiency Alliance. *Study of Influences on Northwest Variable Speed Heat Pump Adoption* (2022). Accessed here.

Figure 3. Change in Information Importance for Recommending Heat Pumps, 2021 to 2025



Note: The 2021 AIC Market Characterization Study referenced in the figure above can be accessed here.

In line with feedback from HVAC contractors in the current study, a 2022 report by NEEA also indicated that customer budget is crucial information contractors must consider when determining if a hybrid system suits a customer.[28] In fact, some contractors indicated they avoid recommending hybrid systems to their customers altogether when they discover that (1) customers on a budget live in an area that makes them ineligible for a utility rebate, or (2) a hybrid system configuration would not qualify for a utility rebate or tax credit. The study also reported that contractors who consider hybrid systems for customers assess their customers' preference for comfort, as a gas furnace can add an additional level of winter comfort that a heat pump might not be able to do alone (e.g., extremely cold outdoor temperatures).

All the aforementioned information helps HVAC contractors think through key equipment considerations, such as whether a hybrid heat pump and natural gas furnace system is a good fit for a customer's home. While our research found that dual-fuel heating was a common system consideration for Illinois contractors (Section 3.1.2), this does not appear to be limited to HVAC contractors in the Midwest. The 2022 NEEA study reported that contractors in the Northwest typically installed heat pumps with backup heating sources, including electric strip heat and natural gas furnaces. This usually depended on what type of system customers had before the heat pump was installed. These contractors also mentioned that in regions of the Northwest where natural gas was less expensive than electricity, a hybrid system with a natural gas furnace may be a better option. Another study conducted by NEEA in 2023 reported that HVAC contractors in the Northwest viewed dual-fuel systems with natural gas as more efficient than heat pumps with backup electric strip heating.[29]

[28] Northwest Energy Efficiency Alliance (NEEA). *Residential HVAC Contractor Market Research* (2022). Accessed here.
[29] NEEA. *Dual Fuel and Gas Heat Pump Research* (2023). Accessed here.

Supplemental Research Question

What are all the heating and cooling systems in residences?

A 2023 field study of micro heat pumps (also known as room heat pumps or portable heat pumps) from NEEA found that single-family home occupants typically used multiple products and methods to heat and cool their homes.[30] Even those with central HVAC systems tended to use ancillary heating sources, including portable space heaters, fireplaces, wood stoves, and pellet stoves. Cooling systems encompassed central and portable air conditioners, portable fans, and ceiling fans.

3.2 HVAC CONTRACTOR INSTALLATION DECISIONS AND PRACTICES

3.2.1 RESEARCH QUESTION 4

When heat pumps are installed with other systems, are they set up to communicate with those other systems? If so, how do they communicate?

INTERVIEW FINDINGS

Switchover temperature is the main communication point between a heat pump and furnace that contractors discussed, specifically, the temperature at which a furnace takes over a home's heating load from a heat pump. (Switchover temperatures are covered in more detail in Section 3.2.2.) **Nearly all contractors who install dual-fuel systems said the systems were also equipped with emergency switch options, enabling customers to manually turn on or off any component of their heating system (9 of 10).**[31] Eight contractors indicated this emergency option was available through the customer's advanced thermostat. One contractor stated they installed a manual switch on the heating system for customer access. The contractor who did not mention their dual-fuel systems having an emergency switch option explained that, since the system's crossover temperature is always automatically set to the equipment manufacturer's recommendation, there would be no need to manually control any of the equipment.

All ten contractors discussed these features with their customers, usually in simple terms without unnecessary detail. One contractor said that if a customer specifically asks about it, they will provide more details about the selected temperature since the customer seemed likely to understand. Another contractor said they usually provide customers with a two-page summary about how a heat pump works and give verbal instructions for how the components of the heating system will work, including the communication between a heat pump and furnace. Three contractors highlighted that the switchover from a heat pump to a furnace was not optional and had been automated by the system; beyond this, these three contractors do not say much else to their customers to avoid confusion. One of these contractors emphasized that customers were generally not well-educated on HVAC systems, let alone intersystem communication.

[30] NEEA. *Micro Heat Pump Field Study* (2023). Accessed here.

[31] While 13 contractors said they sell and install dual-fuel systems, only 10 completed the portion of the interview about emergency switch options for dual-fuel systems.

"Usually, my customers, for the most part, aren't that well-educated on all the nuts and bolts of how to install these things and the efficiencies and everything. They're relying on my expertise. I let them know I'm going to set this at 35 degrees… if I tell them that it's most economical and efficient for their system, nobody's going to fight me on it."

LITERATURE REVIEW FINDINGS

Effective and efficient performance of a heat pump when installed with another heating system relies on properly installed equipment and integrated or automated controls like advanced thermostats, as well as control panels or Wi-Fi-connected applications. **To maximize efficiency, integrated controls are critical to operating dual-fuel systems; a 2024 report by ACEEE found this to be especially true for dual-fuel systems in cold climates.**[32] For heat pumps to operate efficiently and effectively as part of a dual fuel heating system, thermostats must be configured properly to know when to switch from one system to another. This includes being equipped with software that can detect outdoor temperatures and/or access local weather via Wi-Fi connection. Additionally, the thermostat must be programmed with a proper switchover temperature that maximizes a heat pump's capacity to meet the heating load of a home and switches to a supplemental heat source when necessary.

Automated controls like dual fuel-specific advanced thermostats are commonplace but not universal for all dual fuel systems. A 2021 study of Massachusetts homeowners participating in the state's heat pump rebate program found that most customers had an automated control installed by their contractor (107 of 130; 82%).[33] Almost half of these customers had their switchover temperature set above 35°F, which was above the program's recommended setpoint. Additionally, while most of these customers relied on automated controls to switch from their ducted heat pump to supplemental heat, the remainder switched systems manually, which can reduce the potential efficiency benefits realized by a heat pump. Another study of Massachusetts customers with dual-fuel systems in 2023 found manual switching to be even more prevalent, with nearly half of those customers (83 of 189) reporting they did not use an integrated control to switch from their heat pump to supplemental heat and switched manually.[34] In the Northwest, contractors interviewed as part of a 2023 NEEA study on dual-fuel systems said that while advanced controls can help customers control their HVAC systems more easily, they can create unnecessary hurdles to installation and frustrate some customers.[35]

Integrated controls for ductless systems and existing heating systems pose additional challenges. Some contractors interviewed for the 2023 Massachusetts study said they might not set up ductless heat pump systems to communicate with a home's supplemental heating system, indicating it was unnecessary or not worth the cost and trouble.[36] While not dual-fuel focused, a 2022 study in Michigan found that integrated controls between heat pumps and existing electric baseboard heating faced additional challenges. These types of integrated controls were expensive, complicated, and not widely available from manufacturers.[37]

[32] Hill, Samantha, et al. ACEEE. *Better than a Dupe: How to Use Heat Pumps for AC Replacements* (2024). Accessed here.
[33] Guidehouse. Energy Optimization Fuel Displacement Impact and Process Study (2021). Accessed here.
[34] Guidehouse and Illume Advising. *Heat Pump Integrated Control Performance Review* (2023). Accessed here.
[35] NEEA. *Dual Fuel and Gas Heat Pump Research* (2023). Accessed here.
[36] Ibid.
[37] Slipstream. *Michigan Heat Pump Collaborative Market Characterization* (2022). Accessed here.

3.2.2 RESEARCH QUESTION 5

What switchover temperature do installers use when installing dual-fuel systems?

INTERVIEW FINDINGS

A dual-fuel HVAC system's switchover temperature is one way integrated controls allow the system to switch back and forth between the heat pump and the furnace.[38] **All the dual-fuel systems installed by the 10 interviewed contractors who elaborated on integrated controls were programmed to turn on the gas furnace and take over heating for the heat pump at designated switchover temperatures.**[39] Interviewed contractors used a variety of switchover temperatures for their customers' dual-fuel systems. Four contractors provided specific temperatures to which they always set their dual fuel systems, and five contractors provided temperature ranges because the temperature they selected often depended on a customer's preference or the type of heat pump being installed. Finally, one contractor said they program their hybrid systems to always have a switchover temperature at what the equipment manufacturer specifies.

Switchover temperatures that contractors set ranged from −5°F to 40°F, with temperatures between 30°F and 35°F being the most common switchover temperatures. We list the switchover temperatures recorded by contractors in Table 5. Only nine of the interviewed contractors provided temperature estimates.

Table 5. Switchover Temperatures Contractors Select for Dual Fuel Systems (n=9)

Contractor[a]	Switchover Temperature
1	−5°F–0°F
2	25°F
3	26°F
4	25°F–30°F
5	30°F–35°F
6	30°F–35°F
7	35°F
8	30°F–40°F
9	40°F

Note: One contractor has been removed from this figure, as the crossover temperature they set is always what the equipment manufacturer recommends.

[a] Contractors have been assigned arbitrary numbers to maintain anonymity.

Around half of contractors said their customers' preferences around home comfort, energy savings, and bill savings are the main factors in selecting a hybrid system's switchover temperature (4 of 9). Contractors also mentioned the type of heat pump system they install greatly affects what the switchover temperature is (4 of 9), given that cold climate heat pumps can heat a home during lower outside temperatures than a traditional heat pump and some equipment manufacturers recommend a lower or higher switchover temperature for their equipment than others. Another

[38] Margolies, Justin and Art Thayer. *Advancing Beneficial Electrification: The Role of Dual Fuel Home Heating Systems in Cold Climates.* National Rural Electric Cooperative Association. March 2020. Accessed here.

[39] Please note that while 13 contractors said they sell hybrid heating systems, only 10 contractors made it to the switchover temperature portion of the interview.

contractor said it also depends on the customer's climate zone, as those in southern Illinois experience milder winters that are less prone to frigid cold snaps compared to northern Illinois.

LITERATURE REVIEW FINDINGS

Our literature search found five studies reporting customer- or contractor-set switchover temperatures for dual-fuel heat pump installations. A pair of studies in Massachusetts examined dual fuel heat pumps with and without integrated controls. The first of these studies used surveys and heating system sensors to reveal that customers did not use standardized switchover temperatures for oil or propane systems paired with ductless heat pumps or central heat pumps.[40] When customers and contractors used integrated controls to set a switchover temperature, they set the temperature between 5°F and 45°F. Most customers (80%) relied on automated switchover; 15%–20% manually controlled the switchover of their system from the heat pump to a gas-powered system. Based on the survey and metering results, the evaluation team calculated weights for program partial displacement measures, which reflect their estimated rates at which each switchover temperature was present in Massachusetts (Table 6).

Table 6. Integrated Control Switchover Weights

Control Strategy	Central Heat Pump	Ductless Heat Pump
5°F Switchover	15%	5%
15°F Switchover	10%	22%
30°F Switchover	45%	28%
45°F Switchover	30%	11%
Other	0%	35%
Total	**100%**	**101%**

Source: Guidehouse, Inc. Energy Optimization Fuel Displacement Impact and Process Study. 2021.

The research team followed up with a second study in 2023, specifically of mini-split dual-fuel HVAC systems.[41] For this study, the team surveyed customers who used natural gas or oil as their backup heating source. The evaluation team reported that 27% of survey respondents set a switchover temperature above 45°F, 68% above 30°F, and 32% below 30°F.

In 2022, the Michigan Heat Pump Collaborative published a market characterization study with a literature review.[42] The literature review mentions a small field study of eight residential dual-fuel air source heat pumps (ASHPs) installed between 2016 and 2018, all with propane backup heat. All the dual-fuel heat pumps had a switchover temperature between 20°F and 30°F.

In contrast, a ComEd-sponsored field study published in 2024 assessed 36 dual-fuel systems with natural gas furnaces paired with coil-only variable speed heat pumps that replaced central ACs.[43] Thirty of the systems were based in Northern Illinois. Contractors and homeowners were able to set the switchover temperatures; the research team found switchover temperatures from 0°F to 35°F. In a different summary of the report, however, ComEd noted these

[40] Guidehouse, Inc. *Energy Optimization Fuel Displacement Impact and Process Study* (2021). Accessed here.
[41] Guidehouse, Inc. *Heat Pump Integrated Control Performance Review* (2023). Accessed here.
[42] Slipstream. *Michigan Heat Pump Collaborative Market Characterization* (2022). Accessed here.
[43] Hill, Samantha, Ben Schoenbauer, and Pauravi Shah. *Better than a Dupe: How to Use Heat Pumps for AC Replacements* (2024). Accessed here. Coil-only dual fuel heat pumps are a new, more affordable option for heat pumps, in which an existing system with AC and a furnace is upgraded by swapping the AC coil with a heat pump coil.

switchover points were set lower than recommended for optimal customer economic benefits due to the study's goal of measuring heat pump performance.[44]

Finally, a study of ductless heat pumps and central dual-fuel heat pumps with oil or natural gas backup heat in Massachusetts and Connecticut found switchover temperatures ranged between 15°F and 40°F (average 25°F) for systems with oil backup heat and between 20°F and 40°F for systems with natural gas backup heat.[45]

3.2.3 RESEARCH QUESTION 6

What percentage of heat pumps are replacing gas heating systems, are installed with existing gas heating systems, and are installed with new gas heating systems?

INTERVIEW FINDINGS

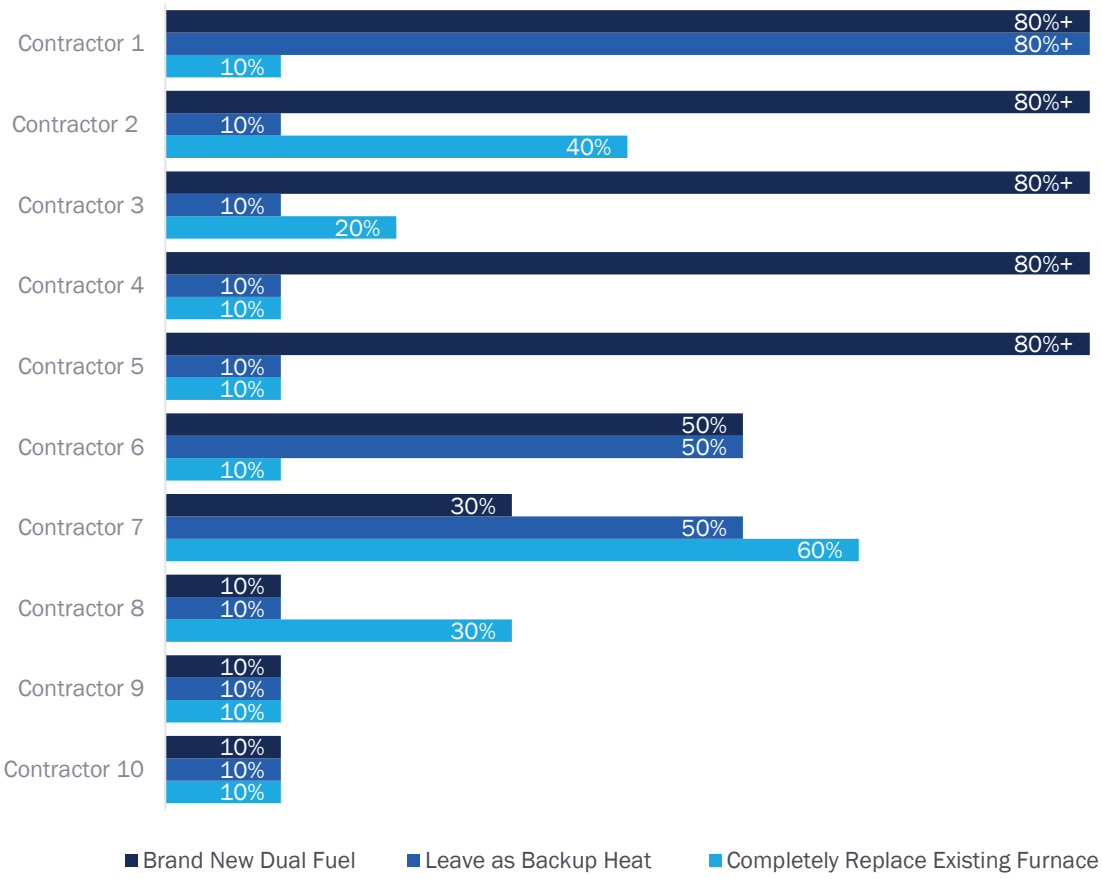
In addition to what contractors recommend to their customers, we asked contractors what they install for their customers. Figure 4 shows the percentages contractors provided for each installation scenario: installing a heat pump with a brand-new gas furnace, leaving a furnace as backup heat with a new heat pump, or installing a heat pump to replace an existing furnace completely. Contractors' responses are general estimates. When asked what percentage of the time they recommend a certain system configuration, we asked for contractors' best guesses. A few contractors' estimates exceeded 100%; interviewers did not attempt to adjust or correct their estimates.

Half of the contractors (5 of 10) showed a preference in what they would install, with five contractors installing a new dual fuel system most frequently. The five remaining contractors were mixed in the percentage of the time they install a heat pump with an existing furnace left as backup heat or as part of a completely brand-new dual-fuel system. Contractors infrequently recommended completely replacing an existing gas furnace with a heat pump; 6 of 10 said they only install this configuration 10% of the time or less.

The vast majority of contractors reported installing a heat pump to replace a gas furnace less than 50% of the time (9 of 10).[46] A majority of contractors also said they would only install a heat pump and leave an existing gas furnace as back-up heat less than 50% of the time (7 of 10); however, three contractors said they would recommend leaving the existing furnace as backup heat 50% of the time or more. Six contractors reported they would recommend an entirely new dual fuel system 50% of the time or more, with five recommending it 80% or more.

[44] Center for Energy and Environment. *Variable Speed Heat Pumps as Air Conditioner Replacement* (2024). Accessed here.
[45] Guidehouse, Inc. *Massachusetts and Connecticut Heat Pump Metering Study* (2024). Accessed here.
[46] Please note that, of the 15 contractors we interviewed, five contractors were excluded from this analysis. Three contractors did not make it to this portion of the interview, and two had difficulty answering these questions.

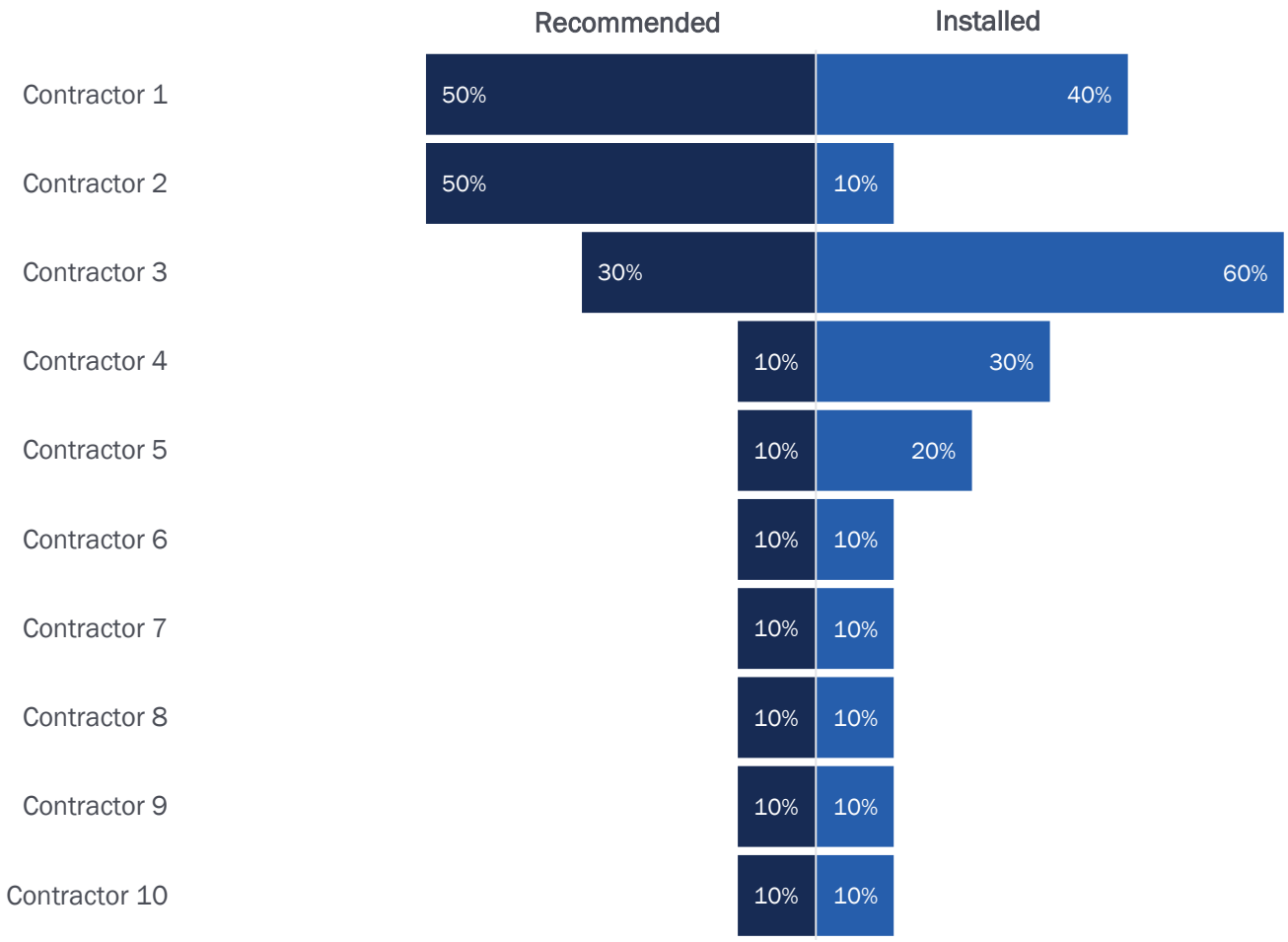
Figure 4. Contractors' Estimated Percentages of Heat Pump Installation Scenarios (n=10)



Based on the percentages that contractors provided, we calculated averages for each installation scenario. These are rough averages based on a small sample and general estimates from contractors, and as estimates derived from a small number of estimates, should be treated as directional information. On average, contractors said they install a heat pump with a brand-new gas furnace 51% of the time, leave a furnace as backup heat with a new heat pump 25% of the time, and install a heat pump to completely replace a gas furnace 21% of the time.

We also examined the difference between contractors' recommendations and installations for a heat pump to fully replace a gas furnace (Figure 5). Surprisingly, three contractors reported installing heat pumps to replace gas furnaces more often than they recommend. Five contractors reported recommending and installing at the same rate, a low 10% for each. The remaining two contractors recommended this scenario more often than they installed it.

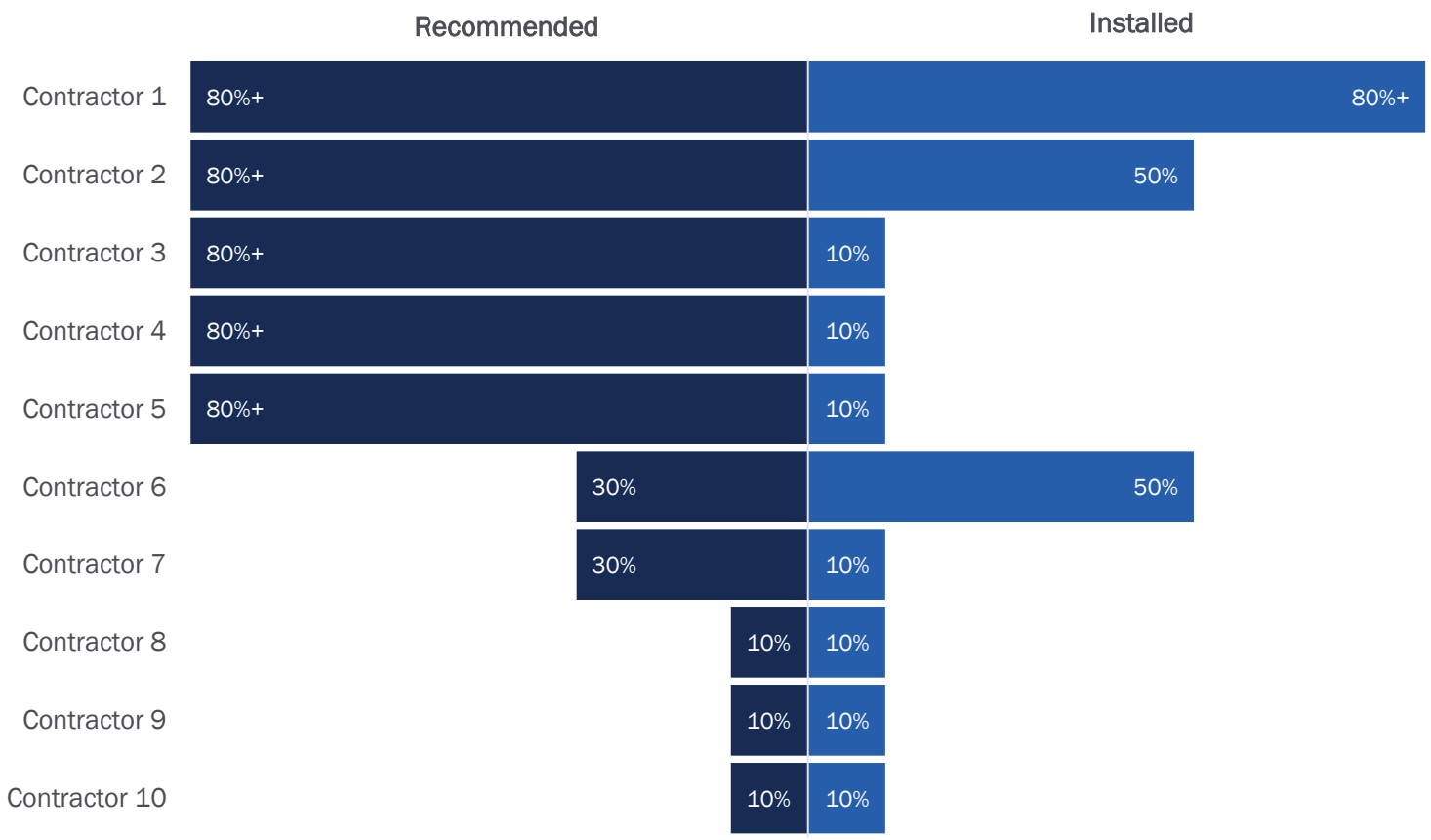
Figure 5. Recommendation vs. Installation for Heat Pump Replacing Existing Gas Furnace (n=10)



Note: Contractors were assigned arbitrary numbers to maintain anonymity.

Next, we compared the difference between contractors' recommendations and installations for a heat pump and an existing furnace left as backup heat (Figure 6). One contractor reported installing more heat pumps in this scenario than they recommended to their customers. Three other contractors recommended and installed it at the same rate of 10%; in contrast, a fourth contractor recommended and installed at the same high rate of more than 80%. The remaining five contractors recommended this scenario more often than they installed it.

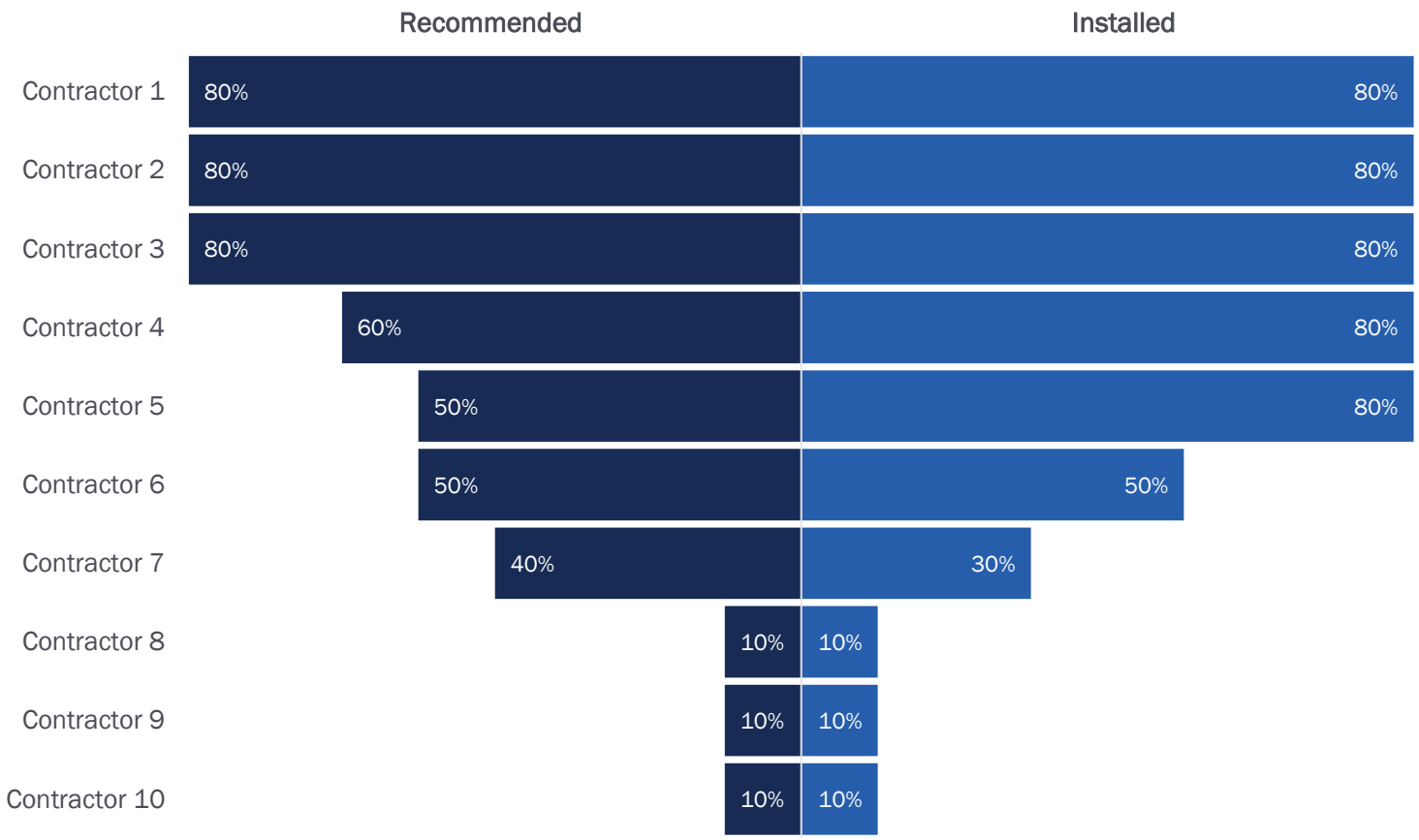
Figure 6. Recommendation vs. Installation for Heat Pump with Furnace Left as Backup Heat (n=10)



Note: Contractors were assigned arbitrary numbers to maintain anonymity.

Lastly, we studied the difference between contractors' recommendations and installations for a brand-new dual-fuel system (Figure 7). Two contractors indicated they install brand-new dual fuel systems more often than they recommend this scenario. Seven contractors said they recommend and install this scenario at the same rate, including three who do so over 80% of the time, one at 50%, and three at 10% of the time. The remaining contractor installed this scenario less often than they recommended it.

Figure 7. Recommendation vs. Installation for Brand New Dual-Fuel System (n=10)



Note: Contractors were assigned arbitrary numbers to maintain anonymity.

LITERATURE REVIEW FINDINGS

From our research of relevant literature, contractors appear more likely to install heat pumps as part of hybrid systems in the colder regions of the US. This is also corroborated by the interviews we conducted with HVAC contractors in Illinois. While not representative of the general population in New York and Massachusetts, of the homes that were included in a meter data analysis as part of a 2022 study, most of the homes with backup heat had either a wood or natural gas-powered backup system (69%; 20 of 29); the remainder had electric resistance (4 of 29), propane (3 of 29), or oil (2 of 29).[47] This could potentially illuminate the types of backup heating systems residents in these states might have when contractors install heat pump systems as part of a hybrid system.

A 2022 study in Michigan reported that customers who consider heat pumps gravitate more towards dual-fuel options, especially because natural gas pricing is competitive with (and sometimes cheaper than) electricity in the state.[48] It is also an attractive option for residents living in portions of Michigan that rely on propane, especially where electricity is likely cheaper.[49] A 2024 study with contractors in Wisconsin found that nearly two-thirds of the homes where they installed new heat pumps had an existing natural gas furnace.[50] In addition, contractors were more likely than not to

[47] Cadmus. *Residential ccASHP Building Electrification Study* (2022). Accessed here.
[48] Slipstream. *Michigan Heat Pump Collaborative Market Characterization* (2022). Accessed here.
[49] Ibid.
[50] Cadmus. *Focus on Energy Calendar Year 2023 Evaluation Report*. Accessed here.

replace an existing natural gas furnace with a new one.[51] A common prediction by HVAC contractors who participated in PNNL's 2024 national survey was that in the next five years, dual fuel systems will continue to be a common heating system configuration and may even become the "normal" system installed in customers' homes.[52]

3.2.4 RESEARCH QUESTION 7

How often are cold climate heat pumps included in hybrid systems?

INTERVIEW FINDINGS

The nine contractors who sell and install ducted cold climate heat pumps had divergent and nuanced installation practices for hybrid systems. Four contractors reported that they *only* install cold climate heat pumps, including heat pumps as part of hybrid systems. One contractor said they sometimes installed cold climate heat pumps as part of hybrid systems, but said a traditional heat pump and gas furnace is usually what they recommend to customers. Four contractors who said they sell ducted cold climate heat pumps rarely install them as part of a hybrid system, if at all. One of these contractors noted that if they installed a hybrid system, it would most likely be with a traditional heat pump paired with a natural gas furnace; if they installed a ducted cold climate heat pump (which they do on occasion), it would be installed without any other heating source and would serve as the primary heating system. However, this contractor said all the *ductless* heat pumps they sell are cold climate heat pumps because there are certain areas of a home where ductless heat pumps are installed that a backup heating system may still have a hard time heating.

> *"If it's a dual fuel system, I'm comfortable giving them a heat pump that can heat down to 20 degrees, but at the end of the day, their thermostat is going to switch over to gas heat. If the sole heat source is going to be the heat pump, then I'm always going to recommend cold climate because I want that to be able to heat no matter if it's the coldest day in January or a nice day in April. Anytime I'm installing a mini split, it's always going to be cold climate."*

LITERATURE REVIEW FINDINGS

Heat pumps have been around for decades and have evolved significantly over the last several years. With advances to key components of heat pumps like the compressor, refrigerant, and defrost cycles, new high-efficiency heat pumps can operate effectively in cold regions of the United States,[53] and often without the help of an additional heating source. According to Rewiring America, an electrification nonprofit, cold climate heat pumps can meet most of a home's heating load (if not the entire heating load) required to keep a home comfortable.[54] This is also corroborated by a NEEA study that reported high-efficiency heat pumps, like cold climate heat pumps, do not require backup heat.[55] A study by NREL found that pairing cold climate heat pumps with existing gas furnaces can diminish the efficiency and effectiveness of the cold climate heat pump.[56] **However, despite cold climate heat pumps' ability to heat a home independently, some HVAC contractors report installing cold climate heat pumps as part of hybrid systems.** Opinion Dynamics' market characterization study in 2021 found that all HVAC installers paired the heat pump systems they

[51] Ibid.
[52] Pacific Northwest National Laboratory (PNNL). *PNNL 2025 Field Research with HVAC Contractors*. Accessed here.
[53] Malhortra, Mini, et al. *Heat pumps in the United States: Market potentials, challenges and opportunities, technology advances* (2023). Accessed here.
[54] https://homes.rewiringamerica.org/articles/heating-and-cooling/heat-pumps-cold-weather
[55] NEEA. *Variable Speed Heat Pumps – Technical Best Practices Gap Analysis* (2022). Accessed here.
[56] NREL. *Cold Climate Air Source Heat Pumps (ccASHPs) Technology* (2022). Accessed here.

installed with backup heat, even when specifications for the equipment said it could operate in freezing temperatures.[57] While installers understood that heat pumps could run effectively down to zero and subzero temperatures, they were still worried about the possibility of the heat pump being unable to perform in extreme cold conditions. A 2022 study in the Northwest found that HVAC contractors believed that backup heat is needed for heat pumps to ensure reliability, even in the milder areas of the region.[58]

3.2.5 RESEARCH QUESTION 8

This section seeks to answer the following research question:

What fraction of ductless heat pump installations are partial vs. full displacement?

INTERVIEW FINDINGS

The vast majority of contractors reported that, most of the time, the ductless heat pumps they install partially displace heat provided in the home by another primary heating system (10 of 11). Contractors typically installed these systems in areas of a home where a customer experienced diminished comfort, such as in a bedroom, office, or sunroom. Interestingly, two contractors said they installed ductless heat pumps to fully displace an existing heating system, but their descriptions of such installations suggested partial displacement; both said they mostly installed ductless heat pumps in additions to homes like spare bedrooms or offices where extending ductwork from the primary heating system was not possible or would not be effective. The sole contractor who used ductless heat pumps for full displacement said they did not install ductless heat pumps often, but when they did install them, it was mostly for customers with solar photovoltaic systems who wanted to get off whole-home natural gas heating or electric resistance heating. By doing so, this contractor explained that the customer could zone the heating in their entire home and fully displace heating provided by their existing ducted heating system, which costs far more to heat their home.

> *"If a customer is going 100% solar and their energy bill was killing them, I have taken up their whole conventional system and put in ductless multi-zone mini splits. They can zone their entire home and "own" their Ameren bill, using the energy they need as it's required."*

In addition to ductwork and new construction considerations, seven contractors also mentioned other considerations for displacement, including a customer's budget and a home's size and layout. We elaborate on those reasons below:

- **Customer budget (2).** Both contractors mentioned customer budget as an important factor in considering the displacement of an existing heating system with ductless heat pumps. One contractor said it was important to determine what incentives or credits a customer would be eligible for before deciding to move forward with mini-splits. The other contractor provided a more general assessment around economic feasibility for the customer and whether moving to heating supplied by heat pumps alone would make sense for that customer.
- **Home size and layout (2).** Two contractors said the home's size and layout of main living spaces were helpful in considering the displacement of an existing heating system with ductless heat pumps. One contractor specifically mentioned he wanted to understand from the customer if there were any troublesome rooms or areas in the house that did not get heated as well as others, and how many of those troublesome spaces there were.

[57] Opinion Dynamics. *Ameren Illinois Market Effects Pilot – HVAC Market Characterization Report* (2021). Accessed here.
[58] NEEA. *Residential HVAC Contractor Market Research* (2022). Accessed here.

> *"When I walk into a house, one of the early questions I ask customers is are there any parts of the home that don't heat and cool the way you would like them to, if there's bedrooms on the second story and a family room that duct work couldn't get out there very well… those kinds of spaces are generally what I will come up with mini splits to treat."*

- **Other (3).** Contractors mentioned other considerations for displacement, including how well a home is insulated, what type of existing system the customer has, and customer preference for type and location of equipment.

LITERATURE REVIEW FINDINGS

Across the country, ductless heat pumps have been and continue to be used mainly for partial displacement. A 2014 study of Massachusetts customers found that ductless heat pumps were rarely installed to fully displace heat provided by an existing heating system; only 5% of customers reported removing their existing heating equipment to solely heat their home with their ductless system.[59] In another Massachusetts study, most customers who had ductless heat pump systems installed reported using their ductless heat pump in addition to their home's primary heating system.[60] A 2019 study of customers in Oregon who had ductless heat pump systems installed reported a similar finding, where a ductless system was often used to heat or cool a space in addition to a primary heating system.[61] A 2020 study of Minnesota customers with ductless systems found that the ductless heat pumps were installed to serve, on average, around one-quarter of a home's heating load; the primary systems typically included electric boilers, baseboard heat, or a propane furnace.[62] In the Northwest, ductless heat pump systems are typically installed to only partially heat a home.[63] Additionally, regional market conditions, such as the sale and distribution of certain heat pumps, also affect the type of heating equipment sold. A 2022 market characterization of heat pumps in Michigan found that the majority of ductless heat pumps being sold in the state had a capacity of 24,000 BTU/hour or lower, which indicated that most homeowners installing ductless heat pump systems are only heating a portion of their homes since systems of this size could only manage some of a home's total heating load.[64] (This could potentially be because Michiganders gravitate more towards dual-fuel options, as discussed in Section 3.2.3.) In New York, a 2022 study of program participants reported that three-fourths of participants used their heat pumps in addition to their existing heat systems.[65]

However, in the future, ductless heat pumps, especially cold climate heat pumps, could fully displace heating provided by another heating system in the home. A 2024 study on heat pump metering of select sites in Massachusetts and Connecticut revealed that ductless mini-splits could fulfill nearly all of a home's heating requirements in both partial and full displacement applications. However, there were a few instances of extreme cold that necessitated backup heating to satisfy the remaining heating needs of the home.[66]

[59] Cadmus. *Ductless Mini-Split Heat Pump Customer Survey Results* (2014). Accessed here.
[60] Navigant. *Quick Hit Study: Ductless Mini-split Heat Pump Survey* (2018). Accessed here.
[61] Cadmus. *Residential Ductless Heat Pump Study* (2019). Accessed here.
[62] Slipstream. *Energy Savings Opportunities in New and Renovated Minnesota Homes* (2020). Accessed here.
[63] NEEA. *Variable Speed Heat Pumps – Technical Best Practices Gap Analysis* (2022). Accessed here.
[64] Slipstream. *Michigan Heat Pump Collaborative Market Characterization* (2022). Accessed here.
[65] DNV. *Heat Pump Impact Evaluation Final Report* (2022). Accessed here.
[66] Guidehouse. *Massachusetts and Connecticut Heat Pump Metering Study* (2024). Accessed here.

Supplemental Research Question

Are customers interested in switching completely away from gas?

Five interviewed contractors said they are likely to recommend a heat pump to customers interested in switching away from gas, propane, or oil to electricity, which has been occurring more often. Two interviewed contractors also said they will recommend a heat pump to a customer who has or will install solar to maximize cost savings associated with at-home power generation. Some customers are hesitant to move completely away from natural gas, making dual-fuel systems an attractive option for customers to select and contractors to recommend.[67] A survey of over 7,000 homeowners across the country found that, while almost half reported prioritizing high-efficiency equipment like heat pumps that lessen their environmental impact (48%), customers were more focused on the durability of equipment, safety, and low installation cost.[68]

3.3 CUSTOMER AND HVAC CONTRACTOR FAMILIARITY WITH HEAT PUMP TECHNOLOGIES

3.3.1 RESEARCH QUESTION 9

Are contractors in AIC territory familiar with the latest cold climate heat pump technology? How does this knowledge affect their recommendations to customers?

INTERVIEW FINDINGS

As discussed in Section 3.1.1, all 15 contractors said they sell and install heat pumps for their customers, and 13 said they also sell and install dual fuel (hybrid) systems. However, contractors varied in the types of heat pumps they sold and installed, including cold climate heat pumps. We provide the type of heat pump equipment each contractor reported selling and installing in Table 7. **Most contractors reported selling and installing traditional (non-cold climate) heat pumps (11 of 15) as well as ductless cold climate heat pumps (12 of 15); nine contractors reported selling and installing ducted cold climate heat pumps.**

[67] NEEA. *Dual Fuel and Gas Heat Pump Research* (2023). Accessed here.

[68] Pacific Northwest National Laboratory (PNNL). *PNNL 2025 Field Research with HVAC Contractors*. Accessed here.

Table 7. Cold Climate Heat Pumps and Hybrid Systems Contractors Sell and Install (n=15)

Contractor	Heat Pump Systems			Dual Fuel/Hybrid Systems	
	Traditional Heat Pumps[a]	Ducted ccHPs	Ductless ccHPs	With Traditional HP	With Ducted ccHP
1		✓	✓		✓
2		✓	✓		✓
3		✓	✓		✓
4		✓	✓		✓
5	✓	✓	✓	✓	Rarely
6	✓	✓	✓	✓	Rarely
7	✓	✓	✓	✓	Rarely
8	✓	✓	✓	✓	Rarely
9	✓	✓	✓	✓	Sometimes
10	✓			✓	
11	✓		✓	✓	
12	✓			✓	
13	✓			✓	
14	✓		✓		
15	✓		✓		
TOTAL:	**11**	**9**	**12**	**9**	**9**

Note: Contractor names have been removed for anonymity, and arbitrary numbers have been assigned instead.

[a] All contractors who reported installing traditional heat pumps installed ducted and ductless systems.

The six contractors who do not sell and install ducted cold climate heat pumps had various reasons for not selling those systems:

- **Lack of familiarity (2 of 6).** Both contractors said they were unfamiliar with the latest cold climate heat pump technology. One contractor was especially surprised to learn there are heat pumps currently on the market that can heat a home with outdoor temperatures at or below 20°F.
- **High up-front cost (2 of 6).** One contractor said cold climate ductless heat pumps are more affordable than ducted cold climate heat pump systems and work as effectively and efficiently for customers looking to install heat pumps. Another contractor said that the Ameren Illinois rebates are not enough to offset the high initial cost of a cold climate heat pump for most customers; therefore, they do not sell them.

> *"Most of these heat pumps are getting sold and installed through Ameren's program. They don't pay enough money for the cold climate systems. It's not enough to be able to warrant [selling them]. They're barely paying enough on their income-qualified programs to pay for the regular systems."*

- **Other (2 of 6).** One contractor said they are fairly limited in the types of systems they can sell and install for their customers. As a participant in a state incentive program, this contractor claimed they could only install a new system of the same type of system as the existing one to qualify for the rebate, and no customer already has an

existing cold climate heat pump.[69] The other contractor said they are aware of the technology and will consider selling it once it becomes more prominent on the market.

Interestingly, four contractors said they *only* sell and install cold climate heat pumps when they recommend a heat pump in general to a customer, including both ducted and ductless heat pumps. All four contractors said they only install cold climate heat pumps for performance reasons. For instance, one contractor emphasized they would not want to sell someone a heating system that could not heat in 25°F weather or below. Another contractor said they don't like customer callbacks and would rather have a heat pump that works in the event of an extreme cold snap.

We also asked respondents about their familiarity with less common but technologically advanced residential HVAC technologies like "ducted ductless" heat pumps and variable refrigerant flow heat pumps. Two contractors said they sell variable refrigerant flow ducted and ductless heat pumps, but one said it is extremely rare that they do and could only remember two jobs in their career where they installed that system.

LITERATURE REVIEW FINDINGS

As mentioned in Section 3.2.4, the market for heat pumps has changed drastically with the introduction of new high-efficiency heat pumps like cold climate heat pumps. They can operate down to subzero temperatures and often meet the heating load of a home without additional help from another heating source. **Most AIC contractors appear to be familiar with cold climate heat pump technology.** HVAC installers interviewed as part of Opinion Dynamics' 2021 market characterization for AIC were aware of cold climate heat pumps. Nonetheless, despite knowing the equipment could perform in subfreezing temperatures, they installed all heat pumps with backup heat.[70] The current study also found that the majority of HVAC contractors were familiar with cold climate heat pumps, though some contractors were more aware of cold climate heat pumps' capabilities. Contractors interviewed in New York and Massachusetts as part of a 2022 study reported that they primarily install cold-climate ductless systems for their customers; they also install ducted heat pump systems.[71] Contractors were also most likely to install these heat pump systems as supplemental heat or as a primary heating source paired with backup heat.

HVAC contractors and installers in other regions appear aware of cold climate heat pumps but may need further education on their effectiveness and performance. A 2022 market characterization study in Michigan reported that HVAC contractors are aware of the limitations of traditional heat pumps when outdoor temperatures drop below freezing, but are not as aware of how newer technology like cold climate heat pumps can address those limitations.[72] A similar market study focused on Massachusetts and New York found that HVAC contractors are recommending cold climate heat pumps to their customers, especially cold climate mini-splits, but are still primarily installing them with backup heat or as supplemental heating systems, even though the systems can adequately heat homes on their own.[73] In the Northwest, NEEA's heat pump technical gap analysis found that even if they are aware of the latest high efficiency HVAC technology, HVAC contractors generally need more training and support to apply quality installation practices of higher efficiency equipment like variable speed and cold climate heat pumps.[74] These best practices include, but are not limited to, load calculations, equipment sizing, switchover and lockout temperature controls, and duct design.

[69] We did not independently verify whether the specific program this contractor mentioned has these specific requirements in place.
[70] Opinion Dynamics. *Ameren Illinois Market Effects Pilot – HVAC Market Characterization Report* (2021). Accessed here.
[71] Cadmus. *Residential ccASHP Building Electrification Study* (2022). Accessed here.
[72] Slipstream. *Michigan Heat Pump Collaborative Market Characterization* (2022). Accessed here.
[73] Cadmus. *Residential ccASHP Building Electrification Study* (2022). Accessed here.
[74] NEEA. *Variable Speed Heat Pumps – Technical Best Practices Gap Analysis* (2022). Accessed here.

3.3.2 RESEARCH QUESTION 10

Are customers familiar with heat pump technology? If yes, do they consider installing one? If not, why not?

INTERVIEW FINDINGS

Almost all contractors reported that their customers ask about heat pumps (13 of 15), but typically not very often. Eight contractors reported that their customers inquire about heat pumps, though not frequently; two contractors stated that their customers ask about them occasionally (2 out of 5); and three mentioned that their customers ask about them most of the time (3 out of 5). Customers typically ask contractors the following questions about heat pumps:

- How effective is a heat pump compared to a gas system?
- Will I see a decrease in my energy bill?
- How does a heat pump work?
- Is a heat pump effective in cold temperatures?
- Are there incentives available for heat pumps?
- Are heat pumps all-electric?

While many customers are curious about heat pumps and may be aware of them, contractors said most customers were relatively unfamiliar with them and the different types of heat pumps available.

Most contractors who said their customers ask about heat pumps shared both accolades and concerns about heat pumps mentioned by their customers (11 of 13). Table 8 provides contractor descriptions of their customers' feelings around heat pumps and why they have those feelings. **Contractors said that customers who felt positively about heat pumps most often said it was because of the bill savings they realized from having the equipment (6 of 11); customers who felt negatively about heat pumps most frequently cited the high up-front cost of the equipment (3 of 11).**

Table 8. Customer Feelings Towards Heat Pumps and What They Tell Contractors (n = 11)

Customer Feelings Toward Heat Pumps	Customer's Reason	# of Mentions
Positive	Bill savings	6
	Availability of incentives	3
	All-electric	2
	Environmental benefits	2
	Efficiency	2
	Quietness	1
Negative	High up-front cost	3
	Cooler heat discharge	2
	Problems in cold weather	2
	Negative story from someone else	2
	Too reliant on electricity	1
	No bill savings	1
	Less effective compared to gas system	1

Customer Feelings Toward Heat Pumps	Customer's Reason	# of Mentions
	Too loud	1

Supplemental Research Question

Do customers understand how using one system over another affects their billing?

Contractor interviews revealed that some customers are aware of the bill savings associated with switching their heating equipment to a heat pump. Contractors also mentioned bill savings as an important customer selling point when recommending heat pumps. In addition, customers (especially low-income customers) worry that heat pumps and their energy bills could become more expensive.[75] In contrast, other customers did not make a connection between their equipment and energy bill on their own unless their bill significantly increased or decreased over several billing cycles—a small number of customers believed changes to their appliance use had no impact on their utility bills.[76]

Contractors often mention several reasons for customers' feelings about heat pumps, as feedback and opinions can vary from customer to customer. Figure 8 highlights key quotes from contractors around customer perceptions of heat pumps, both positive and negative feelings.

[75] Energy Star. *Serving Underserved Households: Results, Insights, and Recommended Outreach Strategies from Low-Income Consumer Centric Research Study*. Accessed here.

[76] Illume Advising and PNNL. *Advancing Energy Efficiency Behaviors Findings* (2023). Accessed here.

Figure 8. Contractor Descriptions of Customer Perceptions of Heat Pumps

"Customers hear that heat pumps can save them money. We did one this year and they were very pleased with the heat pump we put in there."

"Customers are interested in heat pumps because… it is something that can help them switch part or all of their heating from natural gas to electricity. And, also, being aware of the tax credits and rebates available for those units."

"Customers might say they had a friend that had a heat pump installed, or they heard about the tax credits and rebates. That's something that really incentivizes people."

"It's a cost thing. It's also if their power goes out, and they have a propane tank, they want to be able to heat their house. I guess maybe people in more rural areas are a little more hesitant about it."

"They might have had a bad experience in the past. Heat pumps have come a long way. So they might be thinking about heat pumps that weren't very efficient once it dropped below 45 degrees or so."

"A lot of people who are used to a gas furnance are used to a high output temperature. So, a heat pump's lower output temperature feels cooler. That's one of the barriers some people have."

As discussed in Section 3.1.1, contractors inform customers about the various benefits of heat pumps, which may help alleviate concerns among customers with a negative view of heat pumps.[77] Contractors tell customers that installing a heat pump can save money on their energy bills and that heat pumps are generally more efficient than gas systems. They also tell customers that heat pump systems are reliable, benefit the environment, and often qualify for incentives and tax credits.

Supplemental Research Question

Are customers informed by their installers on heat pump best practices?

Five interviewed Illinois HVAC contractors said they spend time explaining to their customers how a heat pump works so they feel comfortable with the technology. However, contractors spend less time on operational best practices like integrated controls and switchover temperature, as they are generally unimportant to customers or might confuse them. Customers typically rely on the expertise of their HVAC contractor or installer when determining the most appropriate heating system. At the same time, contractors consider customer feedback and input to ensure their recommendation aligns with customer goals and satisfaction.[78]

[77] Please refer back to Section 3.1.1 for a detailed description of what contractors said they tell customers about heat pumps.

[78] NEEA. *Residential HVAC Contractor Market Research* (2022). Accessed here.

LITERATURE REVIEW FINDINGS

Customer awareness, familiarity, and engagement with heat pumps have changed in the last several years across the northern tier of the United States. **Prior to 2020, general customer awareness and familiarity with heat pumps were low compared to where they are now.** A market characterization study conducted by NYSERDA in 2017 found that customer awareness of ductless heat pumps in New York was minimal, and the market for them was still relatively small, with the opportunity to grow.[79] Another market study conducted by NEEA in 2019 found that customer awareness of ductless heat pumps was also relatively low in the Northwest, but recognized a continued increase in the sales of ductless heat pumps over the last decade.[80] A market assessment study conducted in 2020 reported that less than a quarter of the 942 Minnesota homeowners surveyed were unaidedly aware of ductless heat pumps, and around one-third of those respondents were aware of ducted heat pumps; less than a quarter of those respondents were aware of cold climate heat pumps.[81] Opinion Dynamics' 2021 market characterization study of HVAC equipment in Illinois found that customer awareness of high-efficiency equipment (including heat pumps) was growing, but remained relatively low.[82]

Studies from the last three years have demonstrated evidence of an evolving heat pump market across the Upper Midwest, Northwest, and Northeast regions of the US, but there are still some evident gaps. Findings around the saliency of heat pumps in relevant regional markets are detailed below:

- **National**: A 2023 survey of 1,500 electricity consumers nationwide found that slightly more than two-thirds of respondents (67%) were aware of heat pumps,[83] demonstrating at least a general awareness of the technology across the US market. However, the survey found that younger adults, typically renters, were the least aware of heat pump technology. It also found that consumers with heat pumps installed either already have these appliances or moved to a home with a heat pump. This signals that more work needs to be done nationally to encourage customers with gas-powered space heating to switch to heat pumps.
- **Upper Midwest**: The Center for Energy and Environment surveyed around 4,000 homeowners across the Upper Midwest in 2024. The majority of respondents lived in Minnesota, followed by Illinois, Michigan, and Wisconsin. The survey found that 78% of respondents had little to no awareness of heat pumps; only 22% reported a moderate to high degree of awareness.[84] A 2024 program evaluation found that interviewed contractors and distributors in Wisconsin recognized big strides in heat pump sales and customer sentiment towards heat pumps; specifically, they noted increased customer awareness around heat pumps and interest in buying them.[85] Customers reportedly asked questions about how heat pumps operated, the cost to operate them, the up-front costs of the equipment, what incentives were available to offset the cost, how well they performed in cold climates, and how they compared to natural gas systems. The evaluation also found that older and low-income customers were the least likely to install heat pumps.
- **Northwest**: A study conducted by NEEA in 2023 found that residential homeowners in Oregon, Washington, Montana, and Idaho are interested in heat pumps and frequently hear about them from others in their social networks.[86] However, residential customers also shared that they generally do not know much about HVAC technology and look to their HVAC contractor for expert advice.

[79] New York State Energy Research and Development Authority (NYSERDA). *2017 Ductless Mini-Split Heat Pump Market Characterization Study.* Accessed here.
[80] NEEA. *Northwest Ductless Heat Pump Initiative Market Progress Evaluation Report 8* (2019). Accessed here.
[81] Cadmus. *Market Barriers and Opportunities for Cold Climate Air Source Heat Pumps in Minnesota* (2020). Accessed here.
[82] Opinion Dynamics. *Ameren Illinois Market Effects Pilot – HVAC Market Characterization Report* (2021). Accessed here.
[83] Smart Energy Consumer Collaborative (SECC). *Electrification at Home and on the Road* (2023). Accessed here.
[84] Center for Energy and Environment (CEE). *Messaging strategies to drive heat pump adoption in Minnesota* (2024). Accessed here.
[85] Cadmus. *Focus on Energy Calendar Year 2023 Evaluation Report*. Accessed here.
[86] NEEA. *Dual Fuel and Gas Heat Pump Research* (2023). Accessed here.

- **Northeast**: HVAC contractors interviewed in Massachusetts and New York as part of a 2022 study said their region's demand for heat pumps has increased.[87]

The findings from our literature review around customer sentiment towards heat pumps and their reasons for installing or not installing a heat pump are similar to what we heard from Illinois contractors in our in-depth interviews. A 2022 study found that customers who install heat pumps do so primarily for increased home comfort and to save money on their energy bills.[88] NEEA's 2023 study on dual fuel heat pump systems found that customers value that heat pumps are energy efficient, can heat and cool the home all in one system, and help customers reduce their carbon footprint.[89] Customers wary of installing a heat pump or dual fuel system that includes a heat pump ultimately do not install one because of the high up-front cost associated with the equipment itself and installation, the cost of operation compared to a natural gas system,[90] and worries around system reliability.[91] This aligns with results from a national survey conducted by the Pacific Northwest National Laboratory in 2024, where HVAC contractors shared they most frequently consider system reliability, lower operating costs, up-front cost, and comfort when considering high-efficiency HVAC equipment for their customers.[92]

[87] Cadmus. *Residential ccASHP Building Electrification Study* (2022). Accessed here.
[88] Cadmus. *Residential ccASHP Building Electrification Study* (2022). Accessed here.
[89] NEEA. *Dual Fuel and Gas Heat Pump Research* (2023). Accessed here.
[90] Slipstream. *Michigan Heat Pump Collaborative Market Characterization* (2022). Accessed here.
[91] NEEA. *Dual Fuel and Gas Heat Pump Research* (2023). Accessed here.
[92] Pacific Northwest National Laboratory (PNNL). *PNNL 2025 Field Research with HVAC Contractors*. Accessed here.

4. CONCLUSIONS AND RECOMMENDATIONS

We determined the following conclusions and recommendations based on the results of our research, including in-depth interviews with HVAC contractors and a literature review of publicly available materials. Conclusions and recommendations are categorized by key research topics: HVAC contractor sales decisions and practices, HVAC contractor installation decisions and practices, and customers' and HVAC contractors' familiarity with heat pump technologies.

HVAC CONTRACTOR SALES DECISIONS AND PRACTICES

- **Conclusion**: In states like Illinois, where natural gas heating is the primary way customers heat their homes, contractors still favor recommending and installing natural gas furnaces to their customers as replacements for their current natural gas systems. All 15 interviewed contractors said they would recommend a natural gas furnace 50% of the time or more; 10 of them said they would recommend a natural gas furnace 80% of the time or more. However, all 15 HVAC contractors indicated that they sell heat pumps. Only two contractors said they would likely not recommend a heat pump to a customer with an existing natural gas furnace (13%; 2 of 15). Five contractors also explicitly said that they would recommend a heat pump to a customer who is on natural gas and shows interest in switching from natural gas to electricity. In addition to what Illinois contractors shared during interviews, our literature review found that HVAC tradespeople generally view heat pumps positively and expect continued market growth.
- **Conclusion**: Contractors increasingly consider heat pumps for their customers, but they typically feel more comfortable doing so when backup heat, like a natural gas furnace, is an option. This is an attractive equipment option for customers, too, as research has found that both contractors and customers in colder regions worry more about a heat pump malfunctioning in extremely cold weather or the fact that they are relying solely on one fuel source for their heating. As a result, single-family homeowners in Illinois who have heat pumps recommended to them will likely still have natural gas heat as a backup, either as an existing furnace left as backup heat or a brand new natural gas furnace installed as backup heat.
  - **Recommendation**: Considering the prevalence of natural gas heating in the state, program implementers, policymakers, and other relevant stakeholders interested in promoting heat pumps should consider bolstering marketing, education, and outreach (ME&O) and workforce, education, and training (WE&T) on heat pumps and dual fuel systems, even for seasoned HVAC contractors who have participated in programs like AIC's Midstream HVAC program.
  - **Recommendation**: Engage contractors regarding gas furnaces and central heat pumps by promoting and considering dual fuel systems. This could facilitate the adoption of heat pumps in contractors' sales practices and customers' homes. This approach may be particularly relevant for HVAC contractors who remain hesitant to sell and recommend heat pumps overall. Additionally, evaluate whether replacing central air conditioners (CAC) with heat pumps presents an attractive sales strategy for HVAC contractors, given that the incremental cost between a CAC and a dual fuel heat pump is relatively low compared to the cost of adding a heat pump in the absence of an existing CAC.
- **Conclusion**: Before promoting any type of heating system, including hybrid systems, HVAC contractors collect essential information from their customers, including budget, home size and layout, general preferences (e.g., comfort, noise level), available fuel sources in the home, feelings around energy efficiency, and the presence and condition of existing ductwork. This information helps to determine whether customers meet the circumstances in which HVAC contractors will recommend a heat pump or hybrid system.

HVAC CONTRACTOR INSTALLATION DECISIONS AND PRACTICES

- **Conclusion**: Interviewed contractors said the main points of communication between a heat pump and another system in a dual-fuel or hybrid heating system are switchover temperature and emergency shutoff controls. Most of this communication occurs via an advanced thermostat that is programmed appropriately. However, our literature review found that contractors do not universally implement automated controls for dual-fuel systems. There does not appear to be a universally accepted switchover temperature or mode for selecting one, and some HVAC contractors do not automate dual fuel systems to switch from one system to another, leaving it up to the customer to do it manually. There are also additional challenges with setting up communication for hybrid systems with a ductless heat pump and existing electric baseboard heating.
  - **Recommendation**: Consider leveraging existing contractor education and training avenues to help increase awareness of and familiarity with dual fuel system best practices around integrated controls and switchover temperature. To the greatest extent possible, partner with industry experts that HVAC contractors trust, like distributors.
- **Conclusion**: HVAC contractors varied widely in what switchover temperatures they select for the dual fuel systems they install. Temperatures ranged from −5°F to 40°F.
- **Conclusion**: Interviewed contractors said they most frequently install heat pumps as part of dual fuel systems, either with an existing natural gas furnace or with a brand new natural gas furnace; most did not install a heat pump to completely replace a gas furnace with no source of gas backup heat. Our literature review revealed the same to be true in other cold regions of the United States, where natural gas furnaces as backup heat were commonplace.
- **Conclusion**: Nine of the fifteen HVAC contractors we interviewed said they sell and install ducted cold climate heat pumps. Four said they only sell and install cold climate heat pumps whenever a heat pump is recommended or installed, including all applications, such as hybrid systems. The remaining contractors said they rarely install cold climate heat pumps as part of hybrid systems.
- **Conclusion**: Most of the time, contractors use ductless heat pumps to partially displace other HVAC systems, such as adding a ductless heat pump to a “trouble spot” in the home that needs additional heating or cooling. This has been the case across the United States for the last decade. Determinants for partial versus full displacement usually hinge on ductwork, customer budget, and home size and layout. However, our literature review suggests that ductless heat pumps may be used in full displacement applications more in the future.

HVAC CONTRACTORS’ FAMILIARITY WITH HEAT PUMP TECHNOLOGIES

- **Conclusion**: Contractors are familiar with heat pump technology, including cold climate heat pumps. Despite this familiarity with higher-efficiency and higher-capacity equipment, contractors in colder regions of the United States are still inclined to install gas backup heating, even when it may not be necessary, such as when the contractor is installing a cold climate heat pump. The most common reason is to ensure customers can still heat their homes if the heat pump malfunctions or the outdoor temperature is extremely cold.
  - **Recommendation**: Develop new education programs and enhance existing training for contractors regarding cold climate heat pump technology and its ability to heat homes, even during subfreezing and subzero temperatures. Options could include (1) creating case studies to demonstrate cold climate heat pump performance in homes across various climate zones, thereby giving contractors more confidence in the technology’s effectiveness in low temperatures. If possible, case studies should show how often electric strip heat backup is utilized and under what circumstances, as well as document operating costs compared to other backup systems. (2) Offer ongoing support through weekly call-in “office hours" where contractors can ask questions about heat pumps and receive immediate answers from AIC implementation team experts and peers who also join the virtual “office.”

- **Recommendation:** Consider options to support contractors' use of dual fuel in ways that are relatively affordable for consumers. One option is to partner with trusted experts like major distributors to provide training about appropriate use of heat and cold climate heat pumps in Illinois' climate zones so contractors are clear about when there is a need for gas backup, when the heat pump alone is sufficient, how more affordable heat pumps can be paired with gas furnaces instead of cold climate heat pumps, among other topics.

- **Conclusion**: Customers may be aware of heat pump technology in general, but they remain unfamiliar with more nuanced information, such as how a heat pump works and the different types of heat pumps available. Interviewed HVAC contractors sometimes get questions directly from their customers about heat pumps, but not very often. This may change in the short term as the market for heat pumps continues to grow and customers become more familiar with heat pumps. Even as the market grows, up-front cost remains a primary barrier for customers adopting heat pump technology.

  Recommendation: Contractors work to bridge the knowledge gap between HVAC systems and customers, as customers heavily rely on professionals like them to recommend and install HVAC equipment. Consider if AIC can support contractor efforts to sell heat pumps and dual fuel HVAC systems with customer education tools like leave-behind summaries of heat pumps and dual fuel systems, their benefits, and available incentives. Additional information about best practices for heat pump use (e.g., "set it and forget it" instead of using overnight setbacks or changing indoor temperature settings often) could also help contractors and consumers alike.

APPENDIX A. IN-DEPTH CONTRACTOR INTERVIEW GUIDE

Introduction

Thank you for making the time to talk with me today. I'm working with Ameren Illinois to understand the market for heating systems in Illinois in residential single-family homes, including heat pumps. From a contractor perspective, I want to understand when heat pumps are recommended, in what scenarios heat pumps are installed, and how customers perceive them. Your answers will help Ameren Illinois know how they can best support and grow the HVAC heat pump market, including programs supporting companies like yours. All your answers are confidential and nothing we report to Ameren Illinois can be used to identify you or your company. You can skip any questions you're not sure about, and there are no consequences if you decide not to participate.

Any questions for me before we get started?

I'll be taking notes as we talk, but I'd like to record the conversation to help with my notetaking. Is that okay with you?

SCREENING [Ask All]

First, we'd like to get a little background information on you and your work to confirm you're eligible for the interview.

Please tell me your title and role at your company.

[IF THEY DO NOT DESIGN RESIDENTIAL HVAC SYSTEMS, THANK AND TERMINATE. TERMINATE TECHNICIANS WHOSE ROLE IS RESTRICTED TO INSTALLATION.

[IF TECHNICIAN/INSTALLER TERMINATED: We're looking to talk with the person(s) at your company who directly work with customers while the decisions are being made about what system to install (i.e., the customer sales person who also designs the system).Is there anyone else at your company or elsewhere who may be better suited for this conversation?]

What percentage of your business would you say is residential HVAC work? Please answer based on the number of jobs completed and not on revenue; your best estimate is fine.

[IF < residential 25% HVAC WORK, THANK AND TERMINATE]

Do you primarily work in new construction, in existing homes, or a mix of both?

[IF < 30% EXISTING, THANK AND TERMINATE]

Out of your residential HVAC work, what's the breakdown between single-family homes and multifamily buildings?

[IF < 30% SINGLE FAMILY, THANK AND TERMINATE]

[IF NOT A PROGRAM ALLY] Are you or your company participating in any incentive programs run by companies like Ameren Illinois for HVAC heat pumps?

1. [IF UNAWARE OR UNSURE] Are you familiar with incentive programs run by Ameren Illinois for energy efficient equipment like HVAC heat pumps?

HVAC Contractor Familiarity with Heat Pump Technology

Now we'd like to understand more about the type of equipment you typically sell and install.

Which types of residential heating systems does your company sell?

1. PROBE FOR:
    a. Gas/propane/oil furnaces:
    b. Central air conditioners:
    c. Central/ducted heat pumps [all electric]:
    d. Mini-split/ductless heat pumps:

e. Combination of ducted and ductless heat pump systems:
f. Dual fuel/hybrid systems (gas/propane/oil furnaces with electric heat pumps):

[IF THEY SELL CENTRAL/DUCTED HEAT PUMPS] Which specific types of residential ducted/central heat pumps does your company sell?

1. PROBE FOR:
    a. Single speed heat pumps:
    b. Two-speed heat pumps (AKA multi-stage):
    c. Variable speed heat pumps/Inverter-driven heat pumps:
    d. Cold climate heat pumps [NOTE for interviewer: All ccHPs are inverter-driven but not all inverter-driven HPs are necessarily marketed as cold climate]:
    e. Variable Refrigerant Flow (VRF) systems [NOTE for interviewer: These are a type of heat pump that is more common in commercial than residential systems. They can be ductless or ducted.]:

[IF THEY SELL MINI-SPLITS/DUCTLESS HEAT PUMPS] Which specific types of residential mini-splits/ductless heat pumps does your company sell?

1. PROBE FOR:
    a. Single zone mini-splits:
    b. Multizone mini-splits (more than one indoor unit):
    c. Whole home mini-split systems [NOTE for interviewer: Whole home are likely multizone systems]
    d. "Ducted ductless," "short run ductless," or "high velocity" mini-splits that are in ducts or concealed in ceilings or walls:
    e. Variable Refrigerant Flow (VRF) systems [NOTE for interviewer: These overlap with option d.]:
    f. Cold climate mini-splits:

HVAC Contractor Sales Decisions and Practices

[ASK ALL]

When you begin an HVAC project for a new residential client, what information do you need to decide what type of HVAC system to recommend? [IF NEEDED: I am thinking of things like: available fuel sources, home's size and shape, features of the space, price, current system, etc.]

I'd now like to hear more about what you recommend to your customers. Thinking of the residential heating systems you've installed in the last year, about what percentage of the time did you recommend each of the following:

1. PROBE FOR:
    a. Gas furnaces:
    b. Propane or oil furnaces:
    c. Dual fuel/hybrid systems (specifically gas/propane/heating oil systems with electric heat pumps):
    d. Central/ducted heat pumps (an "all electric" system):
    e. Mini-split/ductless heat pumps:
    f. Combination of ducted and ductless heat pump systems:
    g. Cold climate heat pumps:

[ASK ONLY IF THEY SELL AND INSTALL HEAT PUMPS BASED ON Q1]

In what circumstances would you be likely to recommend a heat pump to a customer? Why?

In what circumstances would you not recommend a heat pump to a customer? Why not?

I'd like to focus on customers who already have a gas furnace in their home.

1. What percentage of the time do you recommend a heat pump to customers with existing gas furnaces?

a. [FOLLOW-UP] What about a cold climate heat pump?

What percentage of the time do you recommend that the existing system be left as back up heat?

b. [FOLLOW-UP] For what reasons? [PROBES: geography, income, existing fuel source, house size, customer attitudes towards heat pumps, customer attitudes towards electrification, etc.]

What percentage of the time do you recommend a **new** dual fuel/hybrid system with a gas furnace and heat pump?

c. [FOLLOW-UP] For what reasons? [PROBES: geography, income, existing fuel source, house size, customer attitudes towards heat pumps, customer attitudes towards electrification, etc.]

What else would encourage you to recommend and/or install residential heat pumps?

Contractors Who Do Not Install Heat Pumps

[ONLY IF THEY DO NOT SELL OR INSTALL HEAT PUMPS]

I'd like to dive a bit deeper into your opinions on heat pumps.

[IF NOT ALREADY MENTIONED] What are the primary reasons you/your company do not sell or install heat pumps?

1. Have you or your company ever sold and installed heat pumps?
    a. Probe for ductless vs. ducted installations
2. [IF THEY PREVIOUSLY SOLD HEAT PUMPS AND THEN STOPPED] Why did you stop selling heat pumps to your residential customers?
    a. Probe to see if they have problems with both ducted and ductless

How often (if at all) do your residential customers ask about heat pumps?

1. What kinds of questions do they ask? What are they curious about?

What do you tell your customers about heat pumps?

What are your opinions about dual fuel/hybrid systems that pair a gas furnace with a heat pump?

1. To what extent would you consider selling such systems?

What would need to change for you to sell and install heat pumps?

[NOTE FOR INTERVIEWER: PROCEED TO DEMOGRAPHICS SECTION]

Customer Familiarity with Heat Pump Technology

[ONLY CONTRACTORS WHO SELL AND INSTALL HEAT PUMPS]

How often (if at all) do your residential customers ask about heat pumps?

1. What kinds of questions do they ask? What are they curious about?

What do you tell your customers about heat pumps?

When discussing heat pumps with customers…

1. Generally, how familiar are they with heat pumps?

How informed are your customers about the different types of heat pumps available?

From your perspective, how do most customers generally feel about heat pumps?

1. Of customers who feel negatively/don't want to install a heat pump, what reasons do they provide?

a. [PROBE] effectiveness, noise, upfront cost, cost to operate, inconvenience of upgrading to a new system

Of customers who feel positively/follow through with installing a heat pump, what reasons do they provide?

b. [PROBE] quiet, availability of rebates, energy efficiency, cost savings, environmental benefits

HVAC Contractor Installation Decisions and Practices

[ONLY CONTRACTORS WHO SELL AND INSTALL HEAT PUMPS]

Now let's talk about the systems you (or your colleagues who install systems on your behalf) end up installing. We realize what you install may not always be what you initially recommend to your customers.

First, let's focus on mini-splits. Of the mini-splits/ductless heat pumps you sell, what percentage of them **partially displace** existing heating systems, meaning the mini-split is intended to heat only part of the home or another system will heat the home when the outside temperature falls below a certain setpoint?

1. What percentage **fully displace** existing heating systems, meaning the mini-split is intended to heat the entire home?

2. What fraction of the mini-splits you sell are cold climate heat pumps?

What factors do you consider when installing a mini-split/ductless heat pump to partially or fully displace existing heating?

Next, let's focus on central heat pumps. Of the central heat pumps you sell…

1. What percentage fully replace gas furnaces (meaning you sell an all electric system)?

What percentage are installed with **existing** heating systems?

What percentage are installed with **new** gas furnaces?

What percentage are cold climate heat pumps?

When you install cold climate heat pumps, what percentage are installed with a gas furnace?

1. How do you decide if you want to include a cold climate heat pump vs. a regular heat pump?

2. In which situations would you install a cold climate heat pump without any kind of fossil fuel back-up (meaning an all-electric system)?

Now, let's spend some time thinking about dual fuel/hybrid systems that pair a gas furnace with a central electric heat pump.

1. At what switchover or crossover temperature do you typically program a hybrid system to switch from the heat pump to the furnace?

a. What factors contribute to selecting this switchover temperature?

What kind of emergency switch options do these systems typically have?

How do you broach these controls options with customers? Are they aware of this switchover temperature? The emergency switch?

How often do you set a "lockout temperature" to prevent the back-up heat from turning on?

a. [IF EVER] What lockout temperatures do you set?

Demographics/Firmographics [ASK ALL]

What counties do you typically serve? County names or ZIP codes are fine.

[ONLY IF THEY SELL AND INSTALL HEAT PUMPS ONLY] What brands of heat pumps do you sell?

1. PROBE FOR:
    a. Mitsubishi
    b. Daikin
    c. LG
    d. Lennox
    e. Goodman
    f. Carrier
    g. Rheem
    h. Coleman
    i. American Standard

[IF THEY DO NOT SELL HEAT PUMPS] What brands of residential HVAC do you sell?

How many residential HVAC systems would you say your company installs each year? Your best estimate is fine.

What languages do you offer services in besides English?

Closing

Thank you for taking the time to speak with me. We really appreciate your perspective on the residential heating market in Illinois. As a thank you for your time, we'd like to offer you a $125 e-gift card. What would be a good email to send that to? Great, thank you. Have a great rest of your day.

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