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HVAC Installation Contractor Market Research

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Executive Summary

The Northwest Energy Efficiency Alliance's (NEEA) Advanced Heat Pump (AHP) program focuses on increasing the efficiency of installed heat pumps in the Northwest (Idaho, Montana, Oregon, and Washington) and has identified several low-cost improvements with the potential to close the gap between rated and in-field efficiency. These include connected commissioning, cold-climate capable equipment, and practices that minimize reliance on auxiliary electric resistance heat. NEEA's Dual-Fuel Residential HVAC program works with manufacturers, distributors, and utilities to build awareness and communicate the value of optimally designed dual-fuel systems. Both programs require an understanding of how contractors currently select, describe, install, and configure heat pump equipment across the Northwest.

Research Overview

Evergreen Economics conducted qualitative research with residential HVAC professionals in Idaho, Montana, Oregon, and Washington during January and February 2026. The research addressed four primary objectives: (1) understanding contractor perspectives on connected commissioning,[1] (2) understanding contractor perspectives on cold-climate capable heat pumps, (3) documenting practices around minimizing auxiliary and supplemental electric resistance heat, and (4) documenting current dual-fuel system design and installation practices. The final sample of 22 participants included 12 focus group participants and 10 in-depth interviewees.

Conclusions and Implications

1. Contractor decisions about auxiliary heat reflect risk management strategies, not a gap in technical knowledge.

Many contractors who know that heat pump equipment should not require backup heat nonetheless continue to install it. This behavior is primarily driven by specific past experiences, such as bad winter, a wave of callbacks, and compressor failures, or concern about resident callbacks as reasons for installing auxiliary heat. Contractors who omit backup heat describe

[1] Connected commissioning refers to sensor equipped HVAC equipment paired with a mobile app that guides the technician through commissioning steps and provides pass/fail feedback and documentation.

different risk management approaches: some screen out high-risk homes, some configure strip heat as emergency-only, and others have accumulated enough trouble-free field experience to absorb occasional callbacks.

> ***Implication***: *Efforts to reduce auxiliary heat reliance will need to target the specific risks contractors are managing. Demonstrated field performance data, manufacturer-backed service support, and/or intermediate solutions like emergency-only configurations will be important, even as education about cold climate performance expands.*

2. First cost is the primary constraint on cold-climate heat pump adoption, and contractors must convince customers of the value.

In cold markets, cold-climate heat pumps can be required to ensure occupant comfort. In mild climates, the choice between standard and cold-climate equipment is primarily a cost decision affected by incentive eligibility and customer price sensitivity. First cost remains a constraint on higher-performance equipment adoption. Contractors who consistently offer cold-climate or variable-speed equipment describe an active sales process that requires explaining the bid and making the case for comfort and long-term operating cost savings.

> ***Implication:*** *Price barriers can be addressed through incentives, but the combination of cost sensitivity, competitive bidding dynamics, and brand-specific product awareness indicates that adoption will reflect contractor tools and motivation to make the case at the point of sale.*

3. Utility incentive programs can affect installation practice.

Across equipment selection, backup heat configuration, sizing methodology, and commissioning documentation, contractors who participate in utility rebate programs described more structured and utility program-aligned practices than those who do not.

> ***Implication:*** *Incentive program requirements remain a high-impact channel for advancing NEEA's goals. Requiring documented heating capacity, load calculations, or commissioning may help ensure installation quality that supports expected savings.*

4. Customer education is a common unmet need.

The most frequent "failure" contractors described reflects issues with customer expectations rather than equipment or installation problems. Lower supply air temperatures, thermostat setback behavior, and defrost cycles generate callbacks, dissatisfaction, and in some cases unnecessary auxiliary heat operation in systems that are properly sized, installed, and commissioned. Contractors across the sample described this as a persistent, labor-intensive requirement.

Implication: Regional or program-level support for standardized customer education materials could reduce contractor-level burden associated with managing heat pump operating expectations. The value could be broad but may be greatest for those without dedicated sales staff.

5. A spectrum of practices for minimizing auxiliary heat exists.

Contractors described a range of intermediate strategies for minimizing auxiliary heat: emergency-only configuration, where strip heat activates only if manually switched on by the homeowner during a heat pump failure; sizing electric strip backup heat only as necessary to supplement heat pump capacity rather than to satisfy the full design load and locking out auxiliary heating above 35°F; and screening to avoid high-risk installations. Contractors in Montana focus on climate requirements and several Idaho contractors noted that code requirements constrain how far auxiliary heat minimization can go.

Implication: Defining "minimized supplemental heat" as a program-eligible category with specific configuration requirements consistent with state code requirements could move the installed base toward reduced reliance even if use of backup heat is not eliminated entirely.

6. Brand ecosystems affect contractor awareness and create boundaries around product knowledge.

Contractor experience with heat pump equipment tracks closely with the brands they carry. This shapes what they recommend, what they consider "cold climate," and the options they present to customers. Brand relationships reflect long-term dealer agreements, distributor access, manufacturer support arrangements, and in some cases minimum purchase thresholds that limit access for smaller firms. Contractors may be aware that better-performing options exist outside their primary brand ecosystem, but structural constraints on what they can sell limit how that awareness translates to recommendations.

Implication: Efforts that target contractor choices and behavior will encounter the limits of what individual contractors can offer within their brand relationships. Program strategies that work within existing brand ecosystems may be more effective than approaches that assume contractors can freely substitute across brands.

7. New construction and retrofit markets face different challenges and leverage points.

In retrofit, the homeowner decides, incentives directly influence equipment selection, and contractors can assess the building envelope. In new construction, the builder controls equipment selection and focuses on first cost. Even contractors whose retrofit work is predominantly variable-speed reported that new construction pulls toward single-stage or minimum-code systems.

> **Implication:** *Incentive-based approaches that work in retrofit may have limited traction with spec builders. Code alignment or builder-facing support will likely be required to encourage uptake of advanced heat pump equipment that minimizes electric resistance in new construction.*

8. Ductwork limitations often constrain heat pump sizing in retrofit applications.

Ductwork limitations stood out as the single most-cited constraint on equipment sizing in retrofit installations. In older homes, ductwork is often too small or otherwise constrained to accommodate the airflow of a heat pump large enough to meet the full cooling and/or heating load of the home. When presented with the option to upgrade their ductwork, many homeowners decline, leaving contractors to recommend an undersized heat pump that will avoid excessive static pressure or a full-capacity system that will underperform at high capacity.

Ductwork constraints are an ongoing conversation for variable-speed systems. Conversations with the NEEA project team suggest that variable-speed equipment with electrically commutated motors (ECM) may operate fairly efficiently even at moderately elevated static pressure—the fan motor works harder to push air through undersized ducts but uses relatively little electricity to do so compared with total system energy use. Most of the time, variable-speed systems run at lower speeds and lower airflows than their rated peak, reducing the practical impact of undersized ducts during typical operation. Cold-climate heat pumps may run at higher cubic feet per minute (CFM) at lower temperatures, which could stress undersized ductwork during the conditions when capacity matters most. These are active considerations in the regional technical community, with ongoing and evolving conversations and understanding.

> **Implication:** *Support for ducting changes necessary to accommodate full-load heat pump airflow could help overcome customer resistance to accepting contractor ductwork recommendations. Further research about the impacts of moderate to high external static pressure on the performance of variable speed heat pumps may be necessary to fully assess the value of duct system improvements.*

9. Connected commissioning has a multi-stakeholder value proposition, but proprietary fragmentation could limit adoption.

Contractors responded to the connected commissioning concept with pragmatic interest. They value baseline documentation for warranty protection and diagnostic reference and the potential for streamlining submission of program-required measure documentation. They also reported that manufacturers are increasingly requiring installation verification and that customers might value simple confirmation that their system works. Focus group discussions revealed a desire for a universal, cross-brand commissioning platform.

> ***Implication:*** *Positioning connected commissioning as a tool that replaces manual rebate paperwork with automated data sharing, or that addresses technician oversight needs, will likely be the most practical entry point.*

Project Overview

Introduction

The Northwest Energy Efficiency Alliance's (NEEA) Advanced Heat Pump (AHP) program focuses on increasing the efficiency of installed heat pumps in the Northwest (Idaho, Montana, Oregon, and Washington) and has identified several low-cost improvements with the potential to close the gap between rated and in-field efficiency. These include connected commissioning, cold-climate capable equipment, and practices that minimize reliance on auxiliary electric resistance heat. NEEA's Dual-Fuel Residential HVAC program works with manufacturers, distributors, and utilities to build awareness and communicate the value of optimally designed dual-fuel systems. Both programs require an understanding of how contractors currently select, describe, install, and configure heat pump equipment across the Northwest.

This qualitative research included virtual focus groups and in-depth interviews (IDIs) with residential HVAC professionals across four Northwest states (Idaho, Montana, Oregon, and Washington). Data collection occurred in January and February 2026 on behalf of NEEA's Advanced Heat Pump (AHP) and Dual-Fuel Residential HVAC programs. The study addressed four primary research objectives: (1) contractor perspectives on connected commissioning, (2) cold climate capable heat pumps, (3) practices around minimizing auxiliary and supplemental electric resistance heat, and (4) current dual-fuel system design and installation practices.

Methods

The research team organized four virtual focus groups between January 27 and February 12, 2026, hosted on the Sago platform to allow for client observation. These 60–90 minute sessions followed a structured discussion guide. The team recruited five to seven participants for each group; however, a high rate of no-shows reduced the number of participants for each session.

To augment focus group discussions and overcome challenges in recruiting for 90-minute sessions, the team conducted 10 IDIs in February 2026. These IDIs followed the same discussion guide and enabled more extensive probing on topics relative to each contractor's specific market, which deepened the focus group findings.

NEEA supplied a population frame of approximately 2,200 HVAC professionals that Evergreen used as a base population frame. Evergreen staff augmented the list with internet searches that added email contact information or verified phone numbers. Recruitment involved email outreach to 781 contacts, phone follow-up with 337 of those with email addresses, and 41 additional cold calls, with outreach contacting a total of 822 firms. Twelve participants agreed to attend a focus group but failed to show up. The final sample of 22 participants participated in focus groups or in-depth interviews.

Participant Profile

Participants represent a cross-section of residential HVAC contractors in the Northwest. The sample included many business owners and sales professionals who are directly involved in system selection decisions. Experience ranged from a few years to multiple decades, and businesses ranged from solo operators to firms with 20 employees. Most contacts had 10 or more years of direct HVAC experience. Several entered HVAC from other fields, including automotive repair, athletic training, electrical work, and appliance sales.

Geographic Distribution

Participants attended from across the Northwest: Oregon (11 participants, concentrated in Portland metro with some in the Willamette Valley and Central Oregon), Washington (5, in Western Washington including Puget Sound, Snohomish County, Olympic Peninsula, and Bellingham), Idaho (4, including Idaho Falls, Salmon, and Treasure Valley), and Montana (2, Kalispell and Western Montana). Regional differences in climate, regulatory environment, fuel economics, and incentive availability affected contractor perspectives. Table 9 in Appendix A consolidates the regional comparisons and profiles.

A Note on Qualitative Methodology

This research provides nuanced understanding of how this sample of contractors think about and approach complex technical and business decisions. Evergreen reports the terminology they use, the constraints they operate under, the logic behind their product choices, and the regional market conditions that shape their practice. The sample is geographically and experientially diverse but not proportionally representative of any state or market, so findings should not be read as prevalence estimates for the broader contractor population. The analysis identifies thematic patterns and regional variations where data support them.

Heat Pump Market Context

This section presents findings on contractor product mix, understanding of cold-climate products, brand ecosystems that influence equipment selection, emerging product formats, and serviceability concerns.

TABLE 1: EQUIPMENT DEFINITIONS THAT GUIDED THIS RESEARCH

Term	Definition
Heat Pump	Central ducted systems only (not ductless). Can be single-speed, two-stage, or variable-speed.
Variable-Speed Heat Pump	Systems with an inverter-driven compressor that modulates capacity. This is the primary focus for the AHP program.
Dual-Fuel System	A single centrally-ducted system with a heat pump and gas furnace, with only one providing heat at any given time. The furnace acts as the air handler for the heat pump when the furnace is not providing heat. The furnace provides heat when temperatures drop below a specified temperature, referred to as the switchover temperature.
Cold Climate Heat Pump	Extended-capacity heat pumps designed for better performance at low temperatures. Essentially always variable-speed/inverter-driven.

Market Landscape and Recent Changes

Contractors described several trends in the residential HVAC market. In discussing changes they had observed, respondents mentioned a similar set of dynamics, though the impact varied by location.

- **A shift to variable-speed, inverter-driven equipment.** Multiple contractors described this as the single biggest change in recent years. An Idaho contractor reported roughly 90 percent of his current work involves variable-speed systems. A Portland-area contractor stated, “Everything has gone variable speed.” The shift is not universal: a Montana contractor reported two-stage equipment remains her most common ducted installation, and price-sensitive customers or markets still rely heavily on single-stage equipment.
- Cold climate heat pumps are normalized in Western Washington and Western Oregon but remain a premium or context-driven choice elsewhere. A Portland contractor said her company rarely installs non-cold-climate equipment; a Snohomish County contractor

estimated 70 percent of his installs are inverter-driven cold climate units, driven by utility rebate structure. In Idaho, one contact avoids "cold climate" terminology because systems rated to 15–20°F are already his standard, an example of how the term itself carries different meaning across markets.

- **Emerging product formats blur categories.** Side-discharge inverter units and "ducted ductless" systems combine ductless-level efficiency with conventional installation formats, expanding the addressable retrofit market.
- **Utility/incentive programs shape equipment selection where program design supports contractor participation.** Rebate structures in Western Washington and Western Oregon emerged as a direct driver of cold climate and inverter-driven equipment. In contrast, an Idaho-based contractor described utility ducted heat pump rebate requirements as so paperwork-intensive that the required commissioning documentation effectively negates the $400 incentive, limiting the rebate's influence on equipment selection.
- **Price sensitivity remains a constraint.** One contractor estimated a heat pump cost roughly twice that of an air conditioner ($3,100 vs. $1,700 for a two-ton system). Several contractors empathized with customer sticker shock, describing their own disbelief at how expensive equipment has become.

TABLE 2. REGIONAL ENERGY ECONOMICS AS DESCRIBED BY CONTRACTORS

Respondent Region	Context	Implication for Heat Pump (HP) Adoption
Idaho	Low natural gas prices; propane common in rural areas	Gas economics undercut HP value proposition; dual-fuel systems dominate heat pump sales
Montana	Volatile propane costs; extreme heating loads	Cost sensitivity limits uptake even where technology makes sense
Portland/ W. Oregon	Moderate electricity rates; Energy Trust incentives favor all-electric	Strongest market for all-electric HP; dual fuel declining
Western Washington	Varies by utility; strong rebate programs	Incentive-driven adoption; rebate requirements shape equipment mix

Refrigerant Transition

The transition from R-410A to A2L refrigerants (primarily R-32 and R-454B) emerged unprompted in several conversations. Contractors described three effects: serviceability challenges as 410A becomes scarce and expensive (over $100/pound), added tooling costs for new fittings and connectors, and no perceived performance upside. Contractors mentioning this transition described added cost and complexity not improving system efficiency or customer economics.[2]

Workforce and Labor Market Dynamics

Contractors described a technician shortage that relates to this research in two primary ways. First, increasing system complexity in inverter-driven equipment, variable-speed controls, and advanced refrigerant management is exceeding the supply of qualified technicians. Several contractors linked this gap directly to manufacturer interest in connected commissioning as a form of installation verification. One Washington-based contractor described this dynamic explicitly, noting that manufacturers are building in protective measures to ensure expensive equipment is installed correctly regardless of the skill of the technician.

Second, the consultive customer education required to sell heat pumps and explain the specifics of lower supply air temperatures, defrost behavior, and operating cost tradeoffs also requires knowledgeable, technical sales strategies that match product selection to specific home conditions.

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[2] The AIM Act (2020) directed the Environmental Protection Agency (EPA) to phase down hydrofluorocarbon refrigerant production 85 percent by 2036. The EPA's Technology Transitions rule required manufacturers of residential HVAC equipment to shift from R-410A to lower-GWP refrigerants (primarily R-32 and R-454B) for new equipment manufactured after January 1, 2025. Contractors interviewed for this study were navigating this transition in real time, which contributed to the salience of the refrigerant topic across interviews and focus groups.

Heat Pump Types and Features

The contractors interviewed in this study described a market transitioning toward higher-performing, inverter-driven heat pump systems. However, the pace and perception of that transition varied across the Northwest.

Current Product Mix and the Variable-Speed Transition

The shift toward variable-speed, inverter-driven heat pumps is underway but has not displaced single-stage and two-stage products. Contractors described adoption patterns that track with geography, customer economics, and brand relationships.

Contractors in Western Oregon and Western Washington more commonly described variable-speed as their default recommendation. In Idaho and Montana, two-stage ducted systems remain the default. While contractors are aware of variable-speed options, customer economics and the prevalence of dual-fuel installations (in which a gas furnace carries the load when temperatures drop below 25 to 35°F) reduce inverter technology's value proposition of heating efficiently even at cold temperatures. Contacts working in both new and existing homes also described a divide between new construction (where builders drive decisions toward minimum-code equipment) and retrofit markets (where customers are more likely to consider inverter-driven systems, especially when they qualify for incentives).

How Contractors Understand "Cold Climate"

The terms "cold climate heat pump" or "extended capacity heat pump" revealed no single, stable definition across this sample. How a contractor understand the category reflects their geography, the brands they carry, and whether extended-capacity equipment is already their baseline practice. Several contacts did not offer a definition at all, instead pivoting to their practice or their brand, including advocacy for ductless products over ducted. Table 3 summarizes respondent framing of "cold climate" products.

TABLE 3. HOW RESPONDENTS FRAMED THE COLD CLIMATE CATEGORY

Frame	Description
Performance specification	Defined by temperature ratings (for example, 100% capacity at -10°F). Common in cold markets.
Brand proxy	Multiple contractors used “hyper heat” (Mitsubishi trademark) generically for cold-climate capability, suggesting the term has become partially genericized.
Climate requirements	In cold climates, the label is unnecessary—that performance level is expected.
Primarily a ductless category	Some perceive cold-climate capability as more available in ductless than ducted—which may limit how ducted-dominant contractors think about options.
Rebate/program requirement	The equipment tier needed to qualify for utility incentives.

“In this area, for the most part at least half of us, and me in particular, always install systems that work down to at least 15 to 20 degrees. Don’t generally use the terminology because that’s typically what they are installing anyway.”

— Idaho contractor

Several contractors reported that cold-climate capability in ducted systems lagged ductless performance. One described cold-climate equipment as primarily a ductless/mini-split category, noting that she does not see the same low-temperature ratings in conventional ducted air-to-air products. This perception may limit ducted recommendations among contractors in some areas.

Brand Ecosystems and Product Awareness

Contractor brand relationships shape what is installed and how they categorize equipment. Most contractors carry separate brand lines for ducted and ductless: common pairings include Trane/RUUD/Rheem for ducted with Daikin or Mitsubishi for ductless, and Carrier/Bryant for ducted with Mitsubishi or Fujitsu for ductless. A few contractors operate entirely within a single brand ecosystem (Mitsubishi or Daikin).

> *"Some of these brands are kind of backing and guaranteeing that you can use our unit without emergency backup heat."*
>
> — Washington contractor

Dealer relationships are durable—one contractor described a decades-long relationship with Bryant/Carrier; another uses York because the manufacturer supports local advertising costs. Bosch occupies a distinct niche as a variable-speed value play, mentioned across Idaho, Oregon, and Montana.[3] Serviceability and warranty ease also influence brand loyalty; one contractor avoids larger manufacturers specifically because their warranty processes require part returns and extensive paperwork.

Emerging Product Formats

Contractors described emerging product configurations that bring inverter-driven performance into ducted installation formats. Two terms came up repeatedly: **side-discharge inverter units** and **"ducted ductless" systems.** However, contractors used them inconsistently, sometimes appearing to describe the same equipment and sometimes describing distinct configurations. The descriptions below reflect what contractors reported, not verified product categories.

[3] Contacts may have been referring to Bosch's Bova line, which offers an outdoor unit with an A-coil that can be paired with any existing furnace.

When contractors described **side-discharge inverter units**, they emphasized the outdoor unit: a compact, inverter-driven condenser with the same footprint as a ductless outdoor unit, paired with a conventional indoor air handler and existing ductwork. Multiple contractors in Washington, Idaho, and Oregon reported installing or exploring these units. One noted that manufacturers are backing side-discharge units with performance guarantees to -10°F, a level of confidence he had not seen with traditional heat pumps.

> *"They've now come out with side discharge units, so the outdoor heat pump will be the same kind of size and footprint as if you had a ductless unit or a mini split unit, but then it's hooked up to a standard air handler on the inside."*
>
> — Washington contractor

When contractors described "ducted ductless" systems, they emphasized the indoor unit: a fan coil unit from a manufacturer's ductless product line connected to existing ductwork rather than a wall-mounted head or a less-powerful ducted mini-split head. An Oregon contractor described it as "kind of like the head of a ductless unit, but instead it's a smaller unit that sits in your attic that still has a return and supplies but still has the efficiency of ductless." She positioned these as a preferred retrofit option; the system reuses existing ductwork, does not require heat strips, operates down to 5°F, and qualifies for federal tax credits and utility incentive programs. Other contractors described similar practices using different terminology ("whole home ducted vertical air handler systems," or simply "ducted"), suggesting the concept is more widespread than the label.

Both formats could accelerate inverter-driven adoption in the retrofit market, a segment where existing ductwork constraints have historically limited equipment options. The lack of standardized terminology among contractors, however, may itself be a barrier to awareness and informed product selection.

Serviceability and Complexity as Adoption Constraints

Diagnostic complexity and serviceability also emerged as recurring concerns that temper contractor enthusiasm for newer inverter-driven equipment. These concerns connect directly to NEEA's connected commissioning interest; if baseline documentation from commissioning could support faster remote diagnostics, it may partially address the service-complexity burden contractors describe. This was most pronounced among contractors who maintain a service department or who rely heavily on manufacturer technical support for diagnostics.

- **Service burden shapes product recommendations.** One Idaho contractor described actively steering customers toward ducted systems partly because of the service burden he has observed with ductless equipment, noting a higher volume of service calls on ductless relative to ducted units his company has installed. Another Idaho contractor chose her brand portfolio specifically for ease of warranty processing, avoiding manufacturers with cumbersome claims procedures.
- **Inverter-driven complexity introduces new failure modes.** A Montana contractor described the defrost cycle as the "Achilles heel" of heat pumps and noted that inverter-driven systems handle it better but are "more complicated and expensive" to service when they do fail.
- **Manufacturer technical support is a pain point.** A Central Oregon contractor identified manufacturer technical support responsiveness, particularly for variable-speed systems, as the single most valuable form of program support, citing frustration with wait times. A Western Washington contractor linked serviceability to the broader workforce shortage: as systems grow more complex, the pool of technicians qualified to diagnose them is shrinking.

Supplemental and Backup Heat Practices

A central focus of the Advanced Heat Pump program is reducing reliance on electric resistance supplemental heat. This section examines how contractors decide whether to install strip heat, how they size it, how they configure lockout and control settings, and what experiences and incentives shape those choices.

TABLE 4: EQUIPMENT DEFINITIONS THAT GUIDED THIS RESEARCH

Term	Definition
Supplemental, Auxiliary, or Backup Heat	These terms are used interchangeably in the discussions and refer to electric resistance strip heat that operates with the heat pump.
Emergency Heat	The backup source used if the heat pump fails.
Electric Resistance Lockout	The outdoor temperature above which strip heat is prevented from operating.

Electric Strip Backup Heat

The reported share of installs that include electric strip backup heat varied widely across respondents, from near zero to 100 percent. Climate, local code requirements, equipment confidence, and experience all affect where a given contractor lands on that spectrum.

- **Minimal backup (mild climates, high equipment confidence).** One Oregon installer described strip heat as unnecessary with modern variable-speed equipment and estimated installing it once in the past two years. Another Portland-based installer works exclusively with cold-climate Mitsubishi ducted systems and includes zero backup in his installs—though he also refuses to install heat pumps in uninsulated homes. A third Oregon installer began installing electric strip heat only after receiving callbacks from a few customers but configures it as an emergency-only option.
- **Backup as non-negotiable (cold climates, service-oriented models).** A Montana installer includes electric backup on every ducted system and sizes the strip heat to deliver the full heating load at Montana's design temperature of -12°F, treating strip heat as a full-capacity backup rather than as supplemental. In Idaho, contractors reported that code prohibits installing a heat pump without some form of backup heat. One Idaho installer avoids strip heat almost entirely—but only because nearly all of his installs are dual-fuel, relying on gas for backup.
- **Middle ground (50–85% of installs include backup).** Several described installing heat pumps without backup only when using cold-climate heat pumps. Others include backup on almost everything, driven less by design calculations than by concern about mechanical failure.

The Role of Formative Negative Experiences

An emergent theme about backup heat involves negative prior experiences. A bad winter, a wave of callbacks, or a compressor failure, for example, can permanently shift practice toward including backup heat, even when equipment specifications suggest it may not be needed. This group included a few contractors who focus almost exclusively on high-quality heat pump installations, including one that relied on sizing and engineering calculations to avoid installing backup heat only to change course after negative customer experiences.

> *"We had one kicking on and it was -2 degrees and so the system worked but it ran for… probably 36 hours straight and then the compressor failed. After that we started including strip heat on everything."*
>
> *— Oregon contractor, Mt. Hood area*

Others discussed mitigating this risk:

- An Oregon/Mt. Hood based contractor initially did not install backup heat, trusting the equipment's 13°F rating. After callbacks, he shifted to including strip heat on every install, configured as emergency-only. The contractor described scenarios like power surges taking out outdoor unit control boards.
- Another in Western Washington had concerns about mechanical failure scenarios: if a heat pump fails during a cold stretch when a replacement part is backordered, the homeowner has no heat. That conversation, he noted, is "not a fun" one to have.
- In Portland, rather than adding backup heat, one contractor screens out homes where the risk is highest, refusing to install heat pumps on uninsulated homes. During one cold snap, he received three or four calls out of several hundred installs, and all were in "big, drafty, uninsulated houses."
- Another Portland installer views backup heat from a service perspective: inverter-driven, variable-speed equipment has more components and potential failure points than single-

> *"The systems really shouldn't need any backup heat. On paper, everything we've sold and installed should totally keep up. But we're still doing it because of bad experiences in the past. We decided we don't want to have another winter of people being totally disappointed in their heat pumps. It was devastating for us to get call after call from people who were really uncomfortable."*
>
> *— Portland area installer*

stage equipment, so full-capacity backup heat protects the customer during a service event and preserves the contractor's service relationship.

These accounts point to scenarios in which contractors include backup heat even when they are aware the equipment should be able to handle the load. They may explicitly acknowledge that "on paper" it should not be needed but lack confidence built through sustained, trouble-free field experience that the equipment will perform reliably under the full range of conditions.

Strip Heat Sizing Approaches

Contractors described varying approaches to sizing electric strip backup, with three primary tactics, each grounded in a different logic. Table 5 describes the approaches and the associated logic driving each.

TABLE 5. STRIP HEAT SIZING APPROACHES AS DESCRIBED BY CONTRACTORS

Approach	Logic
Size to full design heating load	Strip heat must be capable of heating the home independently if the heat pump fails. Treats backup as primary-equivalent.
Size as supplemental (5–10 kW typical)	Strip heat only needs to provide incremental capacity during cold snaps or defrost. Not intended to replace the heat pump.
Size to existing electrical infrastructure	In retrofits, match what the existing panel and wiring can support. Avoids costly electrical upgrades.

One installer described a hybrid approach: sizing the heat pump to 100 percent of the heating load and the strip heat to 75 percent, providing substantial but not full backup capacity.

Lockout and Control Settings

Control settings guide when backup heat operates. Contractors described three approaches to who manages the controls: contractor-programmed, manufacturer-managed (equipment's onboard controls determine when backup engages), and thermostat default logic (automatic switch when setpoint cannot be maintained within 3°F).

- Contractor-programmed: Nine contractors described setting electric resistance lockout temperatures at the thermostat during installation, typically 30–35°F, with two noting the option to return and adjust if the customer reports comfort issues. One contractor mentioned explaining to the customer that the customer can change the lockout temperature.

- Manufacturer-managed: In this scenario, the contractor lets manufacturer onboard controls determine when backup heat engages, rather than using thermostat-based outdoor temp lockout. One expressed skepticism about smart thermostats that rely on internet-sourced weather data, noting the reported temperature could vary 5–10 degrees from specific conditions—causing the heat pump to lock out too early or too late.
- Thermostat default logic: In this scenario, contractors described thermostats with a default mode that automatically switches to backup heat when the system cannot maintain the setpoint within 3°F. Customers can override this, but most rely on the defaults.

Among contractors who set lockout temperatures, most contractors in mild climates focus on electric resistance lockout (preventing strip heat above a given outdoor temperature). Contractors in colder climates address compressor lockout by preventing the heat pump from operating below a given temperature.

Electric Resistance Lockout

The most reported lockout temperatures for strip heat were 30°F and 35°F (three contractors each, with one of the three 35°F settings used for non-cold-climate systems). A Montana contractor enables electric heat at 20–25°F. One Oregon installer described the most aggressive approach: strip heat configured as emergency-only, meaning it never supplements the heat pump during normal operation.

Utility programs can directly influence lockout settings—one contractor's local utility requires backup heat lockout at 30°F as a condition for rebate eligibility.

Compressor Lockout

Compressor lockout—the outdoor temperature below which the heat pump stops operating—emerged primarily in discussions with contractors in colder climates. A Montana based contractor described identifying compressor lockout through a capacity balance point calculation and said they sometimes push the limit by setting a 2–3°F temperature droop for installations where the heat pump is the priority. In Montana's conditions, where cold weather events can reach negative 40°F, the heat pump physically cannot maintain capacity, and full switchover to backup heat before the heat pump capacity drops off too much is a safety matter.

In milder climates, compressor lockout seemed less relevant. Contractors in Oregon and Washington described "rarely locking out the compressor" because temperatures do not drop low enough to require it. They focused instead on locking out the strip heat.

Customer Communication: Backup Heat

Contractor approaches to explaining backup heat also varied, reflecting contractor confidence in the equipment and level of customer engagement with technical information.

Proactive explanation. A Montana-based contractor described walking customers through the switchover point between heat pump and auxiliary heat and advising them to switch to emergency heat manually if the heat pump fails. A Portland installer described backup heat as a full redundancy system, not just supplemental. Another frames strip heat as a "cheap way to get a secondary heat source" and reports customers generally like the idea of having a backup.

The nighttime setback challenge. The most common customer communication issue across discussions centered on how customers use their thermostats. Several contacts reported issues with customers turning the thermostat down at night and expecting the system to recover quickly in the morning. This leads to complaints, as it can take an hour per degree to bring the temperature back up in the morning. One contractor reported his local public utility district has started advising customers to maintain a constant setpoint rather than using nighttime setback. Another described this as an ongoing challenge, especially for customers that absorbed prior efficiency messages centered on conservation (and nighttime setback behavior).

> *"Trying to convince people not to set it back at night is one of our biggest challenges. They just don't believe that that's really going to be more cost effective."*

Dual-Fuel Systems

This section addresses dual-fuel system configurations—centrally ducted systems that pair a heat pump with a gas (natural gas or propane) furnace. The furnace acts as the air handler for the heat pump and provides heat when outdoor temperatures drop below a switchover point. The furnace may also provide heat during setback recovery when the interior temperature drops below a specified droop range or, potentially, when smart fuel switching strategies lock out the compressor to minimize heating cost, greenhouse gas emissions, or electricity demand in response to real-time signals. The discussion guide asked contractors how often they recommend dual-fuel systems, in what scenarios, how they size the heat pump, and how they determine switchover temperature.[4]

When Contractors Recommend Dual-Fuel Systems

The prevalence of dual-fuel system recommendations varied, reflecting regional fuel availability, local energy economics, and contractor market niche. The open-ended discussions did not result in every respondent providing a specific ratio. With that caveat, three broad groupings describe the landscape.

> *"Especially when someone might be on propane somewhere and they want to add A/C—we could add a heat pump instead of A/C and you'll get the best of both worlds. You certainly don't need to use the propane as much as you might now. But a lot of people are just going to add A/C. If the costs were similar, maybe they would make a different choice. It's substantially more to get a heat pump than it is to do just straight up A/C."*
>
> — Montana contractor

1. Dual-fuel systems as dominant. In Idaho and Montana, where gas or propane is the primary heating fuel and code and/or climate require backup heating, dual-fuel systems are the default. One Idaho contractor recommends it on "99.9" percent of installs (75% propane, 25% natural gas), framing electric strip heat as the most expensive backup option. A similar dynamic exists in Montana.
2. Dual-fuel systems as common or scenario dependent. A larger group recommends dual-fuel systems regularly but selectively. A Western Washington installer estimated 60 percent of installs are dual-fuel; another noted 80–90 percent of existing homes in his area have both gas and electric infrastructure. In Portland, dual fuel is primarily a retrofit scenario—adding a heat pump to an existing gas furnace.
3. Dual-fuel systems as uncommon or declining. Several Oregon contractors described dual fuel as a small or declining practice, especially when incentive programs favor all-electric. One Portland installer operates an exclusively all-electric practice. One Idaho contractor,

[4] Switchover (or crossover) temperature refers to the outdoor temperature at which the system switches from heat pump operation to gas furnace operation.

arguing against dual fuel, stated that if a customer has gas, there is “zero need for a heat pump.”

Scenarios That Drive Dual-Fuel System Decisions

Across the conversations, five recurring scenarios lead contractors to recommend or install dual-fuel systems. The scenarios are not mutually exclusive—a single project may involve more than one.

TABLE 6. SCENARIOS THAT DRIVE DUAL-FUEL SYSTEM RECOMMENDATIONS, AS DESCRIBED BY CONTRACTORS

Scenario	Description
Existing gas	Customer with working gas furnace wants to add air conditioning. Contractor recommends HP instead of A/C-only for the incremental heating benefit. This is the most common entry point for dual-fuel systems in mild climates.
Propane cost reduction	Propane is expensive and hard to budget for. Adding a heat pump reduces propane consumption during shoulder seasons. Strongest driver in rural Idaho, Montana, and areas without natural gas.
Power reliability/ generator backup	Gas furnaces require much less electrical power than heat pumps and can be powered during a power outage using a much smaller generator. This can be a compelling advantage for dual-fuel systems, particularly in rural areas with frequent outages.
Code compliance	Contractors report that Idaho requires backup heat for heat pump installations. Dual-fuel systems satisfy the requirement while avoiding electric resistance, which can be expensive in cold climates.
Fuel flexibility/ hedging	Customer wants the option to shift between fuel sources depending on rate changes or future electrification. Some contractors described this as a “mental backup”—comfort in having two fuel options.

A few cross-cutting themes emerged in these discussions. First, there is growing demand for residential cooling in the Northwest driven by recent heat waves and wildfire smoke concerns, which may create new entry points for dual fuel. Second, efficiency program incentive-structures tend to favor all-electric configurations over dual fuel, which may discourage adoption in Oregon even where it would otherwise make sense.

Switchover Temperature Practices

Fewer respondents addressed switchover temperature in detail, and the data here are thinner, reflecting a range of approaches rather than a consensus practice.

- Manufacturer-managed: Contractors defer to onboard controls or manufacturer recommendations. Two contractors described newer Trane equipment that manages switchover internally.
- Energy economics calculation: Contractors set crossover at 10–15°F for standard heat pumps with propane or as low as -10°F for inverter systems, based on electricity vs. fuel costs.
- Customer tolerance: One Montana contractor cited 20–30°F, noting that customers complain about continuous runtime even when the system is operating efficiently. She described thermostats with an “upstage timer” that switches to gas after a set continuous-run period.
- Simple rule of thumb: Lock out at 35°F for non-cold-climate equipment.

Heat Pump Sizing in Dual-Fuel Configurations

Interviews explored how the presence of a gas furnace changes heat pump sizing approaches. Most respondents indicated that it does but provided varied descriptions of the relationship between the presence of a gas furnaces and heat pump sizing.

- Ductwork can constrain heat pump sizing. When gas backup is available, the heat pump does not need to cover the full heating load on its own, and ductwork capacity can drive sizing (not heat load), particularly in retrofits. One Idaho contractor estimated that ductwork drives his sizing decision about half the time, with cooling load and existing equipment constraints splitting the remainder.
- Contractors size to anticipated use. Contractors serving natural gas customers reported installing smaller heat pumps sized for cooling, given that the furnace is expected to handle heating during the coldest weather. Contractors in Portland and Western Washington described sizing the heat pump for the heating load rather than cooling alone, expecting customers to transition toward heat-pump-dominant operation over time.
- Fuel type shapes the sizing decision making. Propane customers who want to reduce fuel costs may push for a heat pump sized to handle more of the heating load.

Discussions indicate that sizing practices in dual-fuel systems are influenced by the contractor’s expectation of how the customer will use the system. For installations where contractors expect the gas furnace to be the primary heating system, contractors tend to size the heat pump based on cooling load or ductwork capacity. When the heat pump is viewed as the primary heating system, heat pump sizing approaches look more like those for all-electric scenarios.

Regional Patterns

Based on contractor discussions the team identified the following regional patterns:

- Idaho is a dual-fuel-dominant market with code requirements for backup heat, inexpensive gas. Common practices all point to a market where all-electric adoption faces structural barriers.
- Contractors in Montana focus on solving for very cold temperatures that make backup essential and note that propane is common in rural areas.
- Western Washington occupies a middle ground with common dual-fuel installations driven by spotty natural gas coverage and rural power outages, while growing cooling demand creates new heat pump entry points.
- Portland metro and Western Oregon contractors described an electrification-forward market where natural gas is declining, and incentive structures favor all-electric.

System Selection and Sizing

This section summarizes the decision architecture contractors use when recommending and sizing systems across all configurations. Sizing practices specific to dual-fuel systems are covered in Heat Pump Sizing in Dual-Fuel Configurations above.

Sales and Recommendation Approach

Contractors typically present options to homeowners using a tiered “good, better, best” approach, with tiers corresponding to single-stage or entry-level equipment, mid-efficiency two-stage systems, and high-performance variable-speed or cold-climate heat pumps.

The primary variation is the starting point. A Montana contractor described a sales strategy that begins with quotes at the lower tier, explaining that opening with a higher-priced option risks losing the customer to a competitor who leads with cost. Starting low gives contractors an opportunity to explain the value of each upgrade step. A Western Washington contractor serving a higher-end market driven by utility rebate requirements described starting with the heating capacity needed to qualify for incentives, an approach that inherently pushes the price floor upward. An Idaho contractor described assessing customer resources. If the customer clearly cannot afford the mid or upper tier, he does not produce those quotes. As he put it, time spent preparing options the customer will never choose is time wasted.

Price emerged as a dominant decision driver across nearly every respondent. A Bellingham-based contractor described customer engagement as fundamentally constrained by attention and cost tolerance: most homeowners want a system that works and are focused on the price, not the specifications. Another contractor in Washington framed it more directly: every home has a budget, regardless of the homeowner's means. Contractors report customers increasingly arrive with internet research—sometimes helpful, sometimes misleading.

Two contractors described using the sales interaction to educate customers about the benefits of heat pumps, the size they need, and why they should consider variable speed options. One Portland-based contractor runs a BetterBuiltNW load calculation on every project and shows homeowners how insulation improvements reduce the required equipment capacity. He will sometimes steer the customer toward envelope upgrades to reduce the capacity of the heat pump needed or, in some cases, as a necessary step to make a heat pump without backup heat a viable option. Another described a similar approach, using the load calculation to demonstrate the connection between building envelope and equipment size. These approaches position the contractor as an advisor on whole-home performance rather than a salesperson for specific equipment.

> *"I find that if you at least start with a lower offering, it opens it up for me to explain to them why they should be at two stage or variable speed. It bit me when I just assumed they had the money and started them higher."*
>
> — Montana contractor

The Spectrum of Manual J Practice

Load calculation practices among respondents range from rigorous room-by-room Manual J[5] analysis to experience-based rules of thumb. Rather than a binary "do they or don't they" question, the data reveal a continuum that can be grouped into three broad categories. Table 7 describes these categories and their representative approaches.

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[5] Manual J is a load calculation procedure published by the Air Conditioning Contractors of America used to determine the heating and cooling capacity a home needs. Manual J accounts for factors like square footage, insulation levels, climate, home orientation and other factors that affect heating and cooling load.

TABLE 7. LOAD CALCULATION PRACTICES AS DESCRIBED BY CONTRACTORS

Category	Characteristics	Representative Approaches
Room-by-room calculation	Full Manual J with detailed inputs: windows, doors, insulation values, room dimensions, orientation. Software-driven (for example,, Wrightsoft). Often required by code or utility programs. Applied consistently on new construction; selectively on custom retrofits.	Wrightsoft[6] room-by-room where state board requires it, with full drawings and duct sizes. Room-by-room on new construction and larger homes using Wrightsoft; some adopting iPad LiDAR scanning tools. Manual J on every project; output used to document shell performance and refer customers to utility programs for envelope upgrades. BetterBuiltNW on every project; output used as a sales tool for insulation.
Simplified block load	Whole-house block load based on square footage, climate data, and basic building characteristics. Faster than room-by-room; sufficient for straightforward replacements and standard homes.	Two methods cross-checked—utility approved spreadsheet and CoolCalc block load; typically within 10% of each other. Block load for both ducted and ductless. Manual J for retrofits where utility requires a sizing calculation.
Experience-based rules of thumb	Sizing based on square footage, existing equipment, and practitioner judgment developed over years of installations. May use rough heuristics (for example, a ton per 500 sq. ft.). Most common on straightforward replacements in familiar housing stock. Formal tools used only when required by utility programs or when the project is unusual.	Ton-per-thousand-sq. ft. rule for new construction; decades of company experience substitutes for formal calcs on spec housing. Previously used Wrightsoft; now relies on rule of thumb with duct sizing and existing system performance as primary inputs. Manual J done "some of the time" depending on installation type; sizing driven by customer comfort with existing system. Sq. ft. × temperature differential for BTU calculation; like-for-like replacement common.

Project type is the strongest predictor of where a contractor falls on this continuum. Contractors who do room-by-room calculations on new construction often switch to block loads or experience-based sizing on straightforward replacements. A Montana contractor described this

[6] Wrightsoft is a software program used by HVAC professionals to design, size, and sell HVAC systems.

explicitly: his firm uses Wrightsoft and Conduit Tech's iPad LiDAR scanning for new construction and complex homes but reverts to block loads for changeouts where the ductwork is already in place. As another contractor put it, in a changeout situation the ducts are fixed and the calculation is effectively constrained by what already exists.

Regulatory and program requirements can drive tool choice independent of contractor preference. In southeastern Idaho, local utilities accept only Wrightsoft, which creates a compliance cost for smaller contractors. At the other end of the accessibility spectrum, a Portland-based contractor uses the free BetterBuiltNW tool and recommended it to others during a focus group, describing it as fast, simple, and effective.

> *"If it's an uninsulated '20s bungalow with three-inch round ducts in the crawlspace, I'm not putting a five-ton system in there. I'll do the best I can with what I have."*
>
> — Portland contractor

Interview data also suggest a relationship between load calculation rigor and how contractors position themselves in the sales process. Two Portland-area contractors described using load calculations for sizing and as a customer education tool—running "as-is" and "with-insulation" comparisons to show homeowners how envelope improvements reduce required equipment capacity.

Ductwork Constraints and Retrofit Challenges

Existing ductwork emerged as the single most cited constraint on equipment sizing in retrofit installations. Contractors repeatedly described scenarios where the load calculation calls for more capacity than the ductwork can deliver—forcing a choice between under sizing the heat pump, modifying the ductwork, or accepting a performance compromise.

> *"We always do a Manual J. You can do your rule of thumb, you can do all of that stuff… but there are so many variables. Vintage, windows, shading, shell. Nothing worse than installing a new system in a home but the customer not getting anything out of it."*
>
> — Portland contractor

Contractors described several adaptive strategies. One Oregon contractor intentionally undersizes the ducted heat pump to match what the ducts can handle then adds a ductless mini-split head to cover the shortfall—a hybrid approach that delivers adequate capacity without ductwork modification. A Western Washington contractor presents homeowners with layered options: what the home should have, what the duct system can support, and what it would take to bridge the gap. He noted that Seattle-area builders routinely place main-level ductwork in crawl spaces and upper-floor ductwork in attics, creating airflow challenges that persist for the life of the building. Another contractor uses static pressure checks during routine maintenance visits to identify homes where ductwork is undersized, giving homeowners an opportunity to address ductwork outside of an equipment replacement cycle so that when replacement comes, the ducts are already properly sized.

Customer resistance is a recurring challenge. Multiple contractors described homeowners who want equipment replacement, not a ductwork overhaul. When presented with the option to upgrade ductwork for better airflow and efficiency, many customers decline. They want the immediate problem solved at the lowest possible cost. The contractor is left to size the new equipment to the existing ductwork, knowing it may underperform.

Regional Variation in Sizing Approaches

Sizing practices across the region vary along two dimensions: what contractors size to (heating load vs. cooling load vs. ductwork) and the regulatory and programmatic infrastructure that shapes how they do it.

According to **Idaho**-based contractors, the state board requires detailed drawings with duct sizes using systems like Wrightsoft. Third-party Manual J providers serve contractors who cannot produce compliant calculations in-house. The presence of gas backup can reduce the heating-load constraint on ductwork capacity.

Montana operates at the opposite end of the regulatory spectrum. One contractor described a market with limited code enforcement, where contractors and homeowners can install what they choose without oversight. In this environment, sizing defaults to rule of thumb and existing system performance. This contact described their firm transitioning from Wrightsoft to experience-based sizing over a long career and after the Bonneville Power Administration (BPA) stopped the Performance Tested Comfort System (PTCS) program, which required contractors to perform Manual J-equivalent heating and cooling load calculations. Another described a more rigorous practice centered on Wrightsoft and LiDAR scanning for new construction but acknowledged the tension between spec-builder budgets and code requirements is a persistent challenge.

In **Western Washington,** utility programs drive sizing requirements through rebate eligibility criteria. One contact described running two independent sizing tools (the SnoPUD ACCA-approved spreadsheet and CoolCalc) as a cross-check, and his utility's heating-capacity threshold influences installed equipment. Another does Manual J for retrofits, with the utility requiring a sizing calculation.

Oregon contractors offered a diversity of perspectives. Portland-area contractors described practices oriented toward heating load and building performance, often with explicit connections to programs and incentive eligibility. In Central Oregon and the Willamette Valley, some contacts described more experience-based and cost-driven approaches, such as sizing based on the customer's comfort level with their current equipment rather than attempting to right-size the system.

Across the region, utility incentive programs can act as a de facto sizing standard. Contractors who participate in rebate programs, especially when the programs require documentation of heating capacity, load calculations, or commissioning data, described more structured sizing practices than those who do not.

Connected Commissioning

This section summarizes how contractors approach commissioning new heat pump installations and their receptivity to connected commissioning tools.

Current Commissioning Practices

Existing commissioning practices ranged from structured, checklist-driven processes to informal, experience-based startup routines, reflecting business size, service orientation, and contractor participation in utility incentive programs that require documentation.

Contractors with structured processes described multi-step checklists covering static pressure, temperature rise and drop (Delta T), refrigerant pressures, electrical draws, and operational mode cycling. Two contractors described checking static pressure and Delta T on every installation and including first-year maintenance with most jobs as a fallback. The most thorough process involved manufacturer startup sheets for warranty documentation plus a separate internal checklist covering static pressures, Delta T in both heating and cooling, discharge and suction temperatures, liquid line temperatures, amp draws on all motors, defrost operation, and reversing valve function. Another contractor relied on ServiceTitan as a dispatch platform, with install crews completing a detailed digital checklist on tablets that includes photographs of equipment, clearance verification, nitrogen pressure testing, vacuum documentation, and rise test data.

> *"We have the OEM startup sheets that we always fill out. In the event we have any warranty issues, we can send it back to our manufacturers and say, here's our startup information, you know we're legit. But we also have our own additional checklist, which is generally much more thorough."*
>
> — Portland contractor

Contractors with less formal processes described commissioning as a practical startup routine rather than a documented quality-assurance step. A Montana contact described evacuating, charging, and checking pressures and temperatures without using a manufacturer checklist. An Oregon-based contractor described programming the thermostat, confirming heating and cooling operation, and relying on tactile checks (line temperature, airflow feel) developed over years of experience. A Washington contact described trying to follow startup charts and cycle through all modes but acknowledged practical difficulties: customers are often unavailable, and the crew is under time pressure to pack up and move on.

Embedded self-commissioning is appearing in some equipment. An Idaho contractor described the Bosch startup process in detail: a 25-minute full-capacity run that circulates oil and allows the control board to log initial operating parameters as read-only memory. During this process, the board evaluates superheat and subcooling to determine whether the indoor coil is matched to the outdoor unit.

The most checked parameters across respondents included static pressure, temperature differential (Delta T), and refrigerant pressures. Contractors with a service department or who handle warranty claims described commissioning documentation as essential for protecting against future disputes. Those without a service department or who work primarily in new construction described this as a startup confirmation rather than quality-assurance record.

"I try to follow charts and stuff that talk about going over the static pressure, the ductwork… cycle the systems through all of their different modes, whether that's backup heating, auxiliary heating… make sure the refrigerant's good, make sure there's no leaks. But it can be hard because you're packing up all your stuff and the customer's usually not around."

— Western Washington contractor

Tools in Use

Contractors described a range of tools for verifying performance of installed equipment. Spanning from physical gauges and manual recording to Bluetooth-connected instruments and manufacturer-specific software platforms.

- **Fieldpiece Job Link** was the most frequently mentioned connected tool, referenced by three contractors. Job Link uses Bluetooth-connected wireless probes that transmit pressure, temperature, and humidity readings to a phone app, enabling technicians to document system performance digitally and share it with others for verification.
- **Manufacturer-specific platforms** also emerged, including Mitsubishi's Diamond Builder suite and Trane's connected system, which enables remote monitoring of pressures, static pressure, and system status after installation. One contractor described Trane's startup report as an app-generated PDF sent to the customer confirming the system was installed to factory specifications.

"All of our installers have all the data, they just put in probes and it all shows up on a screen. It's super easy now. It's not like it used to be where you had to sit and do math."

— Oregon contractor

- **Dispatch and workflow software** also emerged as a commissioning structure. ServiceTitan can embed commissioning as part of the install workflow, and custom systems for electronic job tracking will include checklists that technicians must complete before a job can be processed.

Not everyone uses digital tools. One Idaho contractor described using manual gauges, physical startup pages, and handwritten tracking. He was aware that app-connected tools are becoming available for the equipment he installs but had not yet adopted them.

Connected Commissioning: Value Propositions

When presented with the concept of an app-based connected commissioning tool, respondents identified value propositions that correspond to different stakeholders. Contractors often articulated more than one.

TABLE 8: STAKEHOLDER VALUE PROPOSITIONS FOR CONNECTED COMMISSIONING

Stakeholder Value	Description
Contractor: Baseline documentation	A common value proposition. Establishing a startup record that can be compared against future readings to isolate what changed. Several contractors described this as something they already do. Connected tools could make the baseline easier to create, store, and retrieve.
Contractor: Accountability and quality assurance	A “secondary verification form” that prevents technicians from cutting corners. One contractor noted he already performs these checks in four different places; a consolidated tool could streamline a fragmented process. Others valued the structured checklist aspect: a defined list means the technician does not have to remember what to check.
Manufacturer: Warranty claim support	Manufacturers immediately ask for the startup sheet when a warranty claim is filed. Connected commissioning could verify equipment was installed to spec. This could be attractive to distributors who may absorb failure costs resulting from improper installation.
Utility Programs: Documentation streamlining	If the tool could share data directly with utility programs, it could replace the manual paperwork often required for rebate verification. Contractors described multiple layers of documentation and follow-up for utility participation. One described a process requiring a sizing calculator, load calculation, TrueFlow® test, and commissioning controls documentation—enough to require dedicated staff time or a separate crew for paperwork.

Customer-facing value is viewed as positive but limited. Multiple respondents noted that homeowners do not typically ask for commissioning reports and are unlikely to engage with technical data. One contractor observed that when customers do ask for a commissioning report, it is often driven by a trust deficit rather than a data need—his company addresses customer assurance through an extended two-year labor warranty rather than documentation. Two contacts saw value in a simplified, customer-facing output—a thumbs-up or checkmark format that communicates "your system checks out" in terms a homeowner can understand.

"Being able to have your crew that's already doing the Bluetooth thing just hit a share to the utility for incentive programs would be pretty cool. Like a limited data form rather than having to take information back to the office. There's a lot of layers."

— Portland contractor

TECHNICIAN-FACING VS. CUSTOMER-FACING DATA

Contacts distinguished between what technicians need from commissioning data and what customers need. One contractor noted a superheat[7] reading of 7.6°F tells a technician a great deal, but a thumbs-up tells them almost nothing; for the customer, the reverse is true.

"It sounds 100 percent helpful because it has a little bit of layman's words for the customer. You know, this checks out OK… We like tables, and equations, to avoid human error."

— Western Washington contractor

One contractor described Trane's Link system, which implements this two-tier approach: it runs the unit through a test mode during startup, automatically adds refrigerant charge if needed, and generates a report confirming the system was installed to factory specifications. The report goes to the customer; the detailed data remains accessible to the contractor and manufacturer. This approach also addresses workforce constraints by automating portions of the commissioning process and lowering the experience threshold for competent startup, a meaningful benefit in a market where experienced technicians are difficult to find.

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[7] Superheat is the temperature of refrigerant vapor above its boiling point at a given pressure. Superheat ratings tell the technician where the system sits relative to the manufacturer's target range. In this scenario the respondent is advocating for a specific value over a pass/no pass for contractor facing information.

Barriers and Opportunities

Proprietary fragmentation is a barrier. One contractor expressed his frustration by noting he performs commissioning checks using four different manufacturer-specific tools—Minneapolis TrueFlow® for airflow testing,[8] Testo for Bluetooth gauges, Mitsubishi's platform, and others. Each operates independently. Another agreed that a standard tool usable across any equipment brand would be valuable. This desire for a universal, cross-brand commissioning platform was the single most consistent request across the focus group discussions.

Not all respondents were enthusiastic about connected commissioning. Several contractors with existing digital tools and structured processes did not see connected commissioning adding value. One Portland contractor was direct: his company already has electronic checklists, internal software, and structured commissioning processes. Another Oregon contractor relies on tactile diagnostics developed over years and described his current approach as working well enough that additional tooling would be a solution to a problem he does not have. Others described existing tools (Fieldpiece, manufacturer apps) as sufficient and mature.

Emergent Topics

Several topics emerged organically from contractor accounts of their day-to-day work and the constraints that shape it.

Regulatory and Code Constraints as Design Drivers

Local codes and ordinances affect choices and, in some cases, override both contractor judgment and customer preference. In Western Washington, Seattle and Everett nighttime noise ordinances cap outdoor equipment sound at 45 decibels at the

"Nighttime decibel reading requirements at the property line of no more than 45 decibels. For an inverter system, I can go about five feet from the property line and be okay. For a single-stage air conditioner, I've got to be 15 to 18 feet from the property line. And in the city of Seattle, that's darn near impossible."

— Western Washington contractor

[8] This contact was likely referring to The Energy Conservatory (TEC)'s line of products that include Minneapolis-labeled blower door and duct blaster equipment.

property line. The noise ordinances function as a de facto equipment mandate, pushing urban installations toward inverter-driven systems regardless of cost or customer preference.

At the other end of the regulatory spectrum, one contact noted that Idaho requires backup heat by code for all unitary heat pump installations. In Montana, a contractor described energy codes that require tighter building envelopes (as low as 1.2 air changes per hour) but lack of enforcement on ventilation requirements, leaving HVAC contractors to explain heating recovery and ventilation (HRV) needs that no inspector will verify. One Montana contractor described lax code enforcement across the state.

Customer Education and the "Living with Heat Pumps" Experience

Contractors described an ongoing role as educators, explaining to customers what to expect when living with a heat pump, particularly if they are used to gas furnaces. The most frequently cited issues were:

- **Lower supply air temperatures.** Heat pumps deliver warm air, not hot air, from registers. Customers accustomed to a blast of hot air from a gas furnace perceive the heat pump as underperforming, even when it is heating the home effectively. One contractor (whose firm installs 800 to 1,000 systems a year) identified this as his most common complaint.
- **Defrost cycles.** The outdoor unit produces steam or briefly cools the air during defrost, prompting customer calls. One Idaho technician described customers calling to report "smoke" coming from the outdoor unit. Multiple contractors described this as a recurring source of confusion.

> *"Defrost. That's a nightmare. People will be like, what's going on? And you just have to explain, 'just give it a few minutes, it'll be warmer again.' It's the same with dual fuel—when the gas furnace kicks on, people know because the air is actually hotter. With the heat pump, the air is warm but not hot."*
>
> — Montana contractor

- **Thermostat setting behavior** was cited as single most cited customer education challenge. Customers turn the thermostat down at night and expect fast morning recovery. Heat pumps take longer to recover than gas furnaces, and the temperature gap can trigger auxiliary heat—creating higher electricity bills and the impression that the system "doesn't work."

Several contractors described customer education as a program support need. One called it "a huge part of the heat pump transition in general." Another described the challenge more concretely: customers want the system to operate the way their old system worked, and they want to use it the way they've always used it. This retraining can "sometimes takes a while." Small contractors described lacking the time, staffing, or materials to deliver the consultative, patient education that heat pump sales increasingly require.

> *"Back in the day, you used to want it warmer, crank it up. Want it cooler, crank it down. Nowadays with heat pumps and the slow process of building heat, it's best just to leave the thermostat and forget about it. But that's not how people are used to operating."*
>
> — Idaho contractor

Challenges and Common Failure Points

When asked what goes wrong with heat pump systems, contractors described a mix of equipment issues, installer errors, and customer-driven problems.

The most common equipment issues included control board failures and refrigerant leaks, with leaks often attributable to original installer workmanship rather than equipment defects. One Montana contractor called defrost performance the "Achilles heel" of heat pumps and described circuit board failures. Dirty filters remain a persistent cause of degraded performance and warranty disputes, with contractors noting that despite reminders, many customers neglect routine maintenance.

Several contractors distinguished between callbacks that reflect genuine equipment failures and those that stem from customer behavior or expectations. The nighttime setback pattern described above is an example of a "callback" that is a usage issue. An Idaho contractor described most early callbacks as attributable to installer error or gaps in customer understanding as opposed to equipment defects and characterized manufacturer defects in the first year as rare. Another Idaho contractor confirmed this, noting customers love their heat pumps, energy bills are lower, and true equipment problems are infrequent.

> *"We don't have many equipment problems or equipment failures. It's just the retraining of how to use the system that sometimes takes a while to get to."*
>
> — Portland contractor

Conclusions and Implications

Conclusions and Implications

1. Contractor decisions about auxiliary heat reflect risk management strategies, not a gap in technical knowledge.

Many contractors who know that heat pump equipment should not require backup heat nonetheless continue to install it. This behavior is primarily driven by specific past experiences, such as bad winter, a wave of callbacks, and compressor failures, or concern about resident callbacks as reasons for installing auxiliary heat. Contractors who omit backup heat describe different risk management approaches: some screen out high-risk homes, some configure strip heat as emergency-only, and others have accumulated enough trouble-free field experience to absorb occasional callbacks.

> ***Implication***: *Efforts to reduce auxiliary heat reliance will need to target the specific risks contractors are managing. Demonstrated field performance data, manufacturer-backed service support, and/or intermediate solutions like emergency-only configurations will be important, even as education about cold climate performance expands.*

2. First cost is the primary constraint on cold-climate heat pump adoption, and contractors must convince customers of the value.

In cold markets, cold-climate heat pumps can be required to ensure occupant comfort. In mild climates, the choice between standard and cold-climate equipment is primarily a cost decision affected by incentive eligibility and customer price sensitivity. First cost remains a constraint on higher-performance equipment adoption. Contractors who consistently offer cold-climate or variable-speed equipment describe an active sales process that requires explaining the bid and making the case for comfort and long-term operating cost savings.

> ***Implication:*** *Price barriers can be addressed through incentives, but the combination of cost sensitivity, competitive bidding dynamics, and brand-specific product awareness indicates that adoption will reflect contractor tools and motivation to make the case at the point of sale.*

3. Utility incentive programs can affect installation practice.

Across equipment selection, backup heat configuration, sizing methodology, and commissioning documentation, contractors who participate in utility rebate programs described more structured and utility program-aligned practices than those who do not.

> ***Implication:*** *Incentive program requirements remain a high-impact channel for advancing NEEA's goals. Requiring documented heating capacity, load calculations, or commissioning may help ensure installation quality that supports expected savings.*

4. Customer education is a common unmet need.

The most frequent "failure" contractors described reflects issues with customer expectations rather than equipment or installation problems. Lower supply air temperatures, thermostat setback behavior, and defrost cycles generate callbacks, dissatisfaction, and in some cases unnecessary auxiliary heat operation in systems that are properly sized, installed, and commissioned. Contractors across the sample described this as a persistent, labor-intensive requirement.

> ***Implication:*** *Regional or program-level support for standardized customer education materials could reduce contractor-level burden associated with managing heat pump operating expectations. The value could be broad but may be greatest for those without dedicated sales staff.*

5. A spectrum of practices for minimizing auxiliary heat exists.

Contractors described a range of intermediate strategies for minimizing auxiliary heat: emergency-only configuration, where strip heat activates only if manually switched on by the homeowner during a heat pump failure; sizing electric strip backup heat only as necessary to supplement heat pump capacity rather than to satisfy the full design load and locking out auxiliary heating above 35°F; and screening to avoid high-risk installations. Contractors in Montana focus on climate requirements and several Idaho contractors noted that code requirements constrain how far auxiliary heat minimization can go.

> ***Implication:*** *Defining "minimized supplemental heat" as a program-eligible category with specific configuration requirements consistent with state code requirements could move the installed base toward reduced reliance even if use of backup heat is not eliminated entirely.*

6. Brand ecosystems affect contractor awareness and create boundaries around product knowledge.

Contractor experience with heat pump equipment tracks closely with the brands they carry. This shapes what they recommend, what they consider "cold climate," and the options they present to customers. Brand relationships reflect long-term dealer agreements, distributor access, manufacturer support arrangements, and in some cases minimum purchase thresholds that limit access for smaller firms. Contractors may be aware that better-performing options exist outside their primary brand ecosystem, but structural constraints on what they can sell limit how that awareness translates to recommendations.

> ***Implication:*** *Efforts that target contractor choices and behavior will encounter the limits of what individual contractors can offer within their brand relationships. Program strategies that work within existing brand ecosystems may be more effective than approaches that assume contractors can freely substitute across brands.*

7. New construction and retrofit markets face different challenges and leverage points.

In retrofit, the homeowner decides, incentives directly influence equipment selection, and contractors can assess the building envelope. In new construction, the builder controls equipment selection and focuses on first cost. Even contractors whose retrofit work is predominantly variable-speed reported that new construction pulls toward single-stage or minimum-code systems.

> ***Implication:*** *Incentive-based approaches that work in retrofit may have limited traction with spec builders. Code alignment or builder-facing support will likely be required to encourage uptake of advanced heat pump equipment that minimizes electric resistance in new construction.*

8. Ductwork limitations often constrain heat pump sizing in retrofit applications.

Ductwork limitations stood out as the single most-cited constraint on equipment sizing in retrofit installations. In older homes, ductwork is often too small or otherwise constrained to accommodate the airflow of a heat pump large enough to meet the full cooling and/or heating load of the home. When presented with the option to upgrade their ductwork, many homeowners decline, leaving contractors to recommend an undersized heat pump that will avoid excessive static pressure or a full-capacity system that will underperform at high capacity.

Ductwork constraints are an ongoing conversation for variable-speed systems. Conversations with the NEEA project team suggest that variable-speed equipment with electrically commutated motors (ECM) may operate fairly efficiently even at moderately elevated static pressure—the fan motor works harder to push air through undersized ducts but uses relatively little electricity to do so compared with total system energy use. Most of the time, variable-speed systems run at lower speeds and lower airflows than their rated peak, reducing the practical impact of undersized ducts during typical operation. Cold-climate heat pumps may run at higher cubic feet per minute (CFM) at lower temperatures, which could stress undersized ductwork during the conditions when capacity matters most. These are active considerations in the regional technical community, with ongoing and evolving conversations and understanding.

> **Implication:** *Support for ducting changes necessary to accommodate full-load heat pump airflow could help overcome customer resistance to accepting contractor ductwork recommendations. Further research about the impacts of moderate to high external static pressure on the performance of variable speed heat pumps may be necessary to fully assess the value of duct system improvements.*

9. Connected commissioning has a multi-stakeholder value proposition, but proprietary fragmentation could limit adoption.

Contractors responded to the connected commissioning concept with pragmatic interest. They value baseline documentation for warranty protection and diagnostic reference and the potential for streamlining submission of program-required measure documentation. They also reported that manufacturers are increasingly requiring installation verification and that customers might value simple confirmation that their system works. Focus group discussions revealed a desire for a universal, cross-brand commissioning platform.

> ***Implication:*** *Positioning connected commissioning as a tool that replaces manual rebate paperwork with automated data sharing, or that addresses technician oversight needs, will likely be the most practical entry point.*

Recommendations for Follow-On Research

Contractor practices prevalence survey

This qualitative report is explicit that ratios and prevalence figures should not be over-interpreted. A structured survey of a larger contractor sample across the four-state region would convert the qualitative themes into measurable prevalence estimates for sizing practices (Manual J vs. block load vs. rule of thumb), strip heat inclusion rates, actual lockout temperatures set, dual-fuel switchover temperatures, and commissioning tool adoption.

Customer education content development and testing

The implication associated with conclusion #4 proposes standardized customer education materials. The current finding reflects contractor reports of what customers misunderstand, not direct evidence from customers. Developing candidate materials (on defrost, supply air temperatures, thermostat behavior, expected runtime) and testing them with homeowners (ideally with a mix of recent heat pump adopters and gas-furnace households) would ground the content and confirm any misunderstandings.

Connected commissioning product requirements research

Contractors expressed consistent interest in a universal, cross-brand commissioning tool but could not specify desired features, integrations, or data flows. A structured contractor workshop combined with manufacturer interviews would translate that expressed interest into actionable product requirements before NEEA invests further in platform development.

Appendix A: Regional Comparison Table

TABLE 9. REGIONAL MARKET PROFILES: CONTRACTOR-DESCRIBED CHARACTERISTICS

These profiles reflect contractor perspectives and should not be interpreted as statistically representative of each state.

Dimension	Portland Metro/ Western Oregon	Western Washington	Idaho	Montana/ Rural Areas
Dual fuel prevalence	Low and declining. Dual fuel is primarily a retrofit scenario, adding a HP to an existing gas furnace. New gas equipment rarely installed alongside HP.	Common. Estimated at ~60% of installs for some contractors. Driven by existing infrastructure and power reliability concerns.	Dominant. Up to 99% for some contractors. Gas satisfies this while avoiding expensive electric resistance.	Dominant. Backup heat essential at design temperatures. Propane backup standard in rural areas.
Backup heat norm	Varies. Some contractors install zero backup with cold-climate equipment. Emergency-only configurations reported.	Included on most installs. Lockout at 30–35°F typical. Utility programs sometimes set lockout requirements.	Required by code. State prohibits unitary HP without backup. Strip heat or gas furnace on every install.	100% of installs. Sized to full design temperature (-12°F or lower). Non-negotiable in this climate.
Variable-speed/ inverter adoption	High. Near-default recommendation for multiple contractors. 70–75% of installs reported by several contacts.	High. Driven by utility rebate requirements. Noise ordinances in urban areas effectively mandate inverter systems.	Moderate. Growing but constrained by customer economics and dual-fuel configurations that reduce VS value proposition.	Low. Two-stage ducted systems remain the common default. Variable-speed available but less common.
Code environment	Moderate. Energy Trust program requirements often exceed code floor. Programs function as de facto standards.	Active. Seattle/Everett noise ordinances (45 dB at property line) function as equipment mandates. Utility programs add requirements.	Structured. State board requires detailed drawings with duct sizes. Utilities accept only Wrightsoft in some areas.	Minimal enforcement. Envelope codes adopted but ventilation requirements not enforced.

Dimension	Portland Metro/ Western Oregon	Western Washington	Idaho	Montana/ Rural Areas
Incentive influence	Strong. Energy Trust structures drive all-electric adoption. Incentive eligibility steers equipment selection.	Strong. Utility rebates shape equipment mix and sizing practices. Heating-capacity thresholds drive what gets installed.	Weak to burdensome. Rebate paperwork described as negating the $400 incentive value. Limited program participation.	Minimal. Few programs available. Inconsistent access to incentives in rural areas.
Key market constraint	Price sensitivity. Sticker shock at HP cost vs. AC. New construction budgets favor minimum-code equipment.	Economics and power reliability. Rural outages drive propane backup demand.	Gas economics and code requirements. Cheap gas undercuts HP value proposition. Code mandates backup heat.	Extreme temperatures and workforce. Remote service areas, limited technician pool, variable installation quality.

Appendix B: Respondent Profiles

This appendix provides a brief profile of each of the 22 contractors who participated in the research, organized by geographic region. Respondents participated through either in-depth interviews (IDI) or one of four virtual focus groups (FG1–FG4). To protect confidentiality, we used letters rather than names. Each profile includes the respondent's data collection method, geographic area, years of experience, role, and a representative quote selected to capture something distinctive about their perspective or practice.

Idaho

Respondent A

Data Collection	In-Depth Interview
Years in HVAC	11
Role	Owner
Company Size	Small
Product Focus	Variable-speed ducted (JCI, Bosch)

> *"I'll give them both bids and then I'll explain that with electric backup, that's the most expensive type; and propane and natural gas is next in expense. My approach is to present all options as honestly as possible and then give them my recommendation of what I would do if it were my home."*
>
> —IDI, Idaho, 11 years' experience

Respondent B

Data Collection	In-Depth Interview
Years in HVAC	23
Role	Estimator/Owner
Company Size	Medium (primarily commercial)
Product Focus	York ducted (two-stage); views ductless as difficult to service

> *"The forced air units are like working on an 80s Ford pickup. New mini splits you can't even troubleshoot. Not simple. In theory they are awesome, but I try to steer people away based on my experience of working on them and seeing how many service calls we get."*
>
> —IDI, Idaho, 23 years' experience

Respondent C

Data Collection	Focus Group 2 (Feb 2)
Years in HVAC	2.5–3
Role	Co-owner/Sales/Scheduling
Company Size	Small (3 people)
Product Focus	Seville/Midea inverter-driven; geothermal common in area

> *"My husband's a journeyman—he does the service work and installs. I do the scheduling, go look at the jobs, estimate, sales."*
>
> —Focus Group 2, Idaho, ~3 years' experience

Respondent D

Data Collection	Focus Group 4 (Feb 12)
Years in HVAC	30+
Role	Owner
Company Size	Small
Product Focus	Ductless-focused (Mitsubishi); tight utility partnerships for rebates

> *"…we have a lot of rural areas that don't have natural gas. They have to use propane. So propane's very expensive. I'm able to offer a dual fuel and save them quite a bit of money. But with natural gas being so cheap, it's a hard sell on that one."*
>
> —Focus Group 4, Idaho/Wyoming, 30+ years' experience

Montana

Respondent E

Data Collection	In-Depth Interview
Years in HVAC	31
Role	Co-owner
Company Size	Small-medium
Product Focus	Primarily two-stage ducted (Goodman/EverRest); some Bosch variable-speed

> *"Especially when someone might be on propane and they want to add A/C—we could add a heat pump instead and you'll get the best of both worlds. You certainly don't need to use the propane as much. But it's substantially more to get a heat pump than just straight up A/C."*
>
> —IDI, Montana, 31 years' experience

Respondent F

Data Collection	Focus Group 1 (Jan 27)
Years in HVAC	25
Role	Owner
Company Size	Medium (~20 employees)
Product Focus	Full range: single-stage through variable-speed and geothermal; Trane primary

> *"Our industry is short—just like most trades, they're short talent and technicians by a large amount. And it's only growing. Your qualified technicians to be able to do these systems right is shrinking. Technology is increasing and getting more complex."*
>
> —Focus Group 1, Montana, 25 years' experience

Washington

Respondent G

Data Collection	In-Depth Interview
Years in HVAC	40+
Role	Sales (formerly many-hatted)
Company Size	Medium-large
Product Focus	Trane + Mitsubishi; mostly two-stage ducted; 60% dual fuel

> *"All the brands are starting to come into cold climate options and performance. Yesterday I installed a system without backup heat—our climate and the performance of the equipment made me comfortable doing that."*
>
> —IDI, Western Washington, 40+ year's experience

Respondent H

Data Collection	In-Depth Interview
Years in HVAC	16
Role	Owner
Company Size	Small (sole proprietor)
Product Focus	RUUD ducted, Daikin ductless; enthusiastic about side-discharge inverter units

> *"It will be able to run at 100 percent efficiency to negative 10 degrees. And then even after that it goes like 90 percent, 80 percent on down. Some of these brands are kind of backing and guaranteeing that you can use our unit without emergency backup heat."*
>
> —IDI, Washington, 16 years' experience

Respondent I

Data Collection	Focus Group 1 (Jan 27)

Years in HVAC	5
Role	Sales/Project Manager
Company Size	Medium
Product Focus	~70% inverter-driven; utility rebate programs drive equipment selection

> *"Up here, we rarely see temperatures overnight even below like the mid-twenties. In most cases, the extended capacity heat pumps will work just fine. Unless we're required to—one of the municipalities here for their rebate program requires backup heat as part of the installation to qualify for the rebate. Which I've always thought was a goofy way to look at it."*
>
> —Focus Group 1, Washington, 5 years' experience

Respondent J

Data Collection	Focus Group 3 (Feb 10)
Years in HVAC	30+
Role	Long-term employee
Company Size	Medium
Product Focus	Trane ducted + Mitsubishi ductless; room-by-room Manual J on every job

> *"15* percent *of it's the equipment, 70* percent *the installation. If it's not installed right—if the charge isn't proper, the airflow's not right, static pressure—it's not good. And that's the difference between contractors. Some do a really good job on that end and some don't. And the client has no idea."*
>
> —Focus Group 3, Western Washington, 30+ years experience

Oregon (Portland Metro)

Respondent K

Data Collection	In-Depth Interview
Years in HVAC	18

Role	Estimator/Salesperson/Owner
Company Size	Medium (residential + commercial)
Product Focus	Single-stage and gas splits are bulk of work; variable-speed for higher-end; Lennox

> *"The majority of our customers are still single-stage heat pumps, really. I would say that's between single-stage heat pumps and then your conventional split system A/C-only gas heat—those are hands down the two primary, the biggest bulk of work."*
>
> —IDI, Portland, OR, 18 years' experience

Respondent L

Data Collection	Focus Group 4 (Feb 12)
Years in HVAC	15+
Role	Estimator
Company Size	Large (Anton Heating)
Product Focus	Carrier variable-speed + side-discharge; Mitsubishi hyper heat for older homes

> *"I do a lot of older retrofit homes in Portland. A lot of houses built in the early twenties, really bad insulation, leaky homes. Most of them have gas furnaces and so we'll just add a heat pump onto those. But if the homeowner wants to get away from gas altogether, then we'll do the hyper heat."*
>
> —Focus Group 4, Portland, OR, 15 years' experience

Respondent M

Data Collection	Focus Group 4 (Feb 12)
Years in HVAC	12
Role	Owner/Sales
Company Size	Small-medium
Product Focus	Mitsubishi cold-climate ducted; 0% backup heat

> *"We had three or four calls out of several hundred installs. But they were ones that I looked back on and they were big, drafty, uninsulated houses and I still let them install a heat pump. I kind of draw a line with people—if they're not willing to insulate, I won't do a heat pump on their house."*
>
> —Focus Group 4, Portland, OR, 12 years' experience

Respondent N

Data Collection	Focus Group 4 (Feb 12)
Years in HVAC	20
Role	Solo contractor
Company Size	Solo
Product Focus	Goodman ducted, Daikin ductless; budget segment; always includes strip heat

> *"I recently got my contractor license, I've had it for about a year. It's pretty much by myself, so I try to do the sales and install everything just by myself. I gotta show up looking clean professionally, trying to sell and then show up and do the install by myself also."*
>
> —Focus Group 4, Portland, OR, 20 years' experience

Respondent O

Data Collection	Focus Group 4 (Feb 12)
Years in HVAC	6
Role	Many-hatted (sales, ordering, research, troubleshooting)
Company Size	Small
Product Focus	Zenner, AirWash, Mitsubishi; sustainability/living building certified niche

> *"I wear a few hats. I don't do the installations, but I do some of the sales. I do a lot of ordering, some of the research on the equipment. I work directly with clients for troubleshooting and setting up appointments. Ordering parts, filters, sourcing stuff—along with the million other things."*
>
> —Focus Group 4, Portland& Gresham, OR, 6 years' experience

Respondent P

Data Collection	Focus Group 3 (Feb 10)
Geography	Oregon (Portland area)
Years in HVAC	20
Role	Owner
Company Size	Medium
Product Focus	Mitsubishi for ducted; no unitary

> *"We did not think we needed to install cold climate where we are, because most of the time it's pretty mild. But we've had some of those winters—probably five years ago. We had so many phone calls that we were just like, forget it, we're not doing it anymore. We very rarely install standard equipment any longer because of that."*
>
> —Focus Group 3, Portland, OR metro area, 20 years' experience

Respondent Q

Data Collection	Focus Group 1 (Jan 27)
Geography	Portland, OR metro area
Years in HVAC	~3
Role	Sales/Customer Service
Company Size	Medium
Product Focus	Extended capacity systems to avoid backup heat; newer to industry

> *"If I have full heat output all the way down to five degrees, knowing then that the system properly sized is going to be able to give heat output that's gonna hit all their needs—I feel comfortable using something that I think will keep up with the temperatures that we hit here without having to worry about backup heat."*
>
> —Focus Group 1, Portland, OR area, ~3 years' experience

Oregon (Outside Portland)

Respondent R

Data Collection	In-Depth Interview
Geography	Oregon (Salem/Portland area)
Years in HVAC	~10
Role	Installer/Electrician/Owner
Company Size	Small
Product Focus	Variable-speed/cold-climate focus; cross-trained electrician; views strip heat as obsolete

> *"I have experience as an electrician—I know what I look for. I dislike companies that pressure me to be a contract dealer. The ones that don't make me sign a contract to sell—those are the ones I work with."*
>
> —IDI, Western Oregon, 10 years' experience

Respondent S

Data Collection	In-Depth Interview
Years in HVAC	8
Role	Many-hatted
Company Size	Medium
Product Focus	Bryant/Carrier ducted; Bosch for standalone value;

> *"Offering too many options is counterproductive. I deliberately limit proposals to two options—more choices overwhelm customers and slow decisions."*
>
> —IDI, Oregon (Eugene–Salem), 8 years' experience

Respondent T

Data Collection	In-Depth Interview

Geography	Oregon (Central)
Years in HVAC	5
Role	Installer/Duct system designer
Company Size	Medium
Product Focus	More single/two-stage than variable-speed; American Standard and Hisense; new construction focus

> *"If it was executed well, yes—but Daikin tried this a few years ago and the test was very, very hard to run. If you had perfect conditions outside, it took about two hours. In residential you do not have that much time to run a diagnostic at the very end."*
>
> —IDI, Central Oregon, 5 years' experience

Respondent U

Data Collection	In-Depth Interview
Geography	Oregon (Mt. Hood area)
Years in HVAC	~5
Role	Manager
Company Size	Small
Product Focus	All inverter; 90% ductless (Daikin); RUUD and Hisense for ducted

> *"We didn't want to include strip heat for a while, but giving the customer peace of mind—because if we do have a callback during an ice storm, I'd rather have that in there versus leaving them without a backup option."*
>
> —IDI, Oregon (Mt. Hood area), ~5 years experience

Multi-State (WA/OR)

Respondent V

Data Collection	Focus Group 1 (Jan 27)
Geography	Washington/Oregon
Years in HVAC	20
Role	Owner
Company Size	Medium (~15–20 employees)
Product Focus	Mix: single-stage for price-sensitive new construction; inverter-driven for retrofit/custom

> *“We have kind of a mix. Residential new construction, there’s a portion that’s very price conscious, so it’s gonna be more of a single-stage, standard heat pump, maybe bare minimum efficiency. We definitely have a market in the retrofit and more custom residential that is gonna be looking at that inverter-driven, multi-stage, variable speed.”*
>
> —Focus Group 1, Washington/Oregon, 20 years

Appendix C: Focus Group Discussion Guide

NEEA HVAC Research: Installation and Sales Professionals

Focus Group Discussion Guide [Final]

Background

NEEA's **Advanced Heat Pump (AHP)** program seeks to increase the efficiency of installed heat pumps by promoting efficiency-boosting improvements. For this research, NEEA is focused on connected commissioning, cold climate capable heat pumps, and minimizing auxiliary/supplemental electric resistance heat. NEEA's **Dual-Fuel Residential HVAC** program aims to collaborate with manufacturers, distributors, and utilities to build awareness and communicate the value of optimally designed dual-fuel systems. This research will inform assumptions about current practices of selecting, designing, and installing dual-fuel systems.

Table 1: Overview of Data Collection Activity

Descriptor	This Instrument
Instrument Type	Focus Group Discussion Guide
Estimated Time to Complete	60–90-minute group discussions (45-minute IDI conversion if needed)
Population Description	General population of HVAC professionals involved in sales, specification, installation of residential HVAC systems
Population Size	Approximately 2,200 records, true qualified population unknown
Completion Goal(s)	50-60 contacts recruited into 5-6 group interviews
Call List Source and Date	Evergreen Economics (November 2025)
Type of Sampling	Mix of I-5, East of the Cascades
Fielding Firm	Evergreen Economics

This is a single integrated discussion guide suitable for mixed role focus groups (sales, installers, owners). The guide progresses from common foundation questions through natural branching based on contractor expertise. These groups will be hosted on a virtual format (Sago platform), which allows for observers.

Key Definitions for This Discussion

Use these to keep conversation on track. If contractors use terms differently, gently redirect.

Heat Pump:	Central ducted systems only (not ductless). Can be single-speed, two-stage, or variable-speed.
Variable-Speed Heat Pump:	Systems with an inverter-driven compressor that modulates capacity. This is our primary focus for the AHP program.
Dual-Fuel System:	A single centrally ducted system with a heat pump and gas furnace. The furnace acts as the air handler for the heat pump even when the furnace is not providing heat. The furnace provides heat when temperatures drop below the switchover point.
Supplemental/Auxiliary/Backup Heat:	We use these terms interchangeably. Electric resistance (strip heat) that operates with the heat pump for additional capacity during cold weather, defrost, or setback recovery, or to provide heat at temperatures too low for the heat pump to operate.
Emergency Heat:	A source of heat other than the heat pump that is used if the heat pump fails. Emergency heat is typically supplied by the supplementary / auxiliary / backup heat source.
Switchover (or Crossover) Temperature:	For dual fuel: the outdoor temperature below which the system switches from heat pump to gas furnace.
Electric Resistance Lockout Temperature:	For electric systems: the outdoor temperature above which electric resistance is prevented from operating.
Cold Climate Heat Pump:	Extended-capacity heat pumps designed for better performance at low temperatures. Essentially always variable-speed/inverter-driven.

Section A: Opening & Context

Duration: ~10 minutes | Build rapport, establish context

Thank you for joining us. We're conducting independent research to understand how HVAC contractors approach sales, design, and installation of heat pumps. We want honest feedback about what works, what doesn't, and what's challenging. This is confidential and there are no right answers.

Q1) Let’s start by getting to know each other a little bit. Please introduce yourself and let us know how long you have been working in residential HVAC and what geographic area you serve.

Q2) And how would you describe yourself? Are you an owner, a salesperson, an installer, a manager, or “many hatted”?

ROUND-ROBIN: Go in order, keep brief. Goal: Get everyone's voice and context.

Q3) Thinking about the HVAC market, what's changed most over the last 5 years?

Open discussion. Listen for things to build on later.

Section B: Heat Pump Types & Features

Duration: 10-12 minutes | Establish foundational understanding of familiarity with different heat pump options

Q4) Let’s start by talking about "heat pumps." What types are you most familiar with or install most often?

Listen for: Single-speed, two-stage, variable-speed/inverter terminology. Probe if needed: "Are we talking about systems with inverter-driven compressors?"

Q5) When I say *"cold climate heat pump"* or *"extended capacity heat pump,"* what's the first thing that comes to mind? What's different about them compared to regular heat pumps?

Probe: When would you choose one vs. a standard heat pump?

Section C: Supplemental Heat Pump Practices

Duration: 15-18 minutes | Note this focus is on electric-only systems (not dual fuel)

FRAMING: "Let's talk about all-electric heat pump systems—not dual fuel—and how you approach backup heat."

Q6) When you install heat pumps, what percentage include electric-strip backup heat?

Follow-up: "Has anyone installed a system WITHOUT backup heat? What made you comfortable doing that?"

Q7) For systems with electric-strip backup, how do you size the strip heat? How do you balance reliance on the compressor versus minimizing electric resistance heating?

Q8) When you talk to customers, how do you explain backup heat—if at all?

Probe: Have you had callbacks or complaints about how backup heat operates?

Q9) Quick show of hands: how many of you program backup heat control settings? [If yes] When you set up controls, what temperatures matter most—backup heat lockout, compressor lockout, or something else?

For our purposes compressor lockout is the outdoor temperature below which the heat pump is prevented from operating. Listen for differences in approach. Ask for stories when settings vary.

Q10) What would it take for you to install a heat pump with NO electric backup heat?

Listen for: Callbacks? Customer complaints? Need for different equipment? More customer education?

Section D: Dual-Fuel Systems

Duration: 10-12 minutes | Focus on heat pump + gas furnace combinations

FRAMING: "Now let's talk about dual-fuel—a single centrally ducted system with a heat pump and gas furnace."

Q11) How often do you recommend dual-fuel systems, and what portion of customers take that recommendation?

Probe: What drives customer decisions—why do they move forward or not?

Q12) When you size a heat pump in a dual-fuel system, what drives your sizing decision—cooling load, heating load, ductwork capacity, or something else?

Listen for whether they size differently than all-electric scenarios.

Q13) How do you determine the switchover temperature, and how do you explain it to customers?

Section E: System Selection & Sizing

Duration: 12-15 minutes | How contractors approach recommendations and design

Q14) Walk me through your typical approach to selecting a system type (or configuration, we aren't talking about specific manufacturer here)—what questions do you ask and what options do you present?

Note that this is general, we'll get into how it might differ by type, size, feature set in a minute.

Listen and probe for: Choice architecture. What options do they present? When does price come up?

In what scenarios would you really recommend a variable speed system (systems with an inverter-driven compressor that modulates capacity)?

Okay, let's pivot to talk a little about strategies for sizing.

Q15) How would you approach sizing for a typical heat pump installation?

Listen for tools or approaches: Manual J, software, rules of thumb, something else?

If needed: describe a typical job (type of home, location, existing equipment, customer)

Does this differ for variable speed systems (systems with an inverter-driven compressor that modulates capacity.)

Q16) And cold climate heat pumps? How might those systems change your approach to sizing?

Listen and probe to encourage them to walk through your design decisions—what design temperature do you use, and how do you decide about backup heat?

Q17) How do you decide what options to show the homeowner? And what have you observed about how they make their final decision? What framing seems to work best with homeowners?

Listen for: Is it "customer chooses" or "you frame what they see"? Where do they get their knowledge?

Section F: Commissioning Practices

Duration: 10-15 minutes | Post-installation practices

Q18) Show of hands: who is involved in commissioning new systems?   Walk me through your typical commissioning approach to a new heat pump system—after install, before the customer takes over.

Probe: Do you use a checklist? What do you test—refrigerant, airflow, static pressure, controls?

Q19) What tools or equipment does your company use for commissioning? Anyone used connected or smart tools that link to your phone or tablet?

If yes: What did you like? Anything annoying?

Imagine a commissioning tool that works like this: The heat pump has built-in sensors. You use an app on your phone. The app walks you through steps: Check charge. Check airflow. Check controls. At the end, instead of a bunch of numbers, it tells you: "Charge: OK. Airflow: OK. Controls: OK." Like a thumbs-up or checkmark. Then it generates a report you can give the customer or utility. That's what some manufacturers are working on.

Q20) What would you think about using something like this—would it be helpful? What features would make it valuable to YOU?

Concept: App walks through steps, sensors provide pass/fail feedback, generates customer report. (Would customers appreciate? Any concerns about something like this?)

Section G: Challenges & Closing

Duration: ~5 minutes

Q21) When things don't go well with a heat pump system, what's the most common issue?

Q22) If a program offered support for heat pump selection or commissioning, what would be most valuable to YOU? Why?

Q23) Is there anything we didn't ask about that we should have? Any frustrations or opportunities you see in this market?

Thank you! Your input has been really helpful. [Confirm incentive details and next steps]