ETA
EFFICIENT TECHNOLOGY ACCELERATOR

Commercial RTU 2025 State of the Market Report

Prepared by Cadmus for ETA
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Definition of Terms and Acronyms

The following acronyms are used in this report.

Table 1. Report Acronyms

Acronym or Abbreviation	Definition
CEE	Center for Energy and Environment
COU	Consumer-owned utility
DER	Division of Energy Resources
ERV	Energy recovery ventilator
ETA	Efficient Technology Accelerator
HP	Heat pump
HVAC	Heating, ventilation, and air conditioning
IOU	Investor-owned utility
MPI	Market progress indicator
RTU	Rooftop unit

EXECUTIVE SUMMARY

Background and Methodology

The Next Gen RTU initiative is an effort under Minnesota's Efficient Technology Accelerator (ETA) that promotes the adoption of high-efficiency rooftop units (RTUs), or next gen RTUs, which provide heating and cooling to commercial buildings. Two technologies offer promising capabilities to increase RTU efficiency and are included in the initiative's focus:

- **Dual fuel heat pump RTUs**, which can be viewed as hybrid versions of or alternatives to standard gas or electric units
- **Energy recovery ventilators (ERVs)**, which can be leveraged as complementary components for any RTU fuel type

The team conducted in-depth market actor interviews to understand how to increase adoption of dual fuel heat pump RTUs and ERVs.

The goal of this research was to examine the current commercial HVAC market — particularly around stocking practices, purchasing processes, and leverage points for incentives — to track market progress and better understand how to increase adoption of dual fuel heat pump RTUs and ERVs. This research was also intended to determine market actors' level of familiarity with each technology and perspectives on barriers, opportunities, and appropriate applications. To achieve these goals, the ETA team worked with Cadmus to conduct in-depth interviews and surveys with market actors at different points in the supply chain (e.g., manufacturers, distributors, contractors, and building owners and facility managers) and with subject-matter experts to gather a breadth of perspectives on the commercial HVAC market.

To learn more about the current market and trends over time, Cadmus undertook the following data collection efforts in 2025. Market actors served geographic areas across the state, but were primarily concentrated in the Twin Cities metro area.

- Interviews with three commercial HVAC **manufacturers** in July and August
- Interviews with three commercial HVAC **distributors** in July and August
- Interviews with 13 commercial HVAC **contractors** from September through November, and an online survey of an additional 12 commercial HVAC **contractors** in November who have a mechanical bond in Minnesota, for a total of 25 commercial HVAC contractors
- Online survey of 65 **building owners and facility managers** in December
- In-depth interviews with two **HVAC experts**, one from a nonprofit focused on market transformations to increase the availability and affordability of energy efficient technologies, and the other expert is a channel manager for an investor-owned (gas and electric) utility

Key Findings

Key findings from this research reflect perspectives gathered across the commercial HVAC supply chain, including manufacturers, distributors, contractors, building owners, and subject-matter experts. Findings are based on interviews and surveys conducted in 2025 and describe prevailing market conditions, levels of familiarity, perceptions of technology performance and value, and factors influencing equipment availability, purchasing decisions, and adoption.

While individual findings vary by market actor and technology, the themes summarized highlight patterns observed across the data and provide context for understanding current barriers, opportunities, and leverage points for increasing adoption of dual fuel heat pump RTUs and ERVs in Minnesota.

Awareness

- Manufacturers and distributors noted **low awareness among contractors and customers** due to few interactions with dual fuel heat pump RTUs and ERVs.
- Building owners confirmed **awareness of efficient technologies is low. Owners also reported relying** heavily on contractor recommendations (66%) when selecting RTU equipment, yet 60% (n=42) said dual fuel heat pump RTUs and ERVs (41%) are rarely included in contractor bids.
- Contractor respondents reported **familiarity with dual fuel heat pump RTUs and ERVs and confidence in their ability to install them if requested (95% for dual fuel heat pump RTUs),** but **do not promote these nor consider either product important to their business models.**

Technology perceptions

- **Contractors and manufacturers expressed skepticism about dual fuel heat pump RTUs' heating performance and value proposition in Minnesota's cold climate**. Distributors tended to hold somewhat more favorable views of dual fuel heat pump RTUs than manufacturers.
- Market actors noted that **ERV technology can provide value in some applications but may not be universally applicable.** Contractors and experts described situations where ERVs can provide meaningful benefits, particularly in densely occupied buildings and settings that require reliable ventilation in cold weather. Distributors agreed that ERVs should be considered selectively rather than as a default add-on.
- Contractors expressed a **preference for RTUs with integrated ERVs over bolt-on ERVs.** Promotion and recent sales were limited for both, especially for bolt-on configurations.

Market conditions and demand

- Market actors noted that Minnesota's commercial RTU market continues to be shaped by standard equipment and **decision-making that prioritizes minimizing upfront costs and avoiding operational disruption**.
- Contractors reported RTU installations are **typically like-for-like replacements**, rather than promoting efficient alternatives that customers did not specifically request.

- Contractors and experts noted that **demand for dual fuel heat pump RTUs has not changed much in the past two years** and were mildly optimistic about increasing market presence in the next five years. Distributors emphasized that **adoption is constrained primarily by customer demand,** which in turn affects stocking practices and lead times.
- HVAC manufacturers expressed greater skepticism about ERV adoption than other actors, citing cost and installation challenges, while experts noted that **demand has remained largely flat.**
- Despite these mixed perceptions, many respondents across groups expressed cautious optimism that adoption could increase over time as market signals shift, such as **increased awareness, education, and incentives.**

Stocking Practices

- **Manufacturers reported limited visibility into distributors' stocking practices, pricing structures, and procurement processes.** In contrast, distributors and SMEs indicated that dual fuel heat pump RTUs and ERVs are generally not stocked, with availability driven primarily by contractor and customer demand. SMEs further noted that **ERVs in particular are typically procured as "special order" items rather than maintained as standing inventory**.
- Two distributors reported that the primary driver of stocking practices is demand, and due to their perceived lack of demand, they **do not stock dual fuel heat pump RTUs or bolt-on or integrated ERVs.**

Purchasing Processes

These purchasing process findings primarily reflect replacement pathways (including both planned replacements and replace-on-failure situations), which dominated market actor inputs. Interviewees noted that planned projects (including new construction or full RTU replacement) are generally more compatible with special-order equipment configurations — particularly integrated ERVs — while replace-on-failure situations tend to favor readily available equipment.

- Dual fuel heat pump RTUs and ERVs are **special orders requiring coordination among manufacturers, distributors, and contractors,** as well as specialized installation equipment including cranes for transportation and installation.
- Contractors surveyed or interviewed said they **sourced equipment through distributors or wholesalers.** For those who purchased equipment from multiple sources, only two stated that manufacturer representatives were their main source for procuring equipment.
- Building owners reported that they **rely heavily on contractor recommendations when selecting RTU equipment (65%),** highlighting the important role contractors play in shaping equipment choices. Building owners reported that **fewer than one-quarter of contractor bids include a dual fuel heat pump RTU or ERV**.
- When evaluating options, **building owners (n=65) cited primary decision factors when selecting new equipment to minimize first cost (26%), lowering energy bills (19%), and improving system reliability (15%)**.

Availability and Lead Times

- Contractors estimated lead times for dual fuel heat pump RTUs and ERVs ranging from **one to two weeks to three to six months;** one expert estimated ERV lead times at roughly **six to eight weeks.** Respondents generally indicated that these lead times are less of a barrier for planned projects (including new construction or scheduled replacements) but can pose challenges in time-sensitive replace-on-failure situations.
- Distributors stated that they **do not stock dual fuel heat pump RTUs or ERVs**. Customers who request a dual fuel heat pump RTU or an ERV must often wait about **two months after placing an order**. Interviewees noted that these lead times **reflect broader HVAC market conditions** and are not unique to dual fuel heat pump RTUs or ERVs.
- Building owners' equipment replacement decisions are generally based on **replacing upon or approaching failure (45%);** only 5% reported replacing RTUs on a schedule (n=65).

Incentive Leverage Points

- Across the supply chain, **cost emerged as a consistent barrier.**
- Manufacturers identified **high equipment cost as the primary barrier to increased adoption** of dual fuel heat pump RTUs and ERVs. The cost of this equipment is prohibitive for consumers, resulting in low demand and limiting manufacturers' incentive to expand production.
- Most **building owners (86%) stated that they would be either *very likely* or *somewhat likely* to use a utility rebate** that would refund them $1,000 for purchasing high-efficiency RTU equipment (n=65).
- Contractors noted potential benefits of **both downstream and midstream incentive programs.**
- **Manufacturers and distributors said that downstream was the most effective** point in the supply chain to motivate increased adoption of dual fuel heat pump RTUs and ERVs.
- Experts suggested that **midstream incentives may have the potential to increase adoption, particularly given low awareness and the opportunity to provide market education.**
- Contractors reported **limited familiarity with customers' utility rates (56%, n=18 said they were *somewhat* familiar),** reducing their ability to communicate potential bill savings associated with more efficient RTU technologies.

Conclusions

These conclusions primarily reflect time-sensitive replacement and planned market dynamics and decision-making. Planned projects may include new construction or full RTU replacement. Dynamics in planned situations may differ from time-sensitive emergency replacements, particularly with respect to equipment availability, configuration, and lead-time constraints.

1. **Familiarity with dual fuel heat pump RTUs and ERVs remains limited across multiple market actors**, particularly among contractors and consumers.

2. **Minnesota-based contractors do not promote dual fuel heat pump RTUs and ERVs nor view these technologies as important to their business models**. Contractors feel demand is driven by customers, though building owners indicate the contractors are a key leverage point. Building owner survey results suggest that contractors may underestimate customers' openness toward alternatives, as opposed to a strong desire for a like-for-like replacement.
3. **Many contractors remain skeptical of the heating capabilities of dual fuel heat pump RTUs relative to those of standard gas units,** driven largely by concerns about cold climate heating performance and economic value in Minnesota conditions.
4. **Demand for dual fuel heat pump RTUs and ERVs has remained largely unchanged over the past two years**, but there is some optimism for future growth.
5. **Market actors expressed mixed views on the value of dual fuel heat pump RTUs and ERVs**, questioning cost to benefit ratios.
6. **Because distributors do not stock dual fuel heat pump RTUs and ERVs, the typical lead time for these products is approximately one to two months**, which is more of a constraint for replace-on-failure situations than for planned projects.
7. **ERVs could be beneficial in specific applications,** especially those requiring a steady flow of fresh air.
8. **Manufacturers and distributors cited downstream as the point in the supply chain most likely to make an impact on market adoption**, whereas some experts and contractors saw more benefit in midstream programs.
9. **Contractors lack familiarity with customers' utility rates** and are missing opportunities to promote the potential of efficient technology to provide bill savings.

Recommendations

1. **Strengthen and refine ongoing contractor and customer awareness efforts** related to the benefits and capabilities of dual fuel heat pump RTUs.
2. **Enhance ongoing efforts to increase awareness and promotion of ERVs** and focus outreach on high-value applications and planned project pathways.
3. **Continue to coordinate with utilities and other market actors (e.g., manufacturers, distributors) on programs that support and incentivize next gen RTUs**, including pilot incentive designs and case studies.
4. **Continue to work with distributors to stock and increase the availability of next gen RTU technologies** to reduce lead times for replace-on-failure situations.
5. **Strengthen and streamline contractor-facing economic messaging to improve communications and interactions with customers at the point of sale on savings and payback**. Building owner survey findings indicate that customers are less motivated by like-for-like replacements than contractors may assume.

INTRODUCTION

Background

Rooftop units (RTUs) are a common heating, ventilation, and air conditioning (HVAC) system used in commercial buildings. RTUs are packaged systems that provide both heating and cooling and are typically installed as self-contained units serving individual zones or building areas. Despite their prevalence, the RTU market has evolved relatively slowly over the past several decades. While incremental improvements in RTU efficiency and controls have been introduced, adoption of higher-efficiency and advanced RTU configurations remains limited with conventional RTUs continuing to dominate commercial replacement and new construction projects.[1] Prior research identifies this disconnect between technical potential and market uptake as a key opportunity to improve energy efficiency and reduce emissions in the commercial building sector.[2]

High-efficiency RTU configurations, including dual fuel heat pump RTUs and RTUs equipped with energy recovery ventilators (ERVs), offer the potential to improve system efficiency, reduce energy use, and support improved ventilation and indoor air quality. However, adoption of these RTU options remains limited. Understanding current market conditions, supply chain dynamics, and decision-making processes across key market actors is important for identifying opportunities and strategic interventions to support broader adoption.

This report presents findings from market research conducted to support the Next Gen RTU initiative, Minnesota's market transformation effort to advance the adoption of high-performance RTUs. The research primarily reflects RTU replacement decisions in existing buildings, particularly replace-on-failure and end-of-life replacements, while also providing insights relevant to planned projects, including new construction and full RTU replacements. The research builds on prior market research, including the RTU Market Characterization report,[3] and provides updated insights on current market conditions, supply chain dynamics, and potential leverage points to support market transformation efforts.

Next Gen Rooftop Units

The Next Gen RTU Initiative was launched in 2024 under Minnesota's ETA to move the Minnesota commercial HVAC market toward greater adoption of energy efficient RTUs. The initiative was designed to improve the performance and adoption of energy efficient RTU technologies in response to increasing demand for energy efficient and sustainable building solutions. Through targeted strategic activities and collaborative partnerships, the effort's mission includes influencing commercial market standards to position next gen RTUs (including dual fuel heat pump RTUs and RTUs with ERVs) as a mainstream, preferred technology. By addressing market barriers and gaps, the

[1] Cadmus Group. August 21, 2025. Commercial Rooftop Units Market Characterization Report.

[2] Lawrence Berkeley National Laboratory. August 2024. Through the looking glass: Analyzing barriers to adoption of advanced rooftop unit controls through human-centered observational research.

[3] Cadeo Group. September 8, 2023. High-Performance RTU Market Characterization. https://www.etamn.org/sites/default/files/research-papers/Final%20RTU%20Market%20Characterization.pdf

program supports energy savings and emissions reduction goals contributing to long-term sustainability outcomes across the commercial building sector. The goal of the initiative is to make next gen RTUs widely available, a majority of market share, and encouraged by building code.[4]

The Next Gen RTU initiative is a statewide program under Minnesota's Efficient Technology Accelerator (ETA), a partnership funded by the state's participating investor-owned utilities (IOUs) and consumer-owned utilities (COUs), administered by the Minnesota Department of Commerce, Division of Energy Resources (DER), and implemented by Center for Energy and Environment (CEE).

Next Gen RTU Technology Focus

The Next Gen RTU initiative is primarily focused on improving the performance of commercial rooftop units through the adoption of two key energy savings technologies: dual fuel heat pump RTUs and ERVs. Importantly while ERVs are used with other types of systems, for the initiative and this report, when we reference ERVs, we are meaning ERVs bolted-on or integrated within RTUs.

Throughout this report, standard packaged RTUs are referenced as the baseline equipment against which market perceptions, purchasing practices, and adoption of dual fuel heat pump RTUs and ERVs are assessed. Standard packaged RTUs are defined as self-contained, factory-assembled HVAC single-cabinet units containing a compressor, condenser, evaporator coil, supply and return fans, filters, and controls, installed outdoors, typically on a roof curb or ground pad.

- **Dual fuel heat pump RTUs:** Packaged rooftop systems that heat primarily on a heat pump with auxiliary gas heat backup.
- **ERVs:** Both bolt-on units and factory-integrated models that exchange sensible and latent energy between exhaust and outdoor air to pre-condition ventilation air and reduce HVAC loads. ERVs may use a wheel or a membrane to transfer energy. Bolt-on ERVs are separate cabinets ducted to an RTU's outside-air and return-air paths and often have their own controls. Integrated RTUs with ERV units incorporate the ERV and controls into the same cabinet and ship as a single, unified system.

Next Gen RTU Market

While standard RTUs are widely available and familiar to market actors, higher efficiency technologies such as dual fuel heat pump RTUs and RTUs with integrated or bolt-on ERVs are less commonly specified, stocked, and installed. Adoption of these technologies depends on a range of factors, including cost, availability, familiarity, and coordination across market actors (e.g., manufacturers, distributors, contractors, and building owners). Even though ERVs have been on the market for years and dual fuel heat pump RTUs products were introduced more recently, adoption of both technologies remains low.

Previous research, including the High-Performance RTU Market Characterization report (Cadeo 2023), documented low levels of awareness of efficient RTU features. The report mapped the supply chain and identified areas where additional research could support interventions and market

[4] RTU Energy Savings and Market Evaluation Plan. https://www.etamn.org/sites/default/files/research-papers/RTU%20Savings%20and%20Eval%20Plan_Final%203.pdf

transformation efforts. That work highlighted the importance of understanding how equipment is stocked, specified, and purchased, as well as how different market actors influence technology adoption. The RTU State of the Market Report builds on this foundational research by providing updated insights into current market conditions and market actors' perspectives.

Research Goals and Scope

This report describes key market trends and insights for RTUs based on multiple primary data collection efforts. The ETA team contracted with Cadmus to conduct this research on behalf of the Next Gen RTU initiative. The purpose of the research was to provide deeper insight into the commercial HVAC market by examining specific market dynamics relevant to technologies falling under the Next Gen RTU product specifications.

The research goals were to gain a better understanding of the following market dynamics.

Table 2. Research goals

Market awareness and perceptions	Are market actors aware of these technologies? What experiences have market actors had with these technologies? What are market actors' perceptions of these technologies?
Stocking Practices	How frequently are next gen RTUs stocked? What factors influence distributors' stocking decisions?
ERV Purchasing Processes	How do contractors source ERVs? How are costs structured? How are products delivered?
Incentive Leverage Points	At which points in the supply chain (upstream manufacturer, midstream distributor, downstream contractor) would incentives have the greatest impact?

The research provides cross-sectional insights from key market actors, including manufacturers, distributors, contractors, and building owners, who represent different points along the commercial HVAC supply chain, as well as from subject-matter experts. This report is intended to support the Next Gen RTU initiative by documenting current market conditions, identifying areas of change over time, and informing market progress indicators used to guide strategy and gauge implementation results under the market transformation initiative.

Methods Overview

Cadmus conducted multiple primary data collection efforts to provide an updated picture of the commercial RTU market. These included in-depth interviews and two surveys.

Cadmus conducted **in-depth interviews** with the following market actors and experts.

- Manufacturers (n=3)
- Distributors (n=3)
- Contractors (n=13) who hold a mechanical contractor bond in Minnesota
- Subject-matter experts (n=2)

Cadmus conducted two **online surveys** with the following market actors.

- Commercial contractors (n=12) who hold a mechanical contractor bond in Minnesota. Survey respondents were distinct from the contractors interviewed; there was no overlap in participants.
- Building owners (n=65). For clarity, the term "building owners" is used and collectively refers to all respondents, including building owners, facility managers, engineers, and property managers (listed in Table 3) who participate in HVAC decision-making.

Table 3 presents the number and type of participants who provided information in surveys and interviews for this research.

Table 3. Number of Interviews and Surveys

Population	In-Depth interviews	Surveys	Total
Commercial Manufacturers	3	N/A	**3**
Commercial Distributors	3	N/A	**3**
Commercial Contractors	13	12	**25**
Subject Matter Experts	2	N/A	**2**
Building Owners	N/A	65	**65**

More detailed information about the methodology for each data collection effort, as well as the survey or interview instruments used are included in Appendix C: Detailed Methodology.

COMMERCIAL CONTRACTOR INSIGHTS

Background

Commercial HVAC contractors are an important component of the RTU market because they routinely influence which equipment options are presented, specified, and installed. Contractors work closely with distributors and manufacturers to source equipment and with building owners to provide project bids and scopes aligned with customer needs. Because many customers rely on contractor recommendations — particularly when replacements are time-sensitive — contractors' familiarity with and willingness to recommend Next Gen RTU options can shape adoption of technologies within the Next Gen RTU effort.

This section summarizes findings from a combination of in-depth interviews and an online survey of commercial HVAC contractors to capture detailed insights and broader qualitative perspectives on the commercial HVAC market, with a focus on dual fuel heat pump RTUs and ERVs. Initial data collection focused on conducting in-depth interviews with contractors, resulting in interviews with 13 contractors. A follow-up online survey was subsequently administered to expand the number of respondents and strengthen the quantitative basis for analysis. Twelve additional contractors participated in the survey.

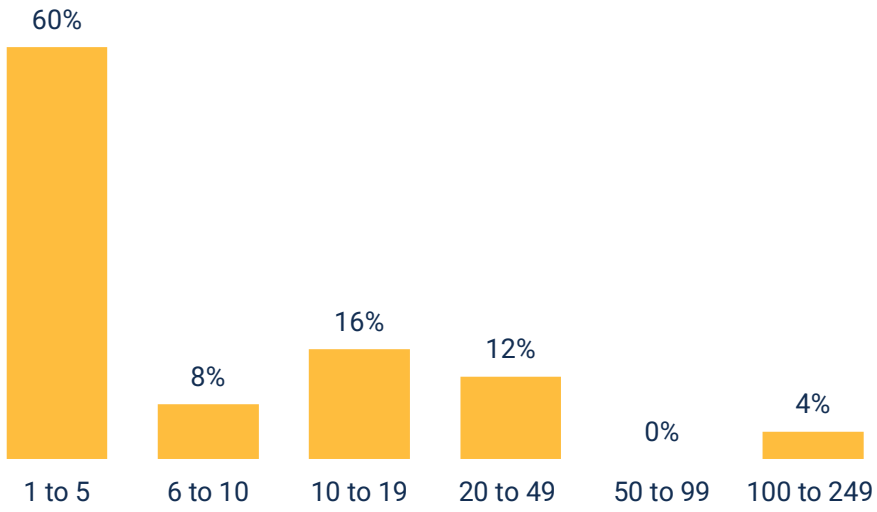
The interview and survey instruments covered overlapping topics, including contractor awareness, familiarity, perceptions, and sales experience related to dual fuel heat pump RTUs and ERVs. Quantitative responses from both data collection efforts were combined where we aligned questions to increase the overall sample size and provide context for descriptive findings. Qualitative data from interviews were analyzed separately and used to contextualize and expand on quantitative findings, providing deeper insights into areas of interest, including decision-making considerations, barriers, and other market dynamics.

Contractor Characteristics

For both the interviews and the survey, Cadmus recruited commercial HVAC contractors who stated that they installed or sold commercial RTUs in Minnesota and excluded from further analysis contractors who did not meet those criteria. Contractors were asked to provide information about their business characteristics, including the size of their company, the number of commercial RTUs they had installed in the past 12 months, and the percentage of these jobs that are planned versus unplanned. Most contractors (60%, n=15) worked for companies with five employees or fewer, and only one contractor worked for a company with over 100 employees (Figure 1). [5]

[5] HVAC Market Actor Profile. https://mn.gov/commerce-stat/energy/data-reports/187296_EcoMetric_HVAC-Market-Actor-Profile-Report_FINAL-Secure.pdf

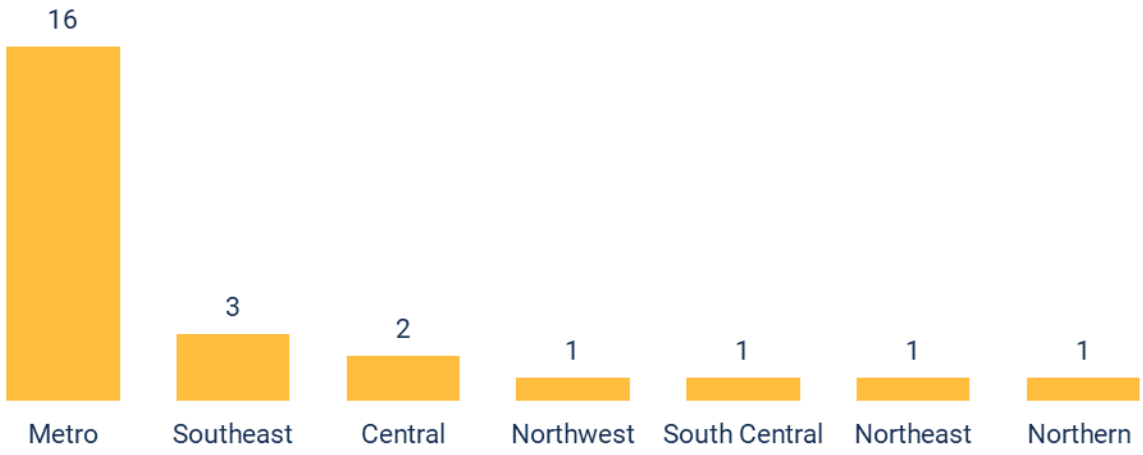
Figure 1. Number of Employees Who Work on Commercial HVAC (N=25)



Source: Commercial Contractor Interview Question. "Including yourself, how many employees at your company work on commercial HVAC?"

Contractors were primarily located in the metro region — 16 contractors (64%) reported a business zip code this region. However, contractors often served multiple areas, and at least one contractor reported serving each region of the state, suggesting that contractor service areas extend beyond the location of contractors' primary offices (Figure 2).

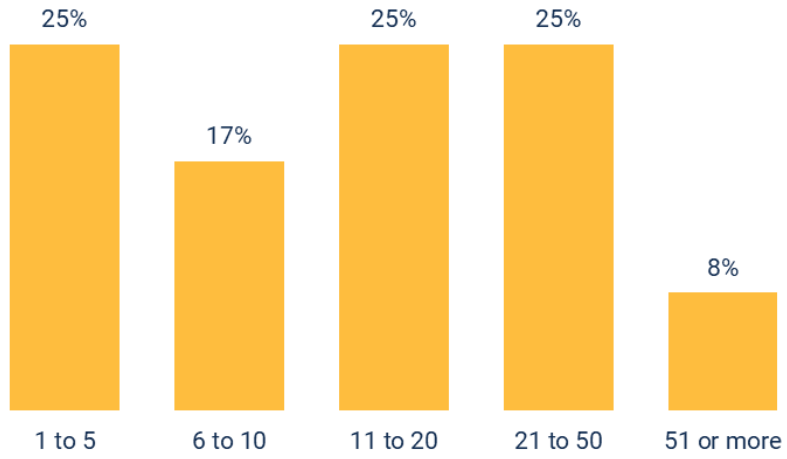
Figure 2. Regions Served by Contractors (N=25)



Source: Commercial Contractor Interview Question. "What region(s) of Minnesota do you serve?"

Contractors' estimates of the number of commercial RTUs their companies had installed over the past 12 months were somewhat evenly distributed across the response options. In total, most contractors indicated that they had installed fewer than 50 commercial RTUs, with only two contractors saying they had installed more than 50 (Figure 3).

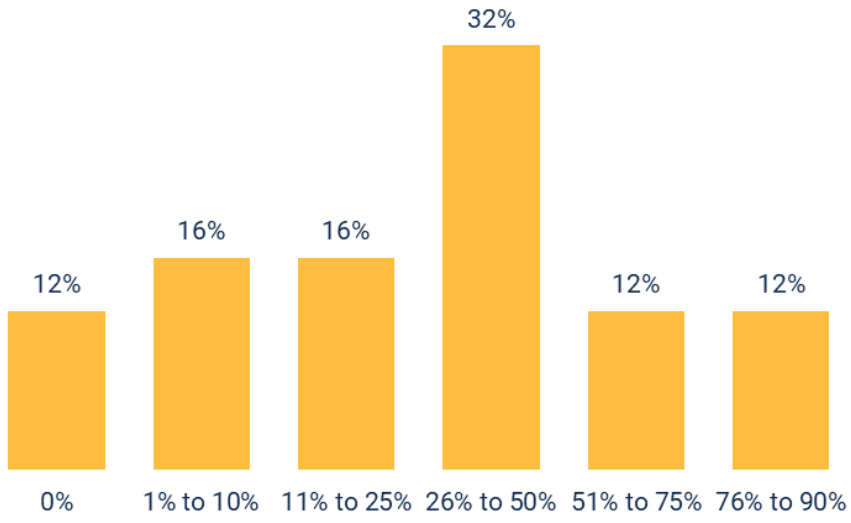
Figure 3. Number of Commercial Rooftop Installations (N=24)



Source: Commercial Contractor Interview Question. "Approximately how many commercial rooftop units did your company install within the past 12 months?"

No clear picture emerged regarding the number of RTU replacements that were planned versus unplanned (i.e., replace-on-failure). Eight contractors estimated that between 26% and 50% were planned (Figure 4), which was higher than expected. Research has shown that most commercial RTU replacements are unplanned; thus, the responses from this sample suggest that these contractors experience a better balance between planned and unplanned circumstances.[6]

Figure 4. Percentage of Planned HVAC Commercial Replacements (N=25)



Source: Commercial Contractor Interview Question. "Please estimate the percentage of your HVAC commercial replacements that are planned."

[6] HVAC Market Actor Profile. https://mn.gov/commerce-stat/energy/data-reports/187296_EcoMetric_HVAC-Market-Actor-Profile-Report_FINAL-Secure.pdf

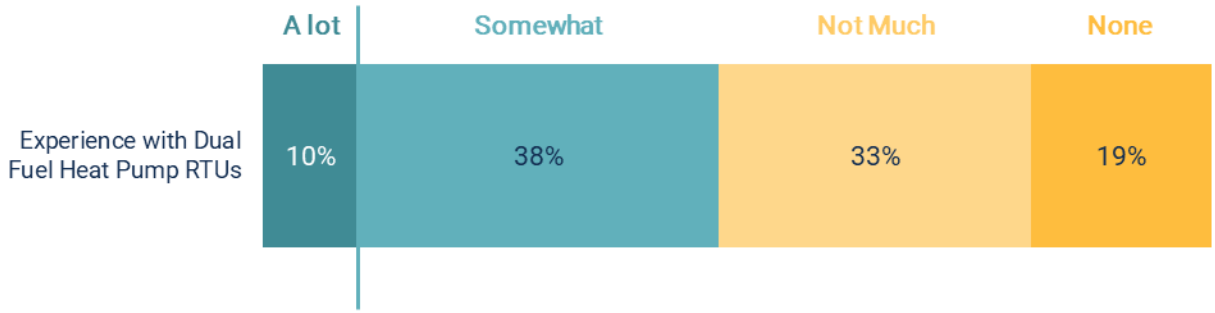
Dual Fuel Heat Pump RTUs

Cadmus asked contractors about their familiarity, experiences with, and attitudes toward dual fuel heat pump RTUs. Both survey and interview approaches were designed to provide a better understanding of contractors' business models and perceptions of the present and future commercial HVAC market.

Familiarity and Experiences with Dual Fuel Heat Pump RTUs

Few contractors reported extensive experience with dual fuel heat pump RTUs. While most respondents had heard of dual fuel heat pump RTUs and could offer opinions on the potential strengths and weaknesses of this technology, only 10% stated that they had *a lot* of experience with dual fuel heat pump RTUs and installed them regularly, whereas 19% stated they had neither investigated them nor installed any. Most respondents stated that they either had installed a few or had at least investigated them without having installed any (71%; Figure 5).

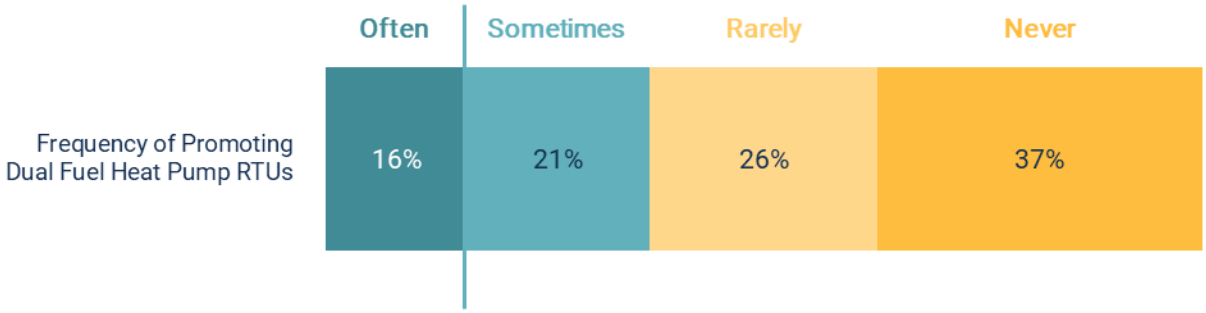
Figure 5. Experience with Dual Fuel Heat Pump RTUs (N=21)



Source: Commercial Contractor Interview Question. "How much experience do you have with dual fuel heat pump RTUs?"

When asked about promoting dual fuel heat pump RTUs, not a single respondent said that they *always* promote dual fuel heat pump RTUs, and only 16% said they promote them *often* (Figure 6). Most respondents stated that they *rarely* or *never* promote dual fuel heat pump RTUs (63%). Contractors noted that customers typically already know what they want, which is most often a gas-based heating unit, so the contractors have little motivation to try to persuade them to look at another option.

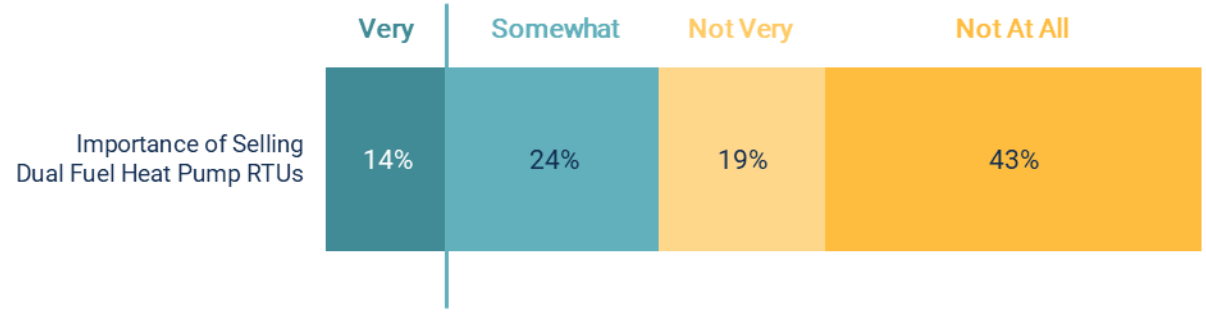
Figure 6. Promotion of Dual Fuel Heat Pump RTUs (N=19)



Source: Commercial Contractor Interview Question. "As part of your business strategy, how often do you or your company promote dual fuel heat pump RTUs as an option for your installation services?" An additional response option of *always* was offered but not selected by any respondents.

Contractors' lack of promotion was consistent with their stated perceptions of the importance of dual fuel heat pump RTUs for their business model, with only 14% reporting that selling dual fuel heat pump RTUs was very important to their business model. The focus for contractors, according to interview data, was to supply customers with what they wanted, which was generally a like-for-like replacement that was overwhelmingly a gas-fueled product (Figure 7).

Figure 7. Importance of Selling Dual Fuel Heat Pump RTUs (N=21)

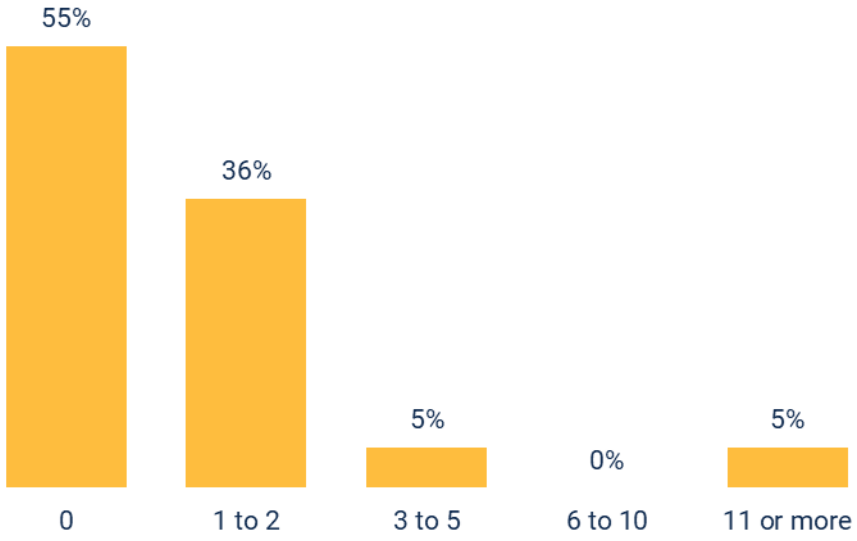


Source: Commercial Contractor Interview Question. "How important is selling dual fuel heat pump RTUs to your business model?" An additional response option of *essential* was offered but not selected by any respondents.

The lack of promotion and perceived importance of selling dual fuel heat pump RTUs are evident in dual fuel heat pump RTU sales volume. More than half of respondents stated that they had not installed a single dual fuel heat pump RTU over the past 12 months (55%). An additional eight respondents (36%) reported installing one or two units, while only one respondent (5%) reported installing three to five units and one respondent reported installing 11 or more units (Figure 8).

> *"Minnesota is very cold. In this climate we don't really promote Heat pumps.*

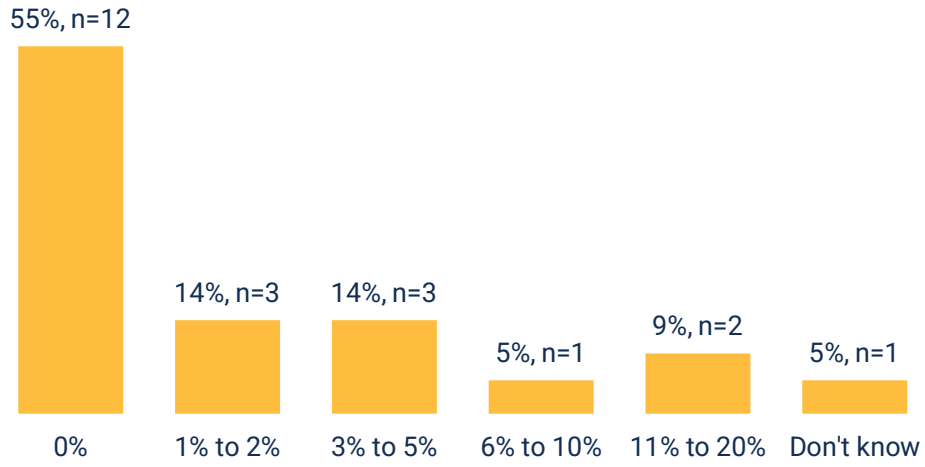
Figure 8. Volume of Dual Fuel Heat Pump RTU Installations (N=22)



Source: Commercial Contractor Interview Question. "Approximately how many dual fuel heat pump RTUs has your company installed within the past 12 months?"

Among the ten contractors who reported they installed at least one dual fuel heat pump RTU, three estimated that dual fuel heat pump RTU installations represented between 1% to 2% of their total RTU installations while three estimated dual fuel heat pump RTU installations were between 3% to 5%. The one contractor who noted installing 11 or more dual fuel heat pump RTUs, estimated 6–10% of current RTU installations were dual fuel heat pump RTUs. Two contractors estimated that dual fuel heat pump RTU installations are 11–20% of current RTU installations (Figure 9).

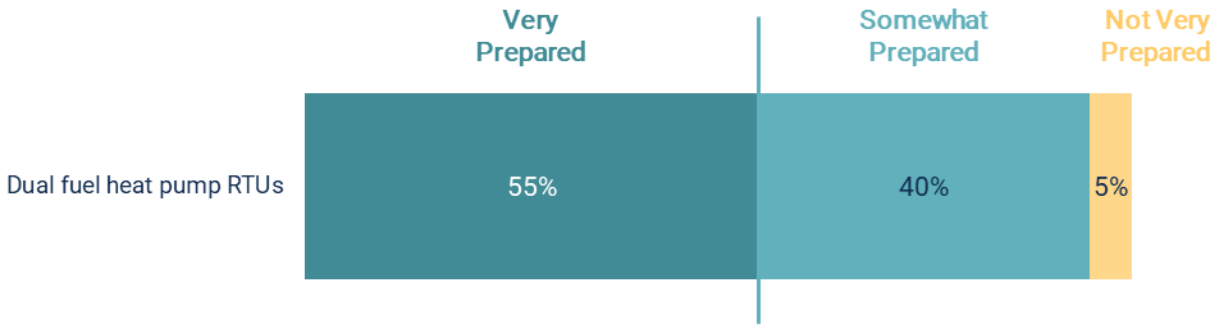
Figure 9. Dual Fuel Heat Pump RTU Installations of Total RTU Installations (N=22)



Source: Commercial Contractor Interview Question. "To your knowledge, what percentage of your current RTU installations are dual fuel heat pump RTUs?" An additional response option of *greater than 20%* was offered but not selected by any respondents.

Although sales and installations of dual fuel heat pump RTUs were low, most contractors (95%) said they were at least somewhat prepared to install one, and many contractors were very confident in their ability to do so (Figure 10).

Figure 10. Preparedness to Install Dual Fuel Heat Pump RTUs (N=20)



Source: Commercial Contractor Interview Question. "How prepared are you to install dual fuel heat pump RTUs if requested by a customer?" An additional response option of *not at all prepared* was offered but not selected by any respondents.

Only one contractor explicitly stated that they were not confident in their ability to install dual fuel heat pump RTUs.

> *Not much in demand but could easily install one if a customer wanted one.*
>
> *Never installed one, but prepared and confident to do so if needed.*

Expectations for and Perceptions of Dual Fuel Heat Pump RTUs

Cadmus asked contractors how the market for dual fuel heat pump RTUs has changed over the past two years, whether they expected the market to change in the next five years, and what factors would contribute to stagnation or change. Contractors also shared their opinions on the technology and what might hinder future adoption.

Contractor respondents' overall sentiment was that the market had not changed much. Of 21 contractors who were surveyed or interviewed, 13 stated that the market has stayed the same, while seven said it has increased "a little."

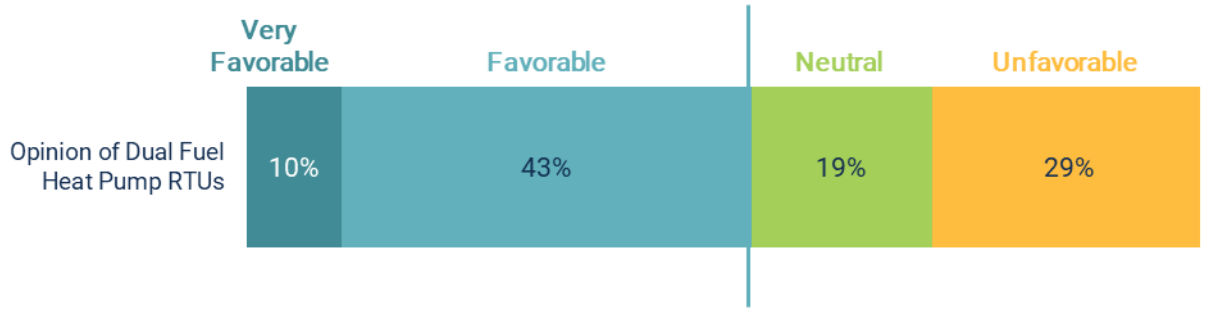
> *Demand has not changed at all. Customers have very low awareness of dual fuel heat pump RTUs so they never request them.*
>
> *No change. People are starting to talk about them, but the current price stops them from acting on it needed.*

Contractors were mildly optimistic about the potential for dual fuel heat pump RTUs to increase their market presence. Of the 12 contractors who offered projections, only one stated that they expect dual fuel heat pump RTUs to increase markedly, whereas eight stated that they expect them to "increase a little." Multiple contractors expressed concerns about the climate and how far the technology still is from providing adequate heating performance, and that any hope for market growth will depend on available rebates or incentives.

> *There will be a push for these if more incentives become available. My guess is by as much as 25%, but still far behind gas.*
>
> *The technology is not where it needs to be for this climate, but there might be a slight increase in the next five years as the technology gets better.*

Contractors' opinions about dual fuel heat pump RTUs were mixed. Slightly more than half of respondents (53%) held *favorable* or *very favorable* opinions, and the remaining respondents held *neutral* or *unfavorable* views of dual fuel heat pump RTUs (Figure 11).

Figure 11. Opinion of Dual Fuel Heat Pump RTUs (N=21)



Source: Commercial Contractor Interview Question. "What is your overall opinion of dual fuel heat pump RTUs as an RTU option?" An additional response option of *very unfavorable* was offered but not selected by any respondents.

The general sentiment regarding dual fuel heat pump RTUs was that their cooling capacity was on par with standard central air conditioning units; however, contractors were critical of their heating performance and capabilities. Many contractors expressed skepticism that the technology was at a point where it would make sense to install a dual fuel product that would likely have to rely heavily on gas and questioned why anyone would want to invest in a dual fuel heat pump RTU if that were the case.

> *"It is so cold in Minnesota that the gas would have to kick in often, which defeats the purpose of having electricity running your heat — why pay the premium?*

Contractors were asked what factors, if any, would prevent increased market adoption of dual fuel heat pump RTUs. Questions were posed as closed-end responses to survey respondents and open-ended responses to interviewees. Table 4 summarizes responses from both survey and interview data, as well as a tally of total mentions across both data collection efforts. Initial cost was the biggest concern, with 14 contractors highlighting that most customers are primarily concerned with keeping initial costs to a minimum. Other top concerns contractors mentioned included heating performance (n=8), customer awareness (n=4), and energy costs (n=4).

Table 4. Challenges Preventing Dual Fuel Heat Pump RTUs from Greater Market Share in Minnesota

Challenge	Survey (N=12)	Interviews (N=13)	Total Mentions
Initial cost	7	7	14 (56%)
Heating performance	6	2	8 (32%)
Energy costs	2	2	4 (16%)
Customer awareness	3	1	4 (16%)
Product availability	2	1	3 (12%)
Requires electrical upgrade	3	0	3 (12%)
Requires structural upgrade	2	0	2 (8%)
Maintenance required	1	1	2 (8%)
Lack of quality training/education	2	0	2 (8%)
Lack of qualified installers	2	0	2 (8%)
Cooling performance	1	0	1 (4%)

Note. Total mentions refer to the total number and percentage of all contractors (survey respondents and interviewees combined).

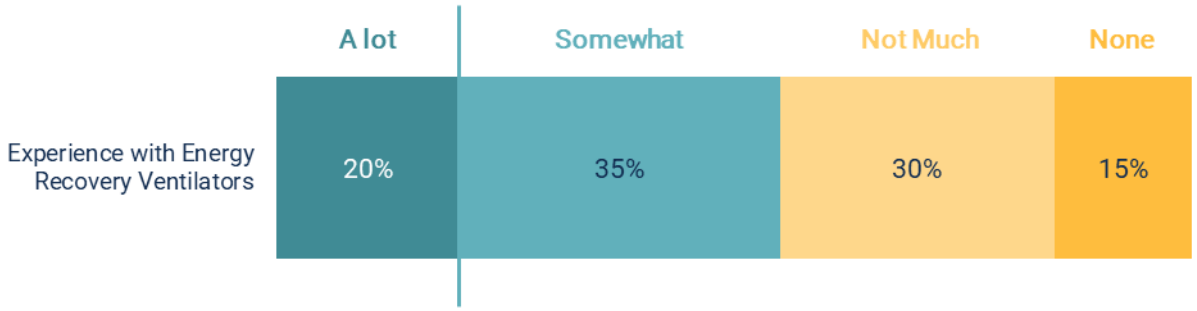
Energy Recovery Ventilators

This section details findings from survey and interview data for ERVs. The structure of this section is similar to that of the dual fuel heat pump RTU section. Cadmus asked contractors about familiarity and experience with ERVs, scenarios in which ERVs are particularly beneficial, and their attitudes toward ERVs. Where applicable, we distinguished between integrated and bolt-on configurations.

Familiarity and Experiences with ERVs

Contractors reported having slightly more familiarity and experience with ERVs in general than with dual fuel heat pump RTUs. Still, 45% rated their experience with ERVs as *not much* or *none*, which correlates with the low prevalence of the technology in Minnesota (Figure 12).

Figure 12. Experience with ERVs (N=20)



Source: Commercial Contractor Interview Question. "How much experience do you have with Energy Recovery Ventilators (ERVs)?"

Applicability of ERVs

During the interviews, Cadmus asked contractors about specific applications in which installing an ERV would be particularly beneficial. Six contractors offered insights. One contractor noted that integrated ERVs are superior to bolt-on ERVs and would be best for new construction or full RTU replacement scenarios, while bolt-on options are applicable when a customer is interested in adding ERV functionality but not in a full RTU replacement. Another contractor explained that typically, new construction has more stringent building codes than retrofits to existing construction. Repairs or replacements for existing buildings may not have to meet the new construction code, depending on permitting. This contractor noted that customers who are aware of and interested in ERVs are generally interested in increasing energy efficiency and saving money.

When discussing specific settings or building types that lend themselves to ERVs, contractors noted that buildings that are densely packed with occupants or sealed too tightly to offer sufficient ventilation are most in need of ERVs. Cold climate areas such as Minnesota would benefit from ERVs because this technology could supply additional moisture to buildings when the outside temperature is too low to open windows. Schools, restaurants/cafeterias, hospitals, offices, and daycare facilities were specifically mentioned as building types that would benefit most from ERVs.

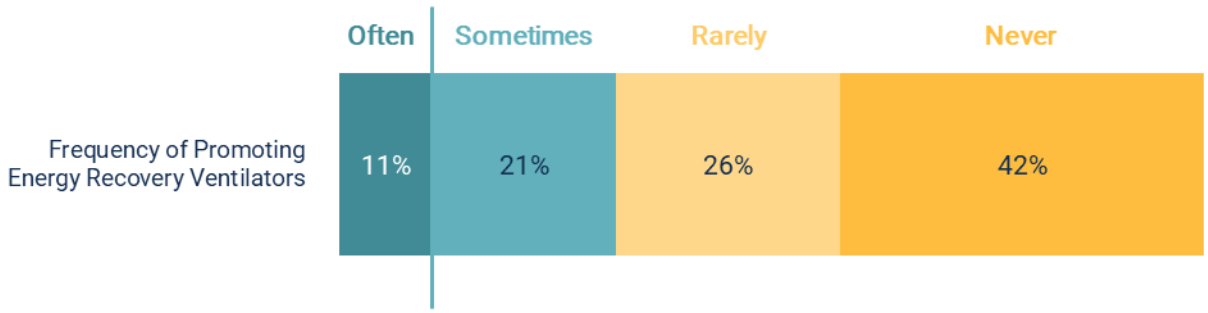
> *When your goal is to increase energy efficiency… [integrated] ERVs are better for new construction because it's easy to just drop in with a crane. Bolt-ons are better for existing buildings because you can just add it without swapping out the RTUs.*
>
> *Just comes down to project requirements. More likely in new construction because of new laws and specifically in schools or kitchens.*

Integrated ERVs

Promotion and Importance of Integrated ERVs

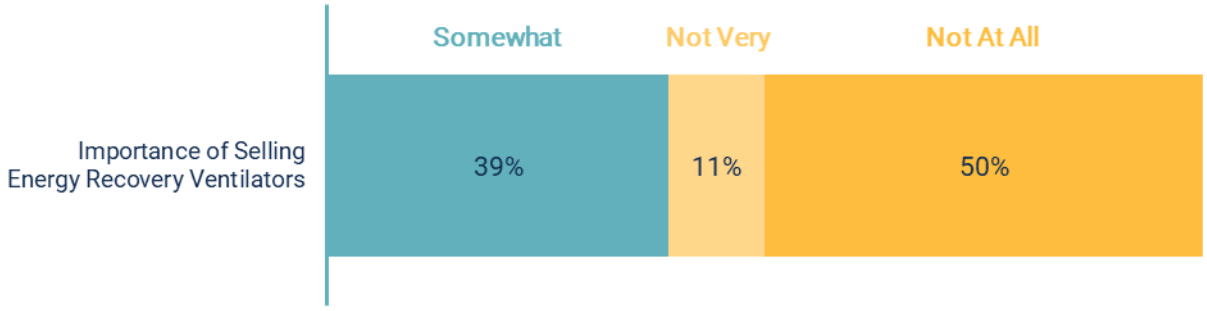
Integrated ERVs are not a prominent part of contractors' promotion strategy. None of the contractors surveyed or interviewed said they *always* promote RTUs with integrated ERVs, and only 11% stated that they *often* promote them. The majority stated that they *rarely* or *never* promote them (68%; Figure 13). Half of all respondents said that promoting integrated ERVs was *not at all* important to their business model, and no contractors said integrated ERVs were *very* important to their business (Figure 14).

Figure 13. Promotion of Integrated ERVs (N=19)



Source: Commercial Contractor Interview Question. "As part of your business strategy, how often do you or your company promote RTUs with integrated ERVs as an option for your installation services?" An additional response option of *always* was offered but not selected by any respondents.

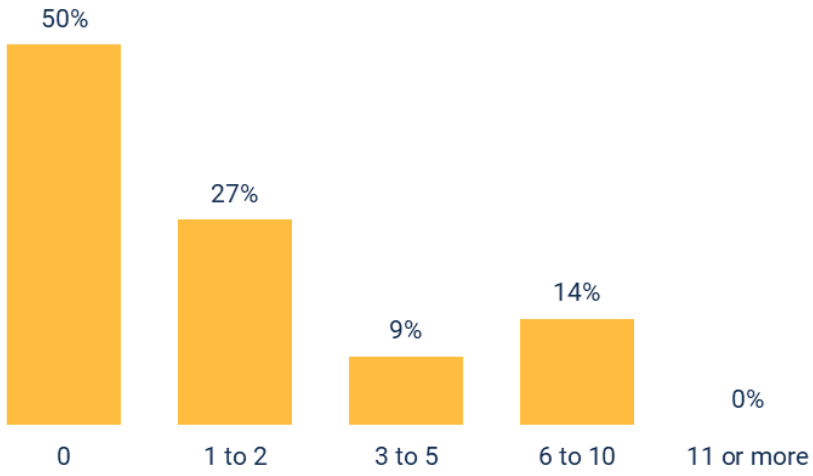
Figure 14. Importance of Selling Integrated ERVs (N=18)



Source: Commercial Contractor Interview Question. "How important is selling integrated ERVs to your business model?" Additional response options of *very important* and *essential* were offered but not selected by any respondents.

The lack of promotion and perceived importance of integrated ERVs to their business model were consistent with low sales, as 11 (50%) respondents reported selling zero units in the past 12 months. Six respondents (27%) reported their company installed one to two integrated ERVs, while two respondents (9%) reported an estimated three to five installations in the same timeframe. Three respondents (14%) reported to have installed at least six (but less than 11; Figure 15).

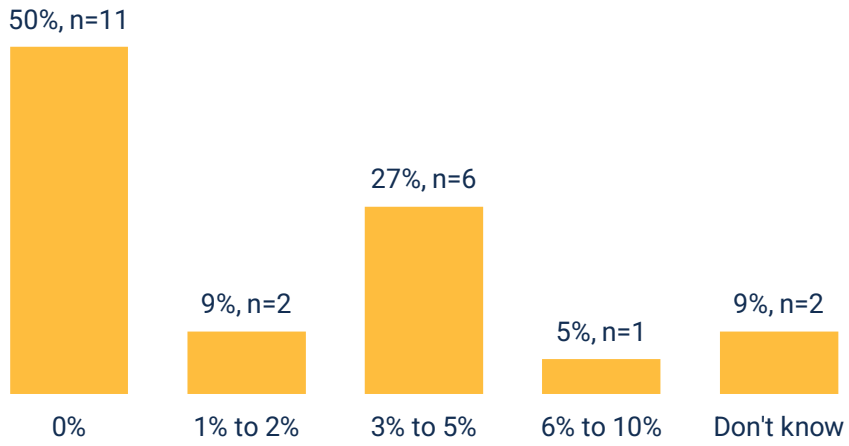
Figure 15. Volume of Integrated ERV Installations (N=22)



Source: Commercial Contractor Interview Question. "Approximately how many integrated ERVs has your company installed in the past 12 months?"

Of the 11 contractors who reported installation of at least one integrated ERV, eight reported sales of integrated ERVs represented 5% or less of their total RTU sales — six estimated that integrated ERV installations made up 3% to 5% of current RTU installations, two contractors estimated between 1% and 2%, and one contractor estimated between 6% to 10%. One contractor estimated 0% and one did not know (Figure 16).

Figure 16. Integrated ERV Installations of Total RTU Installations (N=22)



Source: Commercial Contractor Interview and Survey Question. "To your knowledge, what percentage of your current RTU installations include RTUs with integrated ERVs?" Additional response options of *11% to 20%* and *greater than 20%* were offered but not selected by any respondents.

Expectations for and Perceptions of Integrated ERVs

As with dual fuel heat pump RTUs, Cadmus asked contractors how the market for integrated ERVs has changed over the past two years, whether they expect the market to change over the next five years, and what factors could contribute to change.

> *"It's hard for customers to understand the benefit of the ERV until it's installed.*

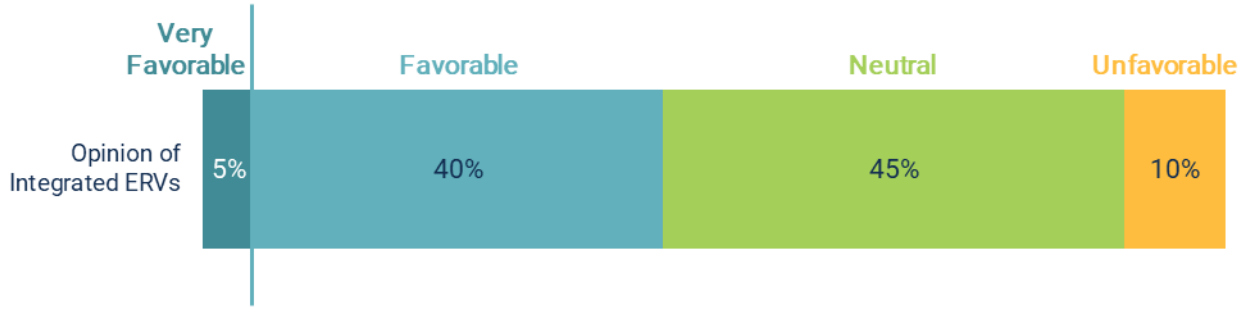
Contractors' overall sentiment about the past two years was that the market had not changed all that much. Of 21 contractors surveyed or interviewed, 16 stated that the market had stayed the same, and five said that it increased "a little." One contractor noted that customers are mainly concerned with price and view ERVs as a luxury, nonessential product. This contractor said that customers often do not really consider or understand how ERVs will benefit their situation.

Nearly half of the respondents stated that they expect the market for integrated ERVs to stay the same. Of the remaining contractors, eight expect a slight increase, and three expect a large influx of business for integrated ERVs because of greater climate and health consciousness and possible reductions in the cost of products.

> *"With Covid, [ERVs] should increase a little as people become more conscious of air quality and want cleaner air in their homes and businesses.*

Contractors' opinions of integrated ERVs ranged from *neutral* to *favorable* (Figure 17). Only one contractor held a *very favorable* view of integrated ERVs, and two held *unfavorable* views. Most contractors said they understood the value of the technology, explaining that they believed ERVs would benefit RTU performance. However, some mentioned the increased need for maintenance, which they perceived as a drawback, and some questioned the added value that ERVs could provide, given their cost.

Figure 17. Opinion of ERVs (N=20)



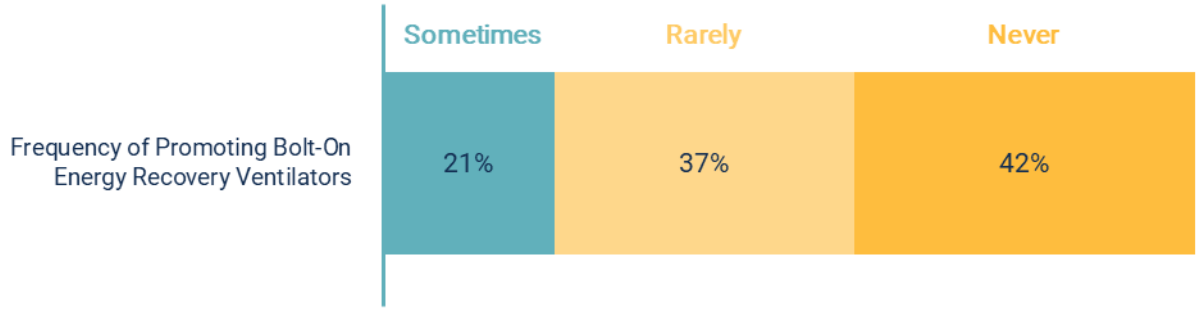
Source: Commercial Contractor Interview Question. "What is your overall opinion of integrated ERVs?" Additional selection options included *very unfavorable and don't know.* An additional response option of *very unfavorable* was offered but not selected by any respondents.

Bolt-on ERVs

Promotion and Importance of Bolt-On ERVs

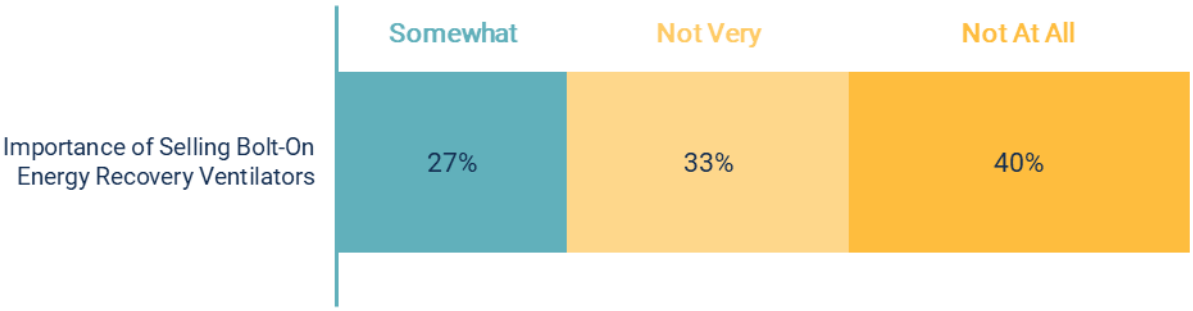
Similar to their views on integrated ERVs, contractors did not view bolt-on ERVs as a major aspect of their sales strategy. No contractors said they *always* or *often* promoted bolt-on ERVs. The majority stated that they *rarely* or *never* promote them (79%; Figure 18). Only 27% of respondents said that selling bolt-on ERVs was *somewhat* important to their business model, with the remaining 73% stating that selling this equipment is *not very* or *not at all* important to their business (Figure 19).

Figure 18. Promotion of Bolt-On ERVs (N=19)



Source: Commercial Contractor Interview Question. "As part of your business strategy, how often do you or your company promote bolt-on ERVs as an option for your installation services?" Additional response options included *always and often.*

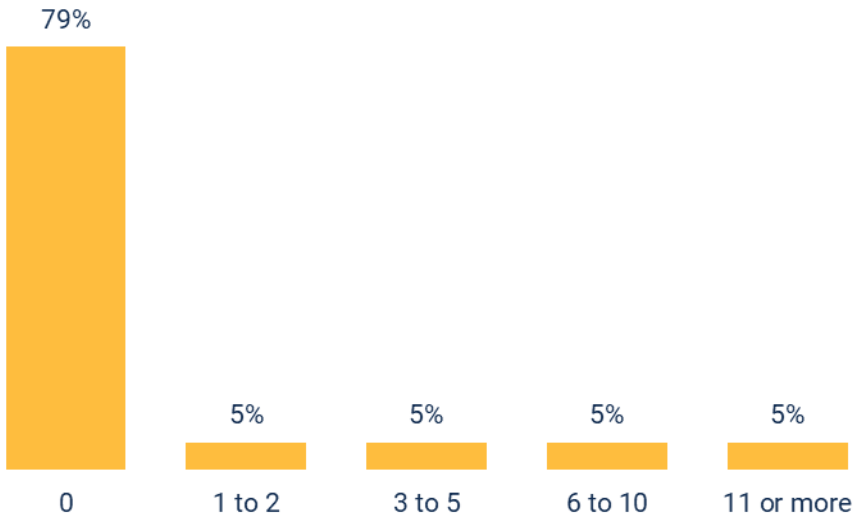
Figure 19. Importance of Selling Bolt-On ERVs (N=15)



Source: Commercial Contractor Interview Question. "How important is selling bolt-on ERVs to your business model?" Additional response options of *essential* and *very important* were offered but not selected by any respondents.

Reported sales volume for bolt-on ERVs was even less than that of the integrated ERVs. Of the 19 contractors who responded, 15 (79%) stated that they had not installed a unit within the past 12 months (Figure 20).

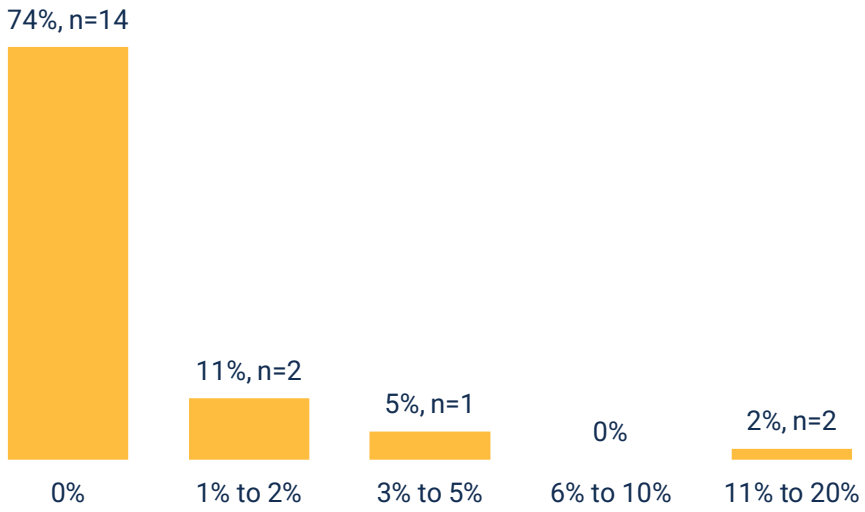
Figure 20. Volume of Bolt-On ERV Installations (N=19)



Source: Commercial Contractor Interview Question. "Approximately how many bolt-on ERVs has your company installed in the past 12 months?"

Of the 19 contractors who provided an estimate of the percentage of current RTU installations include bolt-on RTUs, 14 (73%) said 0%. Two estimated 1 to 2%, one estimated 3 to 5%, and two estimated 11 to 20% (Figure 21). Note that one contractor who reported zero bolt-on ERV installations in the past 12 months estimated sales of 1–2%.

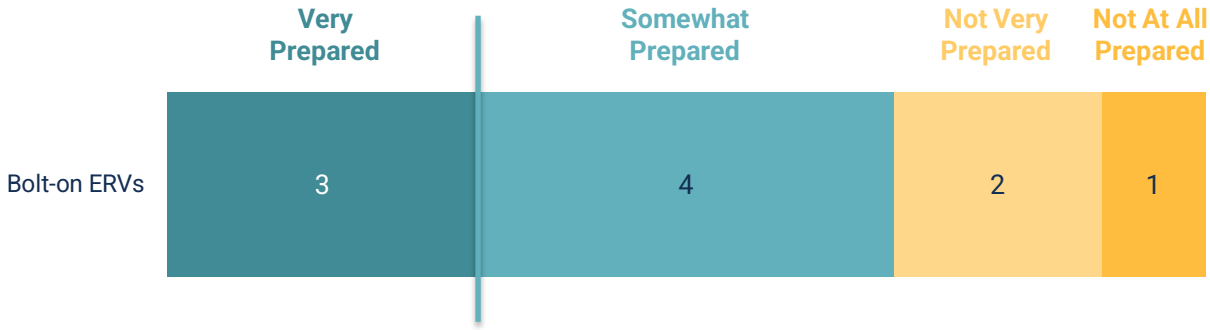
Figure 21. Bolt-On ERV Installations of Total RTU Installations (N=19)



Source: Commercial Contractor Interview and Survey Question. "To your knowledge, what percentage of your current RTU installations include bolt-on ERVs?"

Contractors' confidence in their ability to install bolt-on ERVs was slightly lower than for installing dual fuel heat pump RTUs. Of the 10 contractors who offered a response, three stated that they were very prepared, and four were somewhat prepared. The remaining three were not prepared to install a bolt-on ERV if requested to do so (Figure 22).

Figure 22. Preparedness to Install Bolt-On ERVs (N=10)



Source: Commercial Contractor Interview Question. "How prepared are you to install a bolt-on ERV if requested by a customer?"

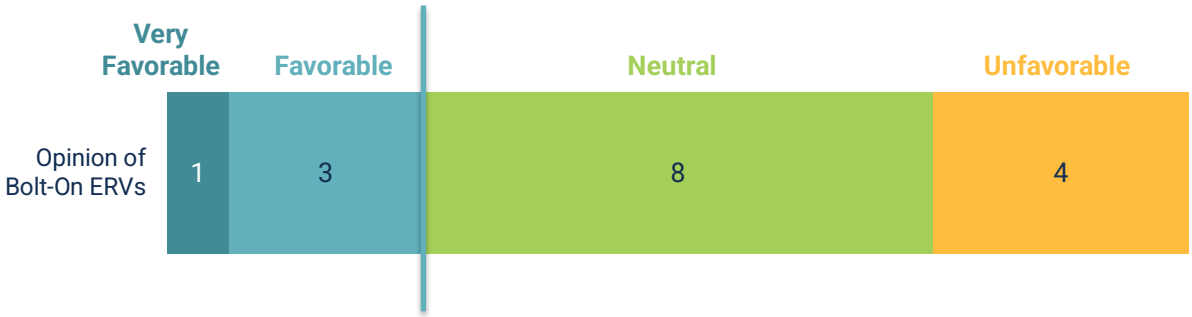
Expectations for and Perceptions of Bolt-On ERVs

Contractors were generally not confident about assessing the market for bolt-on ERVs over the past two years or about predicting the next five years. Most contractors had never installed a unit and had little to say about the market. Some of the contractors had never even heard of bolt-on ERV as an option; the ones who had said there would be no difference in the market between integrated and bolt-on units and that factors such as awareness and price would drive the market. No contractors expected significant increases in sales, but some stated there might be a slight increase because of external factors related to cost and accessibility.

> *The market for bolt-on ERVs is non-existent.*
>
> *The market will be the same as for integrated. They are still pretty expensive and most businesses only care about spending the least amount they have to.*

Opinions of bolt-on ERVs skewed toward *neutral* and *unfavorable*. Of the 16 contractors who responded to this question, only three expressed *favorable* opinions of bolt-on ERVs, and one said *very favorable*. Half of all respondents held a *neutral* opinion (Figure 23).

Figure 23. Opinions of Bolt-on ERV (N=16)



Source: Commercial Contractor Interview Question. "What is your overall opinion of Bolt-on ERVs?" An additional response option of *very unfavorable* was offered but not selected by any respondents.

Contractors were asked what challenges might prevent ERVs, integrated or bolt-on, from having a greater market share in Minnesota. Questions were posed as closed-end responses to survey respondents and open-ended responses to interviewees. Table 5 summarizes responses from both survey and interview data, as well as a tally of total mentions across both data collection efforts. Initial cost was the biggest concern, with 10 contractors highlighting that most customers are primarily concerned with keeping initial costs at a minimum. Other top concerns contractors mentioned included customer awareness (n=7), maintenance required (n=5), and lack of quality training or education (n=5). Given their general lack of awareness of ERVs, it is important to note that not all interviewees offered insights into the challenges that prevent greater market adoption of ERVs.

Table 5. Challenges Preventing ERVs from Greater Market Share in Minnesota

Challenge	Survey (N=12)	Interviews (N=13)	Total Mentions
Initial cost	6	4	10 (40%)
Customer awareness	6	1	7 (28%)
Maintenance required	4	1	5 (20%)
Lack of quality training/education	4	1	5 (20%)
Requires electrical upgrade	2	0	2 (8%)
Lack of qualified installers	2	0	2 (8%)
Product availability	1	1	2 (8%)
Requires structural upgrade	0	0	0 (0%)

Note. Total mentions refer to the total number and percentage of all contractors (survey respondents and interviewees combined)

Product Availability and Sourcing

To assess the current availability of dual fuel heat pump RTUs and ERVs, Cadmus asked contractors who noted that they had at least some experience installing these products to estimate the current lead times for dual fuel heat pump RTUs and ERVs to the best of their knowledge.

For dual fuel heat pump RTUs, only nine survey respondents provided feedback, none of whom stated that dual fuel heat pump RTUs were readily available. Estimates varied widely on average lead times, with some estimating as soon as one to two weeks, and two estimating as long as three to six months. Only one respondent found the current lead times to be *somewhat unreasonable*, which was unsurprisingly a respondent who estimated a three- to six-month lead time. The other six respondents said that the current lead times were *somewhat reasonable* (n=5) or *reasonable* (n=1).

For ERVs, eight survey respondents provided feedback on estimated lead times. One respondent stated that (integrated) ERVs were readily available. All contractors who offered a response said that the lead times for an ERV were *somewhat reasonable* to *reasonable*. For bolt-on ERVs, two stated that they were readily available. For dual fuel heat pump RTUs, integrated ERVs, and bolt-on ERVs, Table 6 and Table 7 provide a breakdown of the expected wait times for each product and contractor perceptions on the reasonableness of the projected wait times, respectively.

Table 6. Expected Lead Time for Commercial HVAC Equipment

Expected lead time	Dual fuel heat pump RTU (N=9)	Integrated ERV (N=8)	Bolt-on ERV (N=8)
Immediate	0	1	2
1–2 weeks	2	2	1
2–3 weeks	1	0	0
3–4 weeks	2	1	3
1–2 months	2	3	1
3–6 months	2	1	1

Table 7. Perceptions of Lead Time Being Reasonable

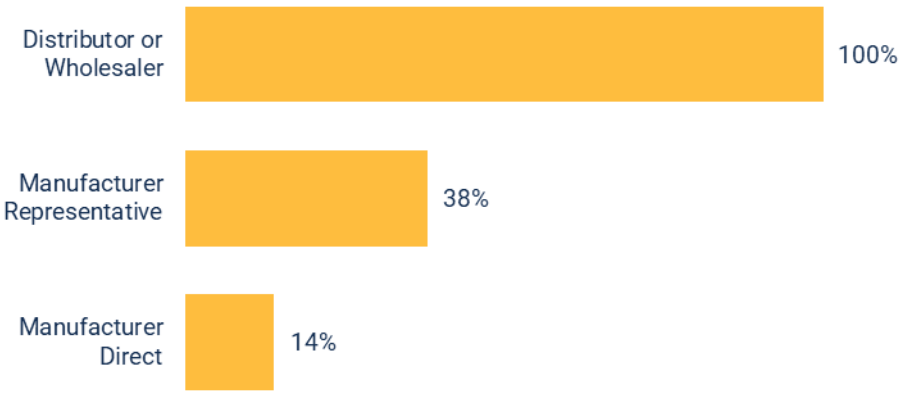
Expected lead time	Dual fuel heat pump RTU (N=7)	Integrated ERV (N=7)	Bolt-on ERV (N=6)
Reasonable	1	2	1
Somewhat reasonable	5	5	4
Somewhat unreasonable	1	0	1
Unreasonable	0	0	0

Contractors tended to agree that customers who decided to purchase a dual fuel heat pump RTUs or an ERV typically planned their replacement well in advance and were unaffected by wait times. Customers who order a replacement due to system failure are much more sensitive to wait times. One respondent noted that during the COVID-19 pandemic, lead times were up to one year and that was *unreasonable*; however, now that the market is more stable, lead times are much more reasonable.

> *"People who want these products plan and know how long it takes.*

All respondents reported that they sourced their RTU equipment through a distributor or wholesaler (Figure 24). Respondents were able to select multiple sources; some also cited manufacturer representatives or that they worked directly with the manufacturer. Of those who sourced from multiple sources, only two stated that working with manufacturer representatives was their main source of procuring equipment.

Figure 24. Source of RTU Equipment (N=21)

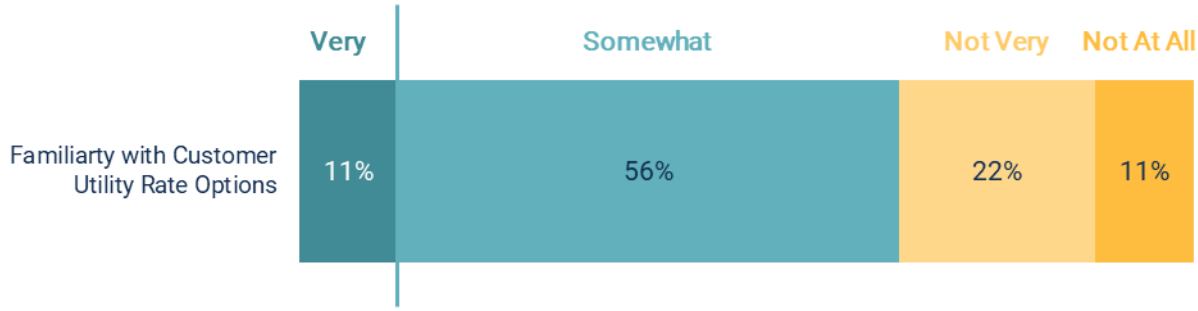


Source: Commercial Contractor Interview Question. "How do you or your company typically source RTU equipment? Select all that apply."

Utility Rates, Bill Savings, and Incentive Opportunities

Cadmus sought to understand contractors' knowledge of utility rates and how contractors discuss bill savings and incentive opportunities with customers. Saving money on upfront costs through incentives or savings on energy bills could encourage customers to opt for more efficient models. Two contractors (11%) said they were *very familiar,* while ten contractors (56%) said that they were *somewhat* familiar with utility rate options. Five (33%) of the 18 respondents said that they were either *not at all* (one contractor) or *not very familiar* (four contractors) (Figure 25).

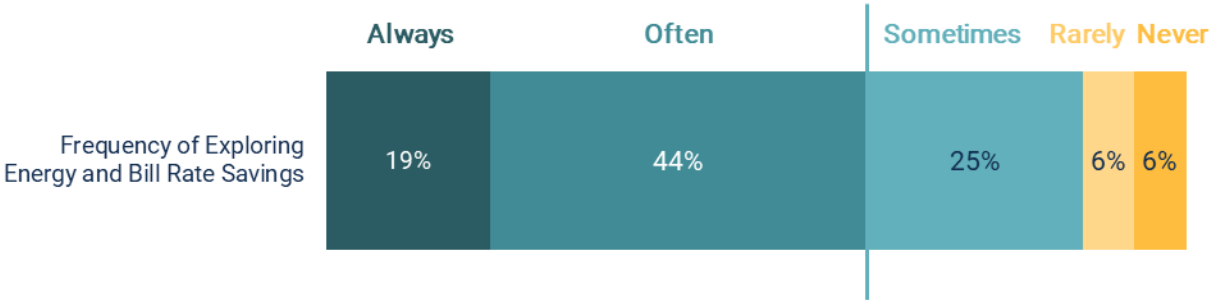
Figure 25. Familiarity with Utility Rate Options (N=18)



Source: Commercial Contractor Interview Question. "How familiar are you with customers' utility rate options."

Contractors also shared how often they explored opportunities for energy and bill rate savings with their customers, with three (19%) stating they did so *always,* and seven (44%) stating they did so *often* (Figure 26). Four contractors (25%) responded *sometimes.* Twelve percent of respondents stated that they either *never* or *rarely* conferred with customers on such opportunities. Thus, overall, it is common practice to discuss bill savings opportunities with clients.

Figure 26. Frequency of Exploring Bill Savings with Customers (N=16)



Source: Commercial Contractor Interview Question. "How often do you explore opportunities for energy and bill rate savings with your customers?

Ten of 13 interviewed contractors rated the availability of rebates or incentives as *very important* when deciding which HVAC equipment to recommend to customers. However, the percentage of sales that involve an incentive or rebate offer varied across the interviewed contractors. Estimates ranged from 15% of the time to nearly every job. The average percentage of sales that involved some form of incentive or rebate provided by the nine respondents was approximately 65%. Contractors say they generally seek out opportunities to save customers money because it leads to good relationships, repeat business, and customer references.

During the interviews, Cadmus asked contractors at which point in the supply chain they believe incentives would have the greatest impact on market adoption of efficient technologies. Among the nine contractors who provided a response, five said downstream and four said midstream. Those who said downstream suggested that incentives showing customers are directly involved in the process would give them a sense of reward for their decisions and would therefore likely make the strongest impression. Those who noted that midstream incentives would have the greatest impact cited customers' aversion to paperwork and their preference for receiving a discounted price on the spot rather than waiting for a rebate; further, midstream incentives motivate distributors to stock products, which allows contractors to procure equipment immediately.

> *Rebates are very important to commercial customers. Big companies want to know what they can do to reduce spending.*
>
> *Incentives are very important. It is the first question I get when discussing estimates.*
>
> *[I use rebates] approximately 15% of the time because most of my business is all standard equipment and there are not many incentives available.*

Manufacturer Insights

Background

Manufacturers play a foundational role in shaping the commercial RTU market through designing products, making production decisions, and configuring high-performance equipment. Manufacturers determine which technologies are offered at scale, how products are configured (e.g., standard versus custom configurations), and the conditions under which advanced features, such as dual fuel heat pump RTUs and ERVs, are produced and shipped. As a result, manufacturer perspectives are critical for understanding constraints related to product availability, cost, and the feasibility of expanding production of Next Gen RTU products.

To better understand these dynamics, Cadmus conducted in-depth interviews with three commercial RTU manufacturers that currently produce RTUs, dual fuel heat pump RTUs, and ERVs to gather qualitative insights into production considerations, market demand, purchasing and delivery pathways, and incentive structures. Manufacturer insights presented here provide upstream context for findings from distributors and contractors and help clarify how production decisions, pricing complexity, and perceptions of demand influence the broader RTU supply chain. These perspectives support the interpretation of market conditions and can inform strategies for the Next Gen RTU initiative to increase availability and adoption of high-performance RTU technologies.

Production Constraints

Cadmus addressed the research goal of identifying production constraints through in-depth interviews with manufacturers. All three commercial manufacturers reported manufacturing RTUs, dual fuel heat pump RTUs, bolt-on ERVs, and RTUs with integrated ERVs. One manufacturer specified that they do not manufacture as many bolt-on ERVs as other products, as they tend to be custom or manufactured only on an as needed basis, but they can offer that product if their client asks for it. This manufacturer noted that they sell products through manufacturer representatives for large commercial projects.

> *"Cost is the biggest barrier. Dual fuel is higher than every other product on the market.*

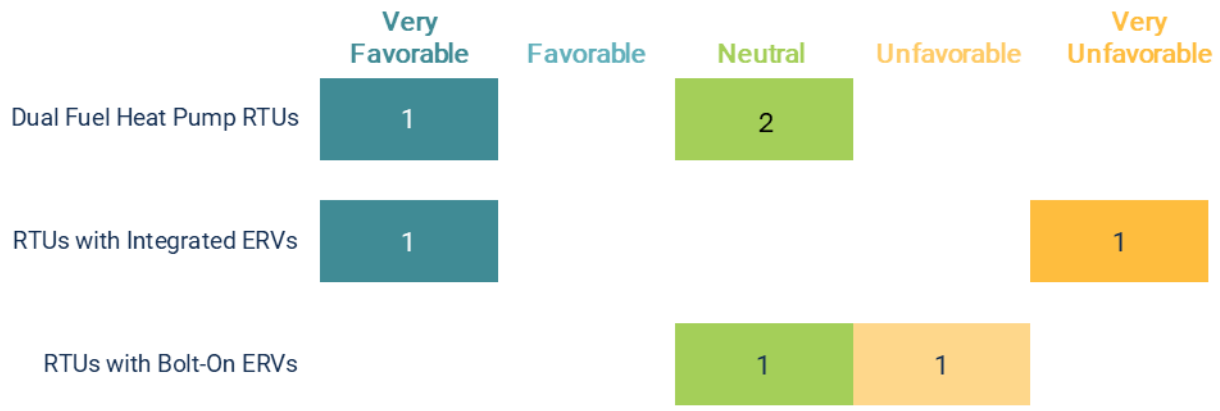
Two of the three manufacturers revealed that the biggest barrier to increased adoption of dual fuel heat pump RTUs and ERVs is cost. Both highlighted the high cost of this equipment in comparison to more standard options. These two manufacturers reiterated that while cost is preventing greater market adoption of RTUs, the high cost of this equipment also prohibits customers from upgrading to efficient RTUs. The third manufacturer stated that the biggest barrier is a lack of customer demand, which limits manufacturers from allocating any effort into product development.

Lastly, manufacturers were asked to rate their overall opinion of each technology on a scale of 1 to 5, where 1 meant *not at all favorable* and 5 meant *very favorable*. For dual fuel heat pump RTUs, manufacturers were split. One noted they hold a *very favorable* opinion about the benefits of dual fuel heat pump RTUs in the market, giving a rating of 5, while the other two manufacturers rated their

opinions of dual fuel heat pump RTUs at a 3 and a 3.5, indicating *neutral* (Figure 27). These two mentioned that while dual fuel heat pump RTUs have a place in the market, they may offer buildings in Minnesota few benefits, questioning their relative benefits in Minnesota's climate compared to other options. One explained further that dual fuel heat pump RTUs are "one solution to a problem, but there are other solutions" that are more effective and less costly. One manufacturer proposed a potential solution focusing on wind and solar energy to generate electricity, but that would require strategic planning.

Manufacturers were then asked to rate their overall opinion of RTUs with integrated ERVs and of RTU bolt-on ERVs on the same scale of 1 to 5. One commercial manufacturer declined to respond. For the two who did respond, one rated integrated ERVs as a 1 (*very unfavorable)*, whereas the other rated them a 5 (*very favorable*). As for bolt-on ERVs, one rated them a 2 (*unfavorable*) and the other rated them a 3 (*neutral*) (Figure 27). These two manufacturers offered additional information, with one noting that ERVs have poor execution and chronic air leakage, while the other mentioned the high costs of this equipment.

Figure 27. Favorability of Dual Fuel Heat Pump RTUs, RTUs with Integrated ERVs, and Bolt-On ERVs (manufacturers)



Source: Manufacturer Interview Question. "What is your opinion of dual fuel heat pump RTUs/Integrated ERVs/Bolt-on ERVs?"

Stocking Practices

Manufacturers were asked about stocking practices for dual fuel heat pump RTUs and ERVs. Interviews revealed that manufacturers are largely unaware of stocking practices, specifically those of distributors. When asked about stocking allowances, consignment, or buy-back terms offered to distributors, the two manufacturers who responded reported not being aware of or knowledgeable about any of these options. More insights regarding stocking practices can be found in the distributor section.

Purchasing Processes

Manufacturers were then asked about the purchasing processes for dual fuel heat pump RTUs and ERVs. When asked how units are sourced and delivered, all three manufacturers said that products are usually delivered to the contractor or shipped directly to the job site. One manufacturer explained that if the product is already in stock, they will ship it to the distributor to deliver to the job site.

> *"For a big job, [we] ship direct to [the] job site. Most are shipped from a local commercial distribution center.*

When asked about the pricing and cost of equipment, two manufacturers were unsure of pricing structures. They explained that contractors include their sales cost in the price that goes to the customer and that they are generally unaware of what that contractor's sales cost entails. A third manufacturer reported that the pricing structure includes the type of equipment and fuel type. All three manufacturers noted that pricing is complex.

Incentive Points

Manufacturers were then asked about incentives and where in the supply chain incentives would have the greatest impact. All three commercial manufacturers noted that downstream incentives for customers would be the most impactful. One manufacturer explained that customers realize the extra cost of projects, and therefore, an incentive or rebate that goes directly to them would help alleviate some of that cost. The two others corroborated this idea, stating that incentives that pay for the equipment are a great motivator to get customers to agree to make upgrades. Two of the three commercial manufacturers also reported that lowering the cost of electricity and equipment to customers is another leverage point that could increase adoption of RTUs.

> *"Downstream is the most effective. Customers have to pay for the equipment so incentivizing them makes the most sense.*

Each manufacturer had insight into how utilities, program administrators, and collaboratives could best support manufacturers to promote next gen RTU adoption when asked. One emphasized that incentives are most effective when they are directed at customers since they are the ones making decisions about their project. Another highlighted the importance of ensuring incentive and rebate offerings are well publicized to contractors, noting that awareness and uptake can be limited even when incentives are available if people do not know about these offerings. A third manufacturer offered similar sentiments and added that greater consistency (or standardization) in rebate and incentive qualification requirements across utilities would help reduce confusion and administrative burden for market actors navigating multiple programs. This manufacturer explained the difficulty market actors face when encountering different requirements to qualify for various utility rebates.

> *"It's one thing to have the incentives. It's another thing for people to know about them and use them, right.*

Market Actors' Familiarity with Dual Fuel Heat Pump RTUs and ERVs

Two manufacturers who responded when asked about contractors' familiarity with dual fuel heat pump RTUs said that contractors are new to this technology and not very familiar with it because they do not sell many of these products. When asked about distributors' familiarity, manufacturers explained that distributors may not have a lot of experience with dual fuel heat pump RTUs and ERVs because they do not sell large quantities of them but should have some market knowledge of this technology. When asked about consumer awareness of dual fuel heat pump RTUs and ERVs, manufacturers noted that consumers have much less knowledge of these products than other market actors. One manufacturer indicated that because dual fuel heat pump RTUs and ERVs do not have a large market presence, customers are largely unfamiliar with them. Another mentioned that customers generally rely on their contractor to recommend appropriate equipment and therefore do not have deep knowledge of these technologies.

> *"[Contractors] are not that familiar with dual fuel heat pump RTUs. Since they don't sell that many and don't install that many, they would need to get up to speed."*

DISTRIBUTOR INSIGHTS

Background

Distributors occupy a central position in the commercial RTU supply chain and play an important role in determining which products are readily available to contractors and building owners (or other decision-makers). As the primary channel through which most RTUs and associated components are procured, distributors influence equipment availability, lead times, and in some cases, the visibility of higher-efficiency/performance options. Distributor stocking practices and purchasing arrangements can therefore shape which technologies are accessible in both planned and time-sensitive replacement scenarios.

Distributor interviews focused on familiarity with dual fuel heat pump RTUs and ERVs, stocking and availability, purchasing and delivery processes, and perceptions of barriers to broader adoption of these technologies. Distributors were also asked to share views on the point in the supply chain where incentives would be most impactful, as well as potential leverage points that could influence stocking decisions and sales.

Insights from distributors provide valuable midstream context for understanding how upstream manufacturing decisions and downstream contractor and building owner (customer) demand interact in practice. Distributor perspectives can help identify constraints related to availability and logistics and inform strategies to address these constraints.

Production Constraints and Market Actor Familiarity

Cadmus interviewed three commercial distributors to elicit their opinions and determine their awareness of dual fuel heat pump RTUs and ERVs. All three revealed that they are familiar with the RTU/ERV market in Minnesota. Distributors were then asked to estimate the awareness of market actors. All three distributors reported that contractors are slightly familiar with dual fuel heat pump RTUs and ERVs. One distributor noted limited availability through manufacturers and stated the need for manufacturers and distributors to support increased awareness of these technologies. When asked about consumer awareness, two distributors explained that customers are generally unaware of these technologies due to their lack of presence in the market. A third distributor explained that customers may be aware of dual fuel heat pump RTUs but generally have less knowledge or familiarity with ERVs.

> *"Contractors are moderately familiar with these technologies, there is just no demand for them in this market.*

> *"Price is always on customers' minds. They ask questions regarding costs. The cost to operate the equipment, if the new product is more than standard equipment, [etc.].*

Distributors were then asked about barriers that prohibit increased market adoption of dual fuel heat pump RTUs. Two agreed that the cost of these technologies is the biggest barrier to increased market adoption, a sentiment shared by manufacturers. A third distributor corroborated the lack of awareness among customers about these products. Distributors explained that their customers are unaware of these products and have misconceptions about their complexity.

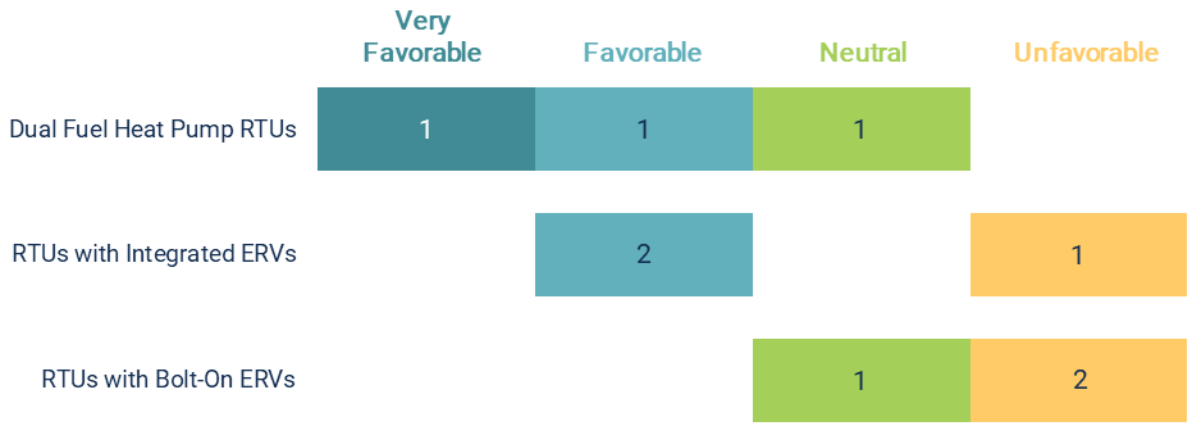
Distributors then rated their overall opinion of dual fuel heat pump RTUs on a scale of 1 to 5, with 1 meaning *very unfavorable* and 5 being *very favorable* (Figure 28). In general, the sentiment from the commercial distributors regarding dual fuel heat pump RTUs is that some are good and some are bad. All three distributors said they do not have any problem with them and one said that they believe in this technology. The distributors cited installation costs as a major factor prohibiting dual fuel heat pump RTUs from increasing market presence but also expressed hope for the future.

When asked to rate their opinion of RTUs with integrated ERVs, two distributors expressed favorable opinions of this technology. These two distributors said wider market acceptance of these technologies would be necessary for business owners to be more comfortable installing them. A third distributor expressed an unfavorable opinion of integrated ERVs, explaining that they have a place in the market but are technical products that are not appropriate for all applications (Figure 28).

Distributor views of bolt-on ERVs were generally less favorable than views of integrated ERVs (Figure 28). One distributor offered a neutral opinion saying, "[I] have nothing against them. They have a place where appropriate." Of the two distributors who offered unfavorable views, one cited limited market demand for bolt-on configurations and noted that projects requiring energy recovery are more likely to pursue integrated solutions, particularly in more customized or application-specific

installations. From this perspective, bolt-on ERVs were seen as having fewer use cases compared to integrated systems.

Figure 28. Favorability of Dual Fuel Heat Pump RTUs, RTUs with Integrated ERVs, and Bolt-On ERVs (distributors)



Source: Distributor Interview Question. "What is your opinion of dual fuel heat pump RTUs/Integrated ERVs/Bolt-on ERVs?" An additional response option of *very unfavorable* was offered but not selected by any respondents.

Stocking Practices

> *"The primary driver [of stocking decisions] is contractor demand both by equipment functionality and by application.*

Distributors were asked to identify the drivers of stocking decisions. Both distributors who answered this question reported that the primary driver is demand, which they explained is determined by contractors and what customers want.

The two distributors revealed that none of their stocked RTUs are dual fuel heat pump RTUs. Both said that the lack of demand and market awareness for dual fuel heat pump RTUs means these products do not need to be stocked or readily available. Similarly, neither distributor stocks RTUs with integrated or bolt-on ERVs due to the limited demand and presence of this technology in the market.

When asked about lead times for dual fuel heat pump RTUs and ERVs, two distributors reported that the typical lead time is less than two months. One explained that the lead time depends on manufacturers. Distributors can decide to stock products, which helps to alleviate delays to the contractor, but lead times are generally a function of production by the manufacturer.

Purchasing Processes

Distributors said that purchasing processes for dual fuel heat pump RTUs and ERVs vary. Distributors noted that products are generally shipped directly from the manufacturer to the job site, while other pathways described included delivery to distributor yards or warehouses for staging and

coordination. Several noted that delivery coordination can be challenging — one explained that coordinating equipment delivery can be particularly difficult if a crane is necessary.

When asked about common pain points, one distributor cited lead times and explained that lead time delays and longer-than-normal lead times are not unique to dual fuel heat pump RTUs and ERVs. Changes to the refrigerant requirement and the presence of new tariffs have also affected lead times. Other distributors similarly discussed refrigerant transitions and related supply constraints (e.g., compressed conversion timelines and limited availability of refrigerant components) as broader market dynamics that can affect equipment availability and delivery schedules beyond any single RTU configuration.

> *"Currently, [dual fuel heat pump RTUs] don't have any major lead time issues. They are around a 30-day lead time to get product in the warehouse. That's standard. If [we] order product with factory installed products, that could take 4–8 weeks.*

Incentive Points

Of the three commercial distributors who responded when asked at which point in the supply chain incentives would be most impactful for increasing market adoption, two distributors noted that incentives to end users would be most beneficial. The third distributor said that there are benefits and drawbacks, no matter where the incentive goes, specifically regarding the paperwork for the rebate application.

> "It comes down to price to the consumer. If there's a program to offset the costs, that would be the most viable. If the price difference was mitigated.

The interviewed commercial distributors offered strategies that utilities, program administrators, and other collaboratives could utilize to best support distributors to promote next gen RTU adoption. Two distributors said that the best way to promote next gen RTU adoption is through targeted and intentional marketing efforts. Another explained that the cost of products deters customers, and therefore programs that help offset costs would be most beneficial in promoting the adoption of these technologies.

Building Owner Insights

Background

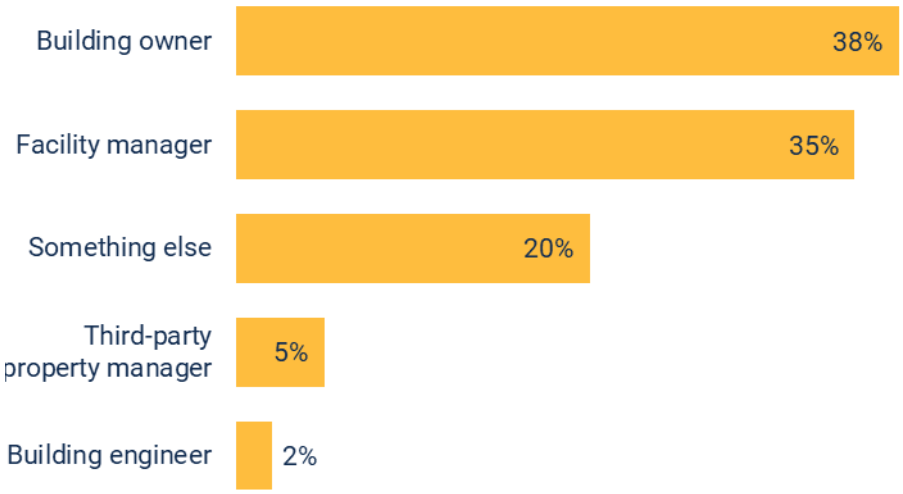
Building owners are often the ultimate decision-makers for commercial RTU replacements and upgrades and play a key role in determining whether high-efficiency technologies are adopted. Facility managers, engineers, and property managers may also contribute to decision-making. Customer priorities, such as cost, reliability, comfort, indoor air quality, and operational considerations, directly influence which equipment options are selected. Therefore, these parties' familiarity with available technologies and their reliance on contractor recommendations can shape whether they consider advanced options during replacement decisions.

This section summarizes results of a survey of Minnesota building owners, facility managers, engineers, property managers, small business owners, and building owner association members. The survey was designed to gather insights into respondents' familiarity with RTUs, dual fuel heat pump RTUs, and ERVs as well as replacement drivers, decision-making processes, and awareness of incentives and rebates. Survey respondents represent a range of roles and building portfolios and provide a downstream view of how RTU decisions are made in practice. For clarity, the term "building owners" is used and collectively refers to all respondents including facility managers, engineers, and property managers or those who participate in decision-making around HVAC (listed in Figure 29).

Respondent Characteristics

Cadmus pursued building owner recruitment through multiple avenues including building owner association email lists; however, building owners who participated in the survey were primarily small to medium-sized commercial building utility program participants in the metro region. Building owners were asked to provide information about roles, responsibilities, the types of buildings and equipment in their portfolio, and who in their organization is responsible for equipment decision-making. The survey received 65 complete responses from those who are involved with the operation and maintenance of HVAC equipment in their properties. The role of respondents varied, as 38% identified as building owners, while 35% identified as facility managers. Other less common roles include third-party property managers and building engineers totaling 5% and 2% of responses, respectively (Figure 29).

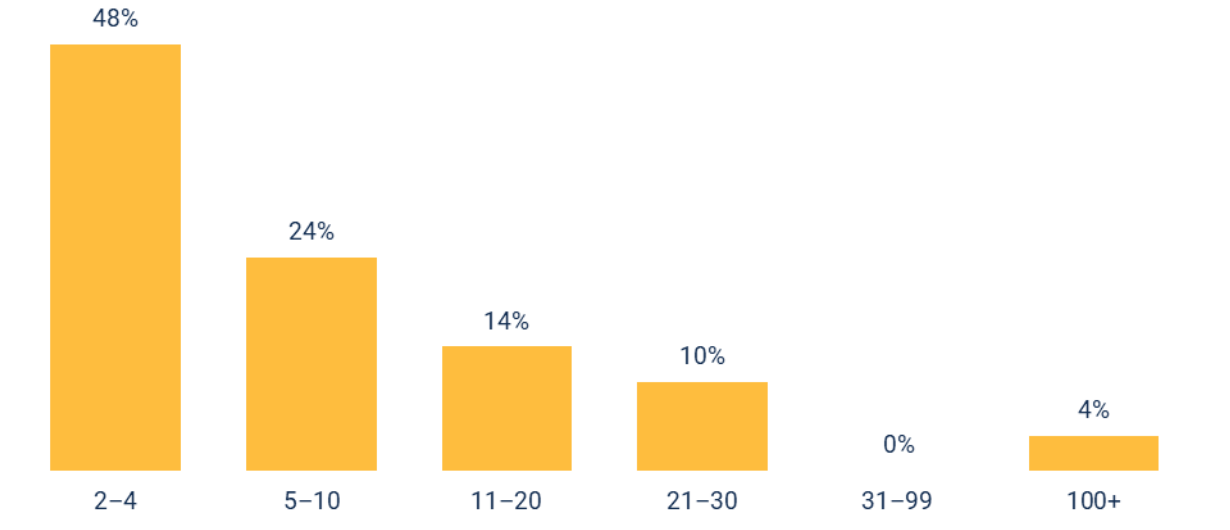
Figure 29. Role of Survey Participant (N=65)



Source: Building Owner Survey Question. "What is your role? Please select the answer that best fits your role."

Building owners described the size of their building portfolios reporting whether they work exclusively with a single building or manage a broader portfolio of buildings. Of the 65 responses, 52% of respondents indicated that they work on or manage only one building, while the other 48% reported involvement with a portfolio of multiple buildings. The number of buildings within these portfolios varied, as shown in Figure 30. Portfolios were generally small, with the most common responses being two and four buildings (48%). Approximately 72% manage 10 or fewer buildings, while one respondent reported working on a larger portfolio of 100 buildings.

Figure 30. Size of Building Portfolio (N=29)



Source: Building Owner Survey Question. "How many buildings do you work with or manage?"

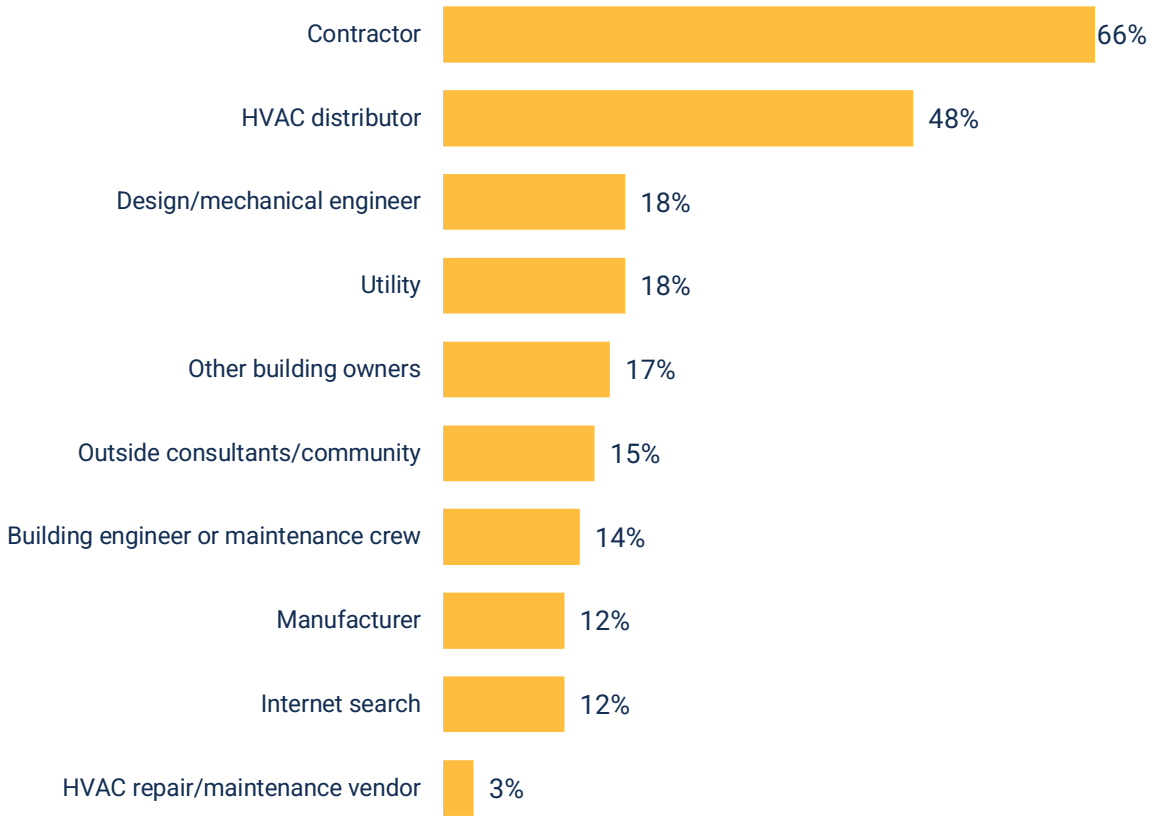
Equipment Specifications and Decisions – RTUs

Cadmus asked building owners about their experience with RTUs, particularly regarding replacements, contractor bids, RTU types, and other significant insights they could offer about RTU equipment and replacement decisions.

Sources of Information on RTU Equipment

Building owner survey responses further illustrate the central role contractors play as information sources during RTU replacement and new equipment decisions. When asked where they would turn for information on new or replacement RTU equipment options and features, 66% identified contractors, followed by 48% who identified HVAC distributors (Figure 31). Fewer respondents indicated utilities, manufacturers, or independent research sources as information channels. These results reinforce qualitative findings throughout the report that building owners rely heavily on contractor guidance when evaluating RTU options, helping explain when dual fuel heat pump RTUs and ERVs are infrequently included in bids unless explicitly requested.

Figure 31. Sources of Information for Building Owners on New or Replacement RTU Equipment (N=65)

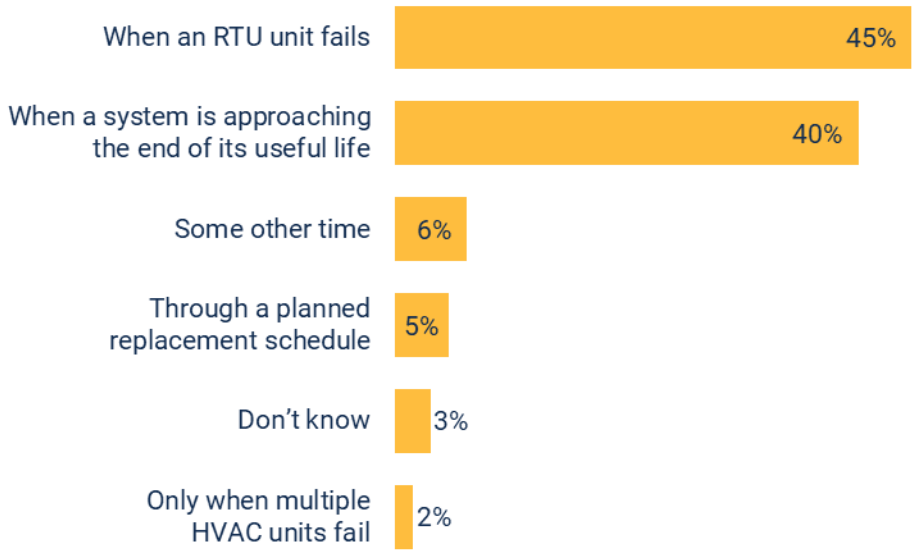


Source: Building Owner Survey Question. "Where would you turn for information on new or replacement RTU equipment options and features? (Select all that apply)"

Replacement of RTUs

The building owner survey was designed to determine the frequency and occurrence of RTU replacements. Most respondents (65%) reported replacing or installing RTU equipment in the last three years. The frequency of RTU replacements generally varied among respondents, as shown in Figure 32. Nearly half of respondents (45%) indicated that RTU failure is the primary trigger for replacements. An additional 40% of respondents reported replacing RTU equipment when a system is approaching the end of its useful life, and a much smaller proportion of respondents (5%) said that RTU replacements occur according to a planned replacement schedule.

Figure 32. When Rooftop Equipment is Replaced (N=65)

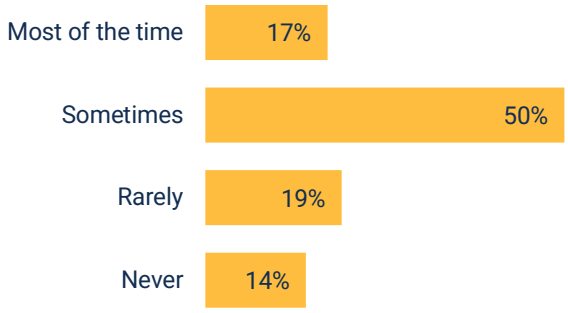


Source: Building Owner Survey Question. "When do you typically replace RTU equipment?"

Two building owners shared insights into the typical replacement schedule for RTUs, indicating that they typically replace RTUs every 15 years.

Along with RTU replacement, Cadmus asked the 42 building owners who indicated they had replaced or installed RTU equipment in the last three years about their experiences with bids from contractors. Half of respondents said that contractors sometimes provide multiple options (i.e., good, better, best) when discussing equipment choices (Figure 33).

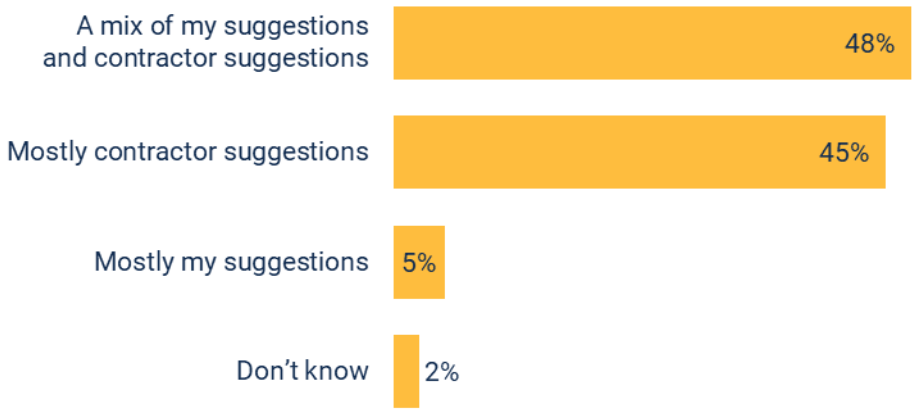
Figure 33. How Often Contractors Provide Options in Bids (N=42)



Source: Building Owner Survey Question. "When you get contractor bids for RTUs, how often do contractors provide you with multiple options, like a good, better, best lineup?"

When asked if the equipment in a bid was requested by the customer or if the contractor suggested equipment applicable and appropriate to the project, responses were split. About half (48%) noted that the recommended equipment is a mix of their own suggestions and contractor suggestions, and 45% said that the equipment presented in bids is generally from contractor suggestions (Figure 34).

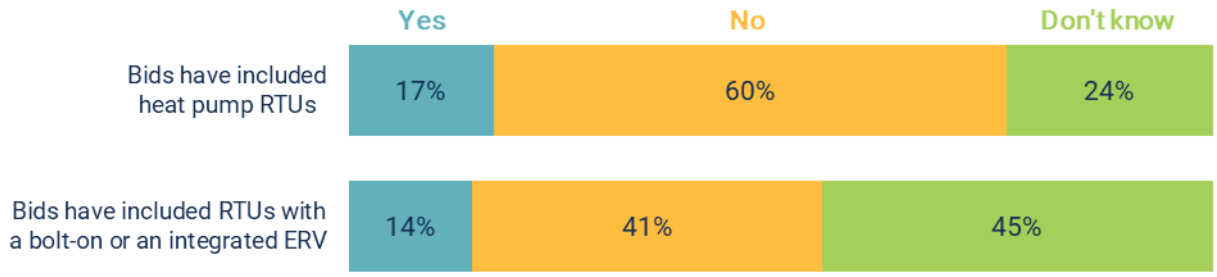
Figure 34. Entity who Suggests Equipment in Bids (N=42)



Source: Building Owner Survey Question. "When you ask for a bid, is the equipment included mostly specific equipment that you have asked for (such as a specific brand or features) or is it mostly equipment that the contractor suggests for your situation?"

Also noteworthy is that only 17% of respondents reported that RTU bids include dual fuel heat pump RTUs, and only 14% reported that ERVs were included in bids. Nearly half (45%) of respondents did not recall whether a bid included an ERV option (Figure 35).

Figure 35. Heat Pumps and ERVs in RTU Bids (N=42)

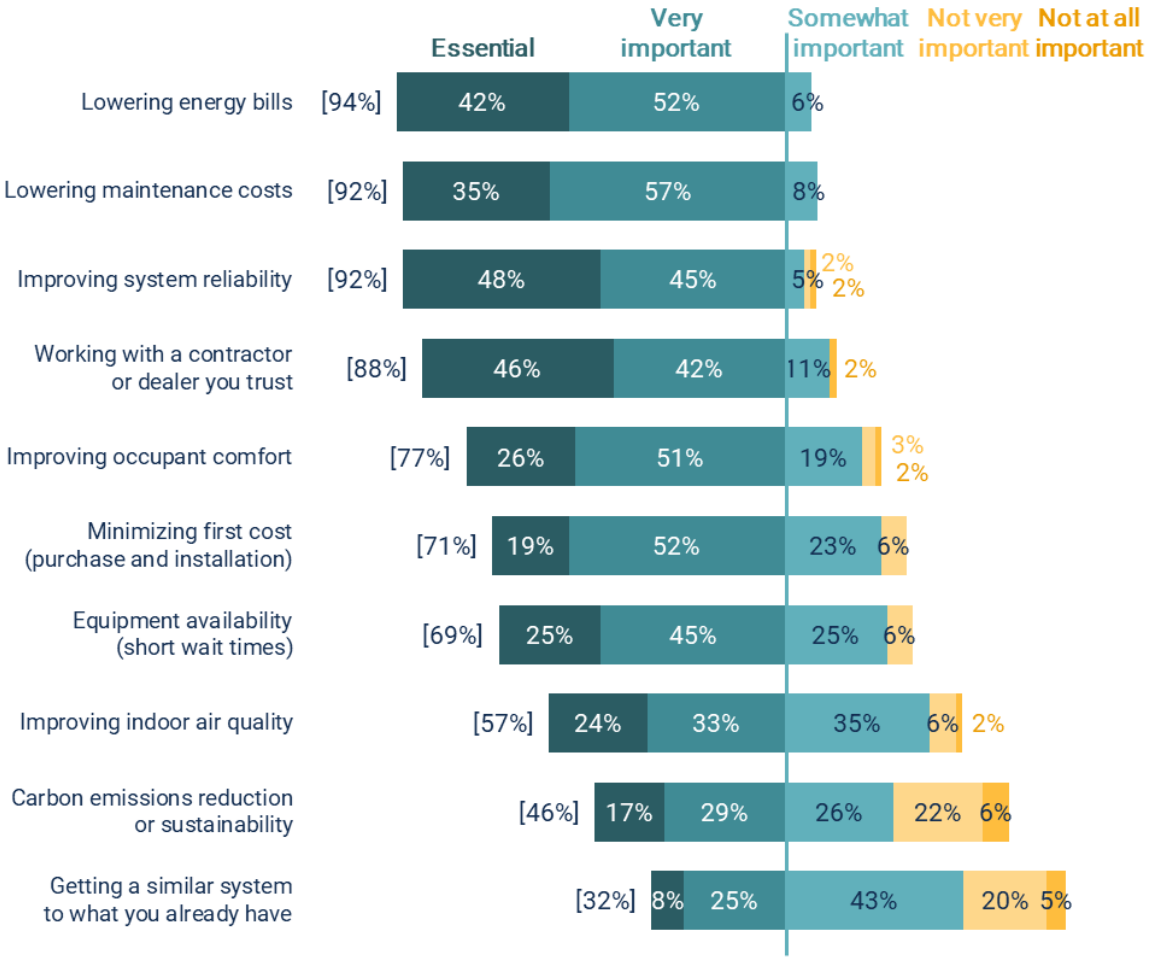


Source: Building Owner Survey Questions. "To your knowledge, have RTU bids ever included heat pump RTUs?" and "To your knowledge, have RTU bids ever included RTUs with a bolt-on or an integrated energy recovery ventilator (ERV)?"

Factors when Selecting RTUs

Cadmus sought additional insights into the importance of various features of RTU installations. As shown in Figure 36, building owners rated a variety of factors associated with selecting RTU equipment. More than half rated all but one factor as *very important* or *essential* to their organization. At least 75% rated the following factors as *essential* or *very important*: lowering energy bills, lowering maintenance costs, improving system reliability, working with a contractor/dealer you trust, and improving occupant comfort.

Figure 36. Importance of Various Factors when Selecting RTU Equipment (N=65)

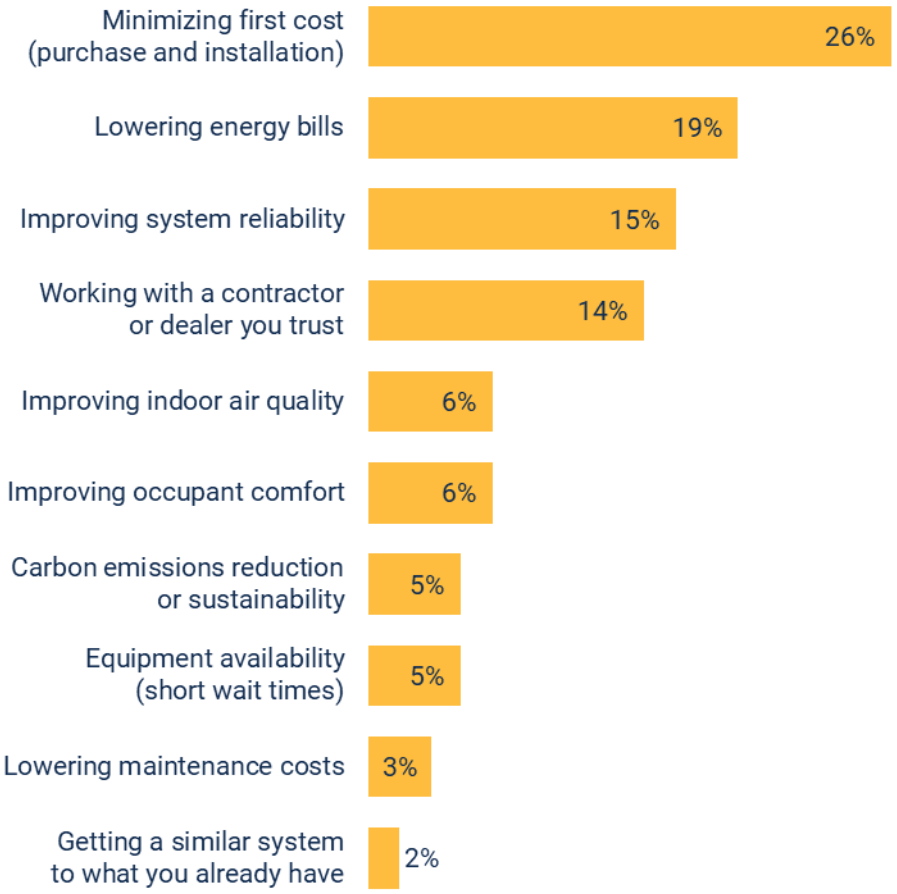


Source: Building Owner Survey Question. "How important would you say the following are to your organization when selecting new RTU equipment?"

> *A new system has to make sense for the space and budget of the owners. Along with workability of the contractor to install new system.*
>
> *Generally, because we own the buildings, we are more concerned about the total life cycle cost than the upfront costs. Noise levels are also a factor.*

Cadmus asked building owners to rate the most important factors. Minimizing the first cost (purchase and installation) proved to be the most influential consideration when selecting RTU equipment (26%). The second most cited factor when selecting new RTU equipment was lowering energy bills (19%; Figure 37).

Figure 37. Most Important Factors when Selecting RTU Equipment (N=65)



Source: Building Owner Survey Question. "You indicated that the following factors are important when selecting new RTU equipment. Of these, which would you say is the most important when selecting new RTU equipment?"

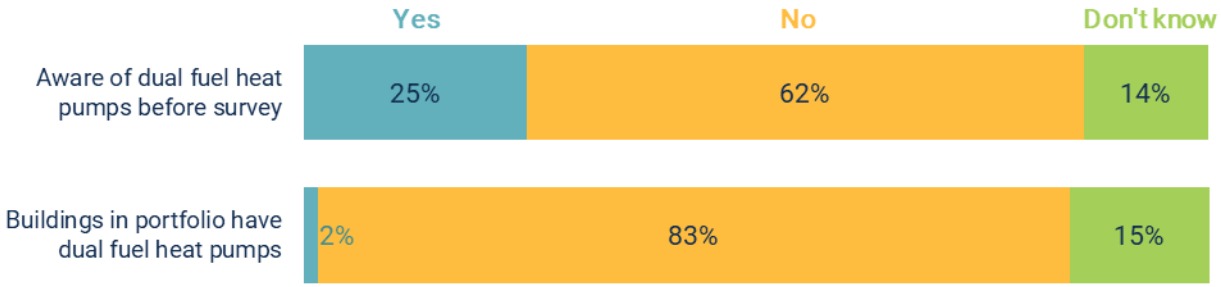
Efficient Equipment – Dual Fuel Heat Pump RTUs and ERVs

This section details findings from the building owner survey that discussed dual fuel heat pump RTUs and ERVs. Cadmus asked building owners about their familiarity and experiences with these technologies and any insights into key market actors.

Familiarity with Equipment

Familiarity of dual fuel heat pump RTUs was low among building owners, with only 25% affirming their awareness of dual fuel heat pump RTUs prior to taking the survey. Additionally, only 2% indicated that the buildings in their portfolio have dual fuel heat pump RTUs (Figure 38).

Figure 38. Awareness and Use of Dual Fuel Heat Pump RTUs (N=65)



Source: Building Owner Survey Questions. "Before this survey, were you aware of dual fuel heat pump RTU products (also called hybrid heat pump RTUs)?" and "Do any of the buildings in your portfolio have dual fuel heat pump RTUs?"

Similarly, only 18% of building owners (12 respondents) were aware of RTU products with an integrated or bolt-on ERV and 71% (46 respondents) indicated they were not aware of integrated or bolt-on ERVs before the survey, while 11% (7 respondents) indicated they were not sure (Figure 39).

Figure 39. Awareness of ERVs (N=65)

Source: Building Owner Survey Question. "Before this survey, were you aware of RTU products with an integrated or bolted on energy recovery ventilator (ERV)?"

Of the 19 building owners who indicated they were either aware of ERVs prior to the survey or not sure, five indicated that at least one of their RTUs had an integrated ERV or bolt-on ERV, while seven said no and seven said they did not know (Figure 40).

Figure 40. Use of ERVs (N=19)

Source: Building Owner Survey Question. "Do any of your RTUs have energy recovery ventilators (ERVs) integrated or bolted on?"

Cadmus asked building owners to identify the manufacturer or brand of RTUs with an integrated ERV or a bolt-on ERV and the quantity of each within their portfolio. Two respondents reported Trane as

the manufacturer their companies use for RTUs, with one owner reporting a single Trane RTU and the second owner reporting three Trane RTUs. The other building owners indicated that their portfolio has RTUs, but they did not know the brands.

Cadmus then asked respondents whether their company has any sustainability, energy efficiency, climate impact or other related goals. Among the 23 building owners (35%) who reported that their company has such goals, 83% (19 respondents) either *strongly agreed* (10 respondents, 44%) or *somewhat agreed* (9 respondents, 39%) that high-efficiency equipment or next gen RTUs could help their company meet its sustainability or climate-related goals (Figure 41).

Figure 41. Agreement with Next Gen RTUs Helping with Company Goals (N=23)

Source: Building Owner Survey Question. "To what extent do you agree that high efficiency or Next Gen RTUs—including dual fuel heat pump RTUs and ERVs—could help my company meet its sustainability or climate related goals?"Note: No respondents selected neutral, somewhat disagree, or strongly disagree.

Rebates

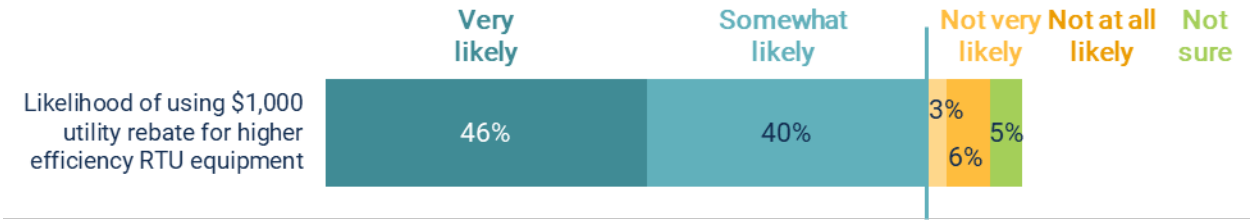
Cadmus sought to understand building owners' familiarity with and likelihood of utilizing available rebates for efficient equipment. Most respondents indicated they were not aware or did not know — only 18 (28%) of building owners stated that they were familiar with utility rebates for efficient RTU equipment (Figure 42).

Figure 42. Awareness of Utility Rebates (N=65)

Source: Building Owner Survey Question. "Are you aware of any utility rebates for higher efficiency RTU equipment?"

Additionally, 30 respondents (46%) said they were very likely to use a utility rebate that would refund $1,000 for high-efficiency RTU equipment (Figure 43).

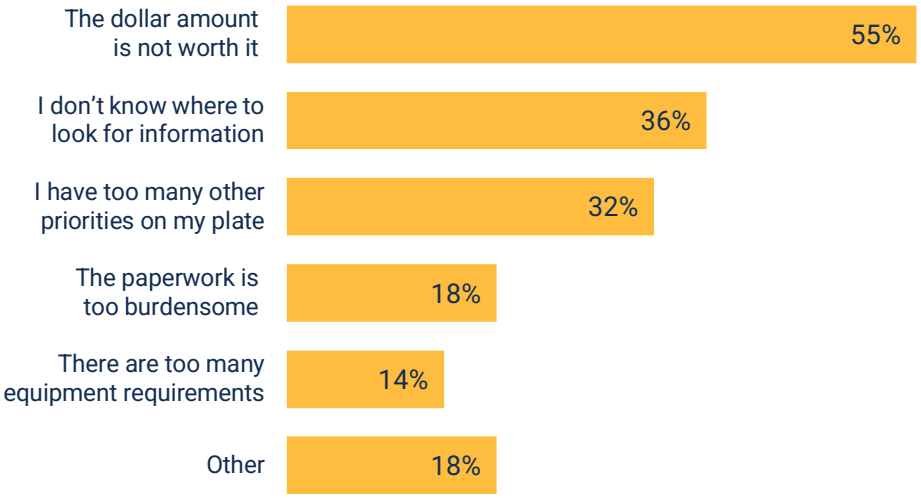
Figure 43. Likelihood of Using Rebate for RTU Equipment (N=65)



Source: Building Owner Survey Question. "How likely would you be to use a utility rebate that would refund $1,000 for higher efficiency RTU equipment (assuming you need to install an RTU)?"

Among the 32 building owners who indicated they were *somewhat likely, not very likely,* or *not at all likely* to use a utility rebate for RTU equipment, 22 provided at least one reason why they might not apply (respondents could select multiple options). The most frequently cited reason related to insufficient incentive value — nine respondents selected that the dollar value was not worth it, and several open-ended responses reinforced that a $1,000 rebate would not meaningfully influence decision-making given equipment costs or recent investments in RTUs (Figure 44). Not knowing where to look for information was the next most common selected choice (eight respondents). Building owners also cited capacity and process-related constraints, including having too many other priorities on their plate (seven respondents), paperwork being too burdensome (four respondents), and too many equipment requirements (three respondents).

Figure 44. Reasons for Not Applying for an RTU Utility Rebate (N=22)



Source: Building Owner Survey Question. ""Why might you not apply for RTU utility rebates (assuming you need to install an RTU)? (Select all that apply)."

Expert Insights

Background

Cadmus collected experts' perspectives to provide high-level context on the current state of the commercial RTU market and to complement insights from manufacturers, distributors, contractors, and building owners. Subject-matter experts can offer a cross-cutting view of market dynamics to explain how different actors engage with emerging technologies, where bottlenecks may occur along the supply chain, and how policy, programmatic, or market conditions may influence future adoption trends.

As part of this research, the team completed two interviews with industry experts experienced in commercial HVAC technologies and familiar with supply chain dynamics relevant to RTUs, dual fuel heat pump RTUs, and ERVs. One expert held the role of principal product manager at a nonprofit organization focused on market transformation efforts to increase the availability and affordability of energy efficient technologies; the other expert served as a manager at an investor-owned electric and gas utility.

Expert interviews were designed to gather qualitative insights on technology applications, perceived leverage points for market transformation intervention, and expectations for future market development. The expert insights presented in this section are intended to inform interpretation of findings from other market actor research and the broader conditions shaping the adoption of high-performance RTU technologies.

Commercial HVAC Insights

Cadmus asked subject-matter experts to provide their perceptions of motivation among various market actors to produce, stock, promote, and purchase dual fuel heat pump RTUs or ERVs. Experts also offered their opinions about where in the supply chain incentives would have the greatest impact, as well as their opinions on leverage points to increase the adoption of these products.

Perceptions of Market Actors' Familiarity with and Impressions of Dual Fuel Heat Pump RTUs and ERVs

Experts indicated that overall familiarity with both dual fuel heat pump RTUs and ERVs remains low across the commercial HVAC market, with modest differences by market actor. Both experts described distributors as having some baseline familiarity with dual fuel heat pump RTUs. Currently, distributors are not selling many dual fuel heat pump RTUs, so they are not paying much attention to this technology. Both experts said that contractors have less familiarity than distributors with dual fuel heat pump RTUs, and like distributors, they simply do not pay much attention to products they do not often sell. Customers essentially have little to no awareness of dual fuel heat pump RTUs.

Experts held a similar line of reasoning for ERVs. However, experts were more skeptical of market familiarity with bolt-on ERVs. While they said distributors and contractors have some level of familiarity with integrated ERVs, experts doubted whether any market actors had any recognition of bolt-on versions, because, as one expert observed, "bolt-on ERVs are not really a thing in the market."

> *"Distributors only focus on products that are going to make them money, so they are not completely invested in dual fuel heat pump RTUs since they do not sell them often…but they would pay attention.*

Purchasing Processes and Stocking Practices of ERVs

Of the two experts interviewed, only one offered insight into ERV purchasing processes and stocking practices. According to the expert, overall demand for ERVs has not changed much in the past two years. Citing a greater push for energy efficiency in many areas of the country, this expert said that slow and steady increases may occur, but they did not expect explosive or exponential growth. The expert noted that the demand for ERVs is far more evident in southern states, where humidity is a major issue, than in northern states, such as Minnesota, with colder climates.

Given the low demand for ERVs in Minnesota, distributors do not consistently stock them. Most RTUs with integrated ERVs are most often custom or semi-custom orders. Lead time for a custom unit is approximately six to eight weeks. Additionally, RTUs with integrated ERVs may require structural changes to a building prior to installation to accommodate the weight of the unit, increasing the lead time. Given these considerations, customers are unlikely to purchase an ERV in a replace-on-failure scenario.

In terms of sales and market penetration, one expert estimated sales for integrated ERVs are less than 5% and far less than 1% for bolt-on ERVs. Market penetration for ERVs in general is even lower than the percentages for sales. Bolt-on units are not at all common in the market.

Leverage Points

Perceptions of Market Actors' Current Motivation to Engage with Dual Fuel Heat Pump RTUs and ERVs

Both experts Cadmus interviewed agreed that market actors across the supply chain were generally uninterested in dual fuel heat pump RTUs or ERVs. Both indicated that manufacturers currently lack the motivation to develop or produce these technologies because of low demand from distributors and contractors. They explained that while manufacturers are aware of the future growth potential for these products, particularly ERVs, absent an organic increase in market demand, they are not likely to increase production. They added that enforceable changes to building codes or product standards would force manufacturers to ramp up production of efficient technologies.

Similarly, experts noted that distributors are currently not motivated to stock or promote efficient technologies due to the lack of incentives — distributors are going to sell only what contractors or customers will buy, and currently, demand for dual fuel heat pump RTUs and ERVs in the Minnesota market is low. One expert noted that ERVs are a bit of a niche product and some distributors probably

target those audiences, but at scale, ERVs are not as visible or accessible as standard products like gas RTUs.

Contractors and customers also are not motivated to promote or purchase dual fuel heat pump RTUs or ERVs. These products are expensive, and in the case of dual fuel heat pump RTUs, relatively unproven in cold climates. Customers generally think of RTUs in terms of acquiring one at minimum cost and minimum hassle. Any product that they do not strongly believe will provide tangible savings or that might require additional maintenance is not likely to be popular. Contractors are generally only interested in providing customers with products they request, and most customers already know what equipment they want. Contractors are reluctant to push or promote products that customers did not ask for because they do not want to risk overstepping and annoying a customer who did not ask about alternative products.

Supply Chain Incentives Impact

The two experts did not agree on a single point in the supply chain at which incentives would have the greatest impact on increasing sales of high-performance equipment. One expert stressed the need for greater education on these technologies across all market actors, suggesting that upstream incentives might motivate a top-down approach in which manufacturers would start producing and promoting efficient technologies. However, the same expert noted that midstream incentives would likely have the greatest overall impact because, as the midpoint in the chain, distributors could both help educate consumers and promote technologies that are more readily available. Also, distributors are closer to the point of purchase and could more easily facilitate direct relationships with contractors and customers.

> *"Midstream might be most productive as the pinch point where they can provide education and will be incented to stock, making dual fuel heat pump RTUs and ERVs more readily available, which would reduce cost to the end user.*

The other expert suggested that the point on the supply chain with the greatest impact might depend on the technology. If customers have knowledge of the technology, then downstream rebates are likely to be impactful. This expert also noted, considering that dual fuel heat pump RTUs and ERVs are not well known to customers, midstream would have the greatest impact because it offers an educational component.

LIMITATIONS

This report presents insights into the state of the Minnesota commercial RTU market based on interviews and surveys conducted with key market actors in 2025. The research was designed to support strategy development, program planning, and interpretation of market progress indicators for the Next Gen RTU initiative rather than to produce statistically representative estimates of market conditions or outcomes. Findings should be interpreted as indicative of prevailing market dynamics, perspectives, and barriers rather than precise measures of market size, penetration, or adoption rates.

The analysis draws on input from manufacturers, distributors, contractors, building owners, and subject-matter experts to capture multiple, diverse perspectives in the commercial HVAC market. While this approach provides a cross-sectional view of the market, the number of participants within some groups was limited, particularly among manufacturers, distributors, and experts. These sample sizes reflect the practical constraints of engaging specialized market actors and may not capture the full range of experiences or viewpoints across all market participants.

Many findings related to technology familiarity, sales activity, stocking practices, lead times, and perceived barriers are based on self-reported information from interview and survey participants and were not independently verified. Results may vary by respondents' roles, levels of experience, exposure to dual fuel heat pump RTUs and ERVs, and the specific market segments they serve.

Finally, the findings reflect market conditions during the 2025 data collection period and represent a snapshot in time. The findings are intended to inform interpretation of market progress indicators and guide strategic decision-making rather than serve as a definitive assessment of market adoption or program impact. While the commercial RTU market is generally characterized by slow change due to long equipment lifetimes and replacement cycles, it may be influenced over time by factors such as technology performance improvements, changes in codes and standards, incentive availability, and broader economic conditions. As these factors evolve, market behaviors and perspectives may shift gradually. Despite these limitations, the research provides a foundation for understanding current market conditions and informing Next Gen RTU initiative strategies and market transformation activities.

Conclusions and Recommendations

Taken together, the findings from this research highlight several market trends and opportunities for increasing the adoption of dual fuel heat pump RTUs and ERVs. The following section outlines nine conclusions and five corresponding recommendations for the Next Gen RTU initiative.

Conclusions

Conclusion #1	**Familiarity with dual fuel heat pump RTUs and ERVs remains limited across multiple market actors, particularly among contractors and consumers.** Experts, manufacturers, distributors, and contractors described limited familiarity with dual fuel heat pump RTUs and ERVs in the Minnesota market. Contractors themselves reported varying levels of experience with these technologies, with many indicating they have installed few (if any) dual fuel heat pump RTUs or ERVs. Similarly, contractors reported that consumers have little to no awareness of the existence, benefits, and applications of both technologies. Building owners also reported low familiarity with these technologies, often relying heavily on contractor recommendations when considering HVAC replacement options. This dynamic, in which contractors have limited direct experience and customers depend on contractor guidance, may reinforce slow uptake of next gen RTU configurations. Overall, this finding is not isolated to a single market actor group, but rather a pervasive theme throughout the supply chain which could reflect early stage or emerging market development for these technologies in Minnesota.

Conclusion #2	**Minnesota-based contractors do not promote dual fuel heat pump RTUs and ERVs nor view these technologies as important to their business models.** Sales for both dual fuel heat pump RTUs and ERVs were very low (less than 1% to 2% of all sales) for most contractors. Low sales and minimal efforts to promote these technologies are partly a result of low demand from consumers and the perception that the harsh cold climate of Minnesota in the winter is not conducive for dual fuel heat pump RTUs. In particular, bolt-on ERVs have very little traction in the Minnesota market. According to building owners, dual fuel heat pump RTUs and ERVs are not often presented in contractor bids. However, building owner survey results suggest that contractors may have more influence over equipment selection than they perceive. While many contractors reported that customer demand primarily drives equipment decisions, building owners indicated that equipment choices are frequently based on contractor recommendations or a mix of contractor and customer input. This suggests that the limited promotion of dual fuel heat pump RTUs and ERVs by contractors may play a role in their low adoption in the market. Additionally, building owner survey results suggest that contractors may underestimate customers' openness to alternatives, as relatively few owners rated "getting a similar system to what they already have" as a high priority, while energy bills, maintenance costs, and reliability ranked as the most important decision factors.
Conclusion #3	**Many contractors remain skeptical of the heating capabilities of dual fuel heat pump RTUs relative to those of standard gas units, driven largely by concerns about cold climate heating performance and economic value in Minnesota conditions.** Many contractors expressed skepticism about dual fuel heat pump RTUs' heating capabilities in Minnesota's cold climate, particularly during extended periods of extreme winter conditions. Several questioned whether installing a dual fuel product would be economically worthwhile if the system would rely heavily on gas heating during the coldest periods. Contractors noted that if gas remains the dominant heating source during peak heating demand, customers may see limited value in paying a higher upfront cost for dual fuel heat pump RTUs. These concerns about cold climate performance and the overall value proposition contribute to contractors' hesitancy to actively promote dual fuel heat pump RTUs relative to standard gas units.

Conclusion #4	**Demand for dual fuel heat pump RTUs and ERVs has remained largely unchanged over the past two years, yet there is some optimism for future growth.** All market actors generally expressed some level of optimism regarding future adoption of efficient products. Most expect growth to occur within the next five years, though it is likely to be slow and steady rather than rapid acceleration. Future adoption of efficient products will be contingent on regulations and codes for new and existing buildings that motivate building owners to adopt these products to adhere to climate goals, coupled with the availability of incentives and rebates.
Conclusion #5	**Market actors expressed mixed views on the value of dual fuel heat pump RTUs and ERVs, questioning cost to benefit ratio**. Although they see the value of both dual fuel heat pump RTUs and ERVs, many market actors question whether the cost of these products is too high relative to their benefits, especially in Minnesota, where the bill savings due to the electric component of dual fuel heat pump RTUs may not be sufficient to offset the initial cost of the equipment.
Conclusion #6	**Because distributors do not stock dual fuel heat pump RTUs and ERVs are not readily available, the typical lead time for these products is approximately one to two months.** Given the low demand for dual fuel heat pump RTUs and ERVs in Minnesota, distributors do not keep these products in stock. Customers who seek these products generally plan ahead and thus do not view lead times of one to two months or longer as a significant barrier. Lead time constraints are more of an issue for replace-on-failure scenarios. Customers facing emergency replacements and needing immediate availability are generally not seeking these products. Conversely, standard gas units are generally immediately available for both planned and emergency replacements.

Conclusion #7	**ERVs could be beneficial in specific applications, especially those requiring a steady flow of fresh air.** Market actors view ERVs as beneficial for densely occupied buildings that require a steady flow of fresh air. Buildings such as schools, daycare facilities, restaurants, office buildings, or hospitals with high occupancy rates benefit from ERVs, especially in winter when temperatures are too cold to open windows for fresh air.
Conclusion #8	**Manufacturers and distributors cited downstream as the point in the supply chain most likely to make an impact on market adoption, whereas some experts and contractors saw more benefit in midstream programs.** Manufacturers and distributors noted that downstream rebates would be most effective as they are more likely to be perceived by consumers as direct benefits. Many contractors viewed downstream as the most impactful point in the supply chain; however, half of the contractors and both experts favor midstream programs, which provide both incentives to contractors and education to consumers about little-known products.
Conclusion #9	**Contractors lack familiarity with customers' utility rates and are missing opportunities to promote the potential of efficient technology to provide bill savings.** Many contractors are not familiar with their customers' utility rates, and while the majority make some effort to discuss bill-saving opportunities with customers, they do not push hard to promote efficient technology. They acknowledge and accept that most customers are either looking for the cheapest option or want to replace their existing units with a similar or the same unit (e.g., gas for gas). However, building owners stated that lowering energy bills is a prime motivator and they rely on contractors' expertise when making recommendations, indicating a potential disconnect between how contractors perceive customers' preferences and customers' willingness to entertain efficient options.

Recommendations

The following are recommendations for the Next Gen RTU initiative.

Recommendation #1	**Strengthen and refine ongoing contractor and customer awareness efforts related to the benefits and capabilities of dual fuel heat pump RTUs.** Contractors remain hesitant to promote dual fuel heat pump RTUs and often question their heating capabilities in Minnesota's cold climate, while building owners have low awareness and seldom see dual fuel heat pump RTUs in bids. However, building owner survey responses suggest that contractors may have more influence over equipment decisions than they perceive, as owners frequently rely on contractor recommendations when evaluating equipment options. Continue existing contractor engagement and training efforts, refine awareness to directly address the gaps surfaced in this research by emphasizing cold climate performance information for newer models, clarifying cost and bill savings expectations, and highlighting practical use cases where dual fuel heat pump RTUs fit. Provide simple, sales-oriented tools that contractors can use with owners and other decision-makers to overcome misconceptions that currently appear to limit promotion and adoption.

Recommendation #2	**Enhance ongoing efforts to increase awareness and promotion of ERVs and focus outreach on high-value applications and planned project pathways.** Market actors, particularly contractors, demonstrated awareness of the best applications for ERVs, but do not consistently communicate or promote this information to consumers. Because ERVs are typically special-ordered with longer lead times and are not routinely stocked, strengthen the current Next Gen RTU initiative efforts by prioritizing planned projects (rather than replace-on-failure projects). Initiatives for distributors and contractors could focus on developing targeted marketing campaigns and promotional materials to promote ERVs to building owners, facility managers, and other potential customers who could benefit most from this technology and have influence in the decision-making process.

Recommendation #3	**Continue to coordinate with utilities and other market actors (e.g., manufacturers, distributors) on programs that support and incentivize next gen RTUs, including pilot incentive designs and case studies.** Utility rebates for next gen RTUs exist in Minnesota and are primarily structured as downstream incentives. However, interview and survey findings suggest market actors see value in both downstream and midstream approaches. Customers are more likely to feel like a part of the process of saving when offered downstream rebates, while midstream incentives can influence equipment availability, distributor engagement, and contractor awareness. Building on the Next Gen RTU initiative's role in coordinating with utilities and market actors, the initiative could support pilot incentive designs that pair streamlined downstream incentives with a targeted midstream component. For example, a pilot structure could include a midstream design with a portion of the incentive going to the end customer to reinforce demand, and a portion going to the distributor to encourage stocking. This may also be a good opportunity for collaboration and case study development. Coordinating with utilities undertaking similar or related pilots and documenting lessons learned could help inform future incentive design and accelerate market adoption of next gen RTUs.

Recommendation #4	**Continue to work with distributors to stock and increase the availability of efficient RTU technologies to reduce lead times for replace-on-failure situations.**
	Because the largest share of RTU installations occur under replace-on-failure conditions, equipment availability within a tight decision window strongly influences final technology selection. While existing rebates help address first-cost barriers, they do not address the lack of availability of dual fuel heat pump RTUs and ERVs when a unit fails. To address this constraint, the Next Gen RTU Initiative could consider expanding existing distributor engagement, piloting targeted availability of a limited set of common, high-volume sizes and configurations most likely to serve replacement scenarios among select distributors. This could include testing short-term stocking pilots for priority dual fuel heat pump RTU models, limited inventory support or manufacturer coordination, and streamlining ordering pathways for pre-identified replacement configurations. Because demand from contractors and customers impacts distributors' practices, efforts to increase availability should be coordinated with complementary strategies to increase awareness of dual fuel heat pump RTUs and ERVs, as recommended in this report. This includes efforts to reduce upfront cost barriers so that improved stocking practices translate into increased sales and ultimately widespread adoption.

Recommendation #5

Strengthen and streamline contractor-facing economic messaging to improve communications and interactions with customers at the point of sale on savings and payback.

For dual fuel heat pump RTUs and ERVs to gain greater market traction, contractors must be able to clearly communicate the financial value of these technologies to customers. The Next Gen RTU initiative has developed savings tools and case studies to support contractor engagement; however, this research suggests that economic value messaging is not consistently incorporated into sales conversations, particularly in replace-on-failure situations where time is limited. Building on existing efforts, the initiative could refine contractor-facing tools to better align with sales conditions. This could include simplified scenario-based estimates for common building types, concise fact sheets and talking points addressing payback questions, and bid-ready inserts that incorporate existing rebates. Integrating these streamlined materials into contractors' workflows may improve confidence and consistency in how dual fuel heat pump RTUs and ERVs are presented to building owners and other decision-makers.

Additionally, building owner survey findings indicate that customers are less motivated by like-for-like replacements than contractors may assume. Strengthening contractor-facing tools that translate next gen RTU features into owner-values outcomes (e.g., reducing energy bills, lowering maintenance costs, and improving reliability) may help bridge this disconnect at the point of sale.

Appendix A: Market Progress Indicators Table

Table 8 outlines the logic model outcomes and corresponding market progress indicators (MPIs). Cadmus provided data for MPIs as indicated by the ETA team in the "2025 data source" column, where the data source corresponded to research conducted for this report (e.g., contractor survey, distributor survey, manufacturer survey, and consumer survey). Data from the building owner survey is offered where indicated for the "consumer survey." Dual fuel heat pump RTUs are represented by the acronym DFHPRTUs for brevity.

Table 8. Market Progress Indicators

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
OC1. Next Gen RTUs are readily available (reasonable wait time and some stocked)				
A. Increasing % of contractors indicate that Next Gen RTUs are readily available with reasonable lead times	**DFHPRTUs:** est. 24-30 weeks (p. 48) **ERVs:** "Significantly adds to lead time." (p. 49)	**DFHPRTUs:** 3/7 est. 3-6 months, 4/7 unsure (p. 13) 69% (inclusive of IDK responses) indicated that product availability was a challenge - removing the IDK, 85% said it was a challenge (p.12) **ERVs:** 1/9 est. available now, 1/9 est. 3-4 weeks, 2/9 est. 1-2 months, 2/9 est. 3-6 months, 3/9 unsure (p. 19)	**DFHPRTUs**: 0/9 (0%) est. available now, 2/9 (22%) est. 1-2w, 1/9 (11%) est. 2-3w, 2/9 (22%) est. 3-4w, 2/9 (22%) est. 1-2m, 2/9 (22%) est. 3-6m 1/7 thought wait times were *somewhat unreasonable*; 5/7 *somewhat reasonable*, 1/7 *reasonable* **Integrated ERVs:** 1/8 (13%) est. available now, 2/8 (25%) est. 1-2w, 0/8 est. 2-3 w 1/8 (13%) est. 3-4w, 3/8 (38%) est. 1-2m, 1/8 (13%) est. 3-6m	Contractor survey

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
			5/7 thought wait times were *somewhat reasonable*, 2/7 said *reasonable* **Bolt-on ERVs:** 2/8 (25%) est. available now, 1/8 (13%) est. 1-2w, 0/8 est. 2-3w, 3/8 (38%) est. 3-4w, 1/8 (13%) est. 1-2m, 1/8 (13%) est. 3-6m, 1/6 thought wait times were *somewhat unreasonable*; 4/6 *somewhat reasonable*, 1/6 *reasonable*	
B. Increasing % of distributors' stock Next Gen RTUs that align with our recommended specifications	**DFHPRTUs:** "Not currently stocked." (p. 48) **ERVs:** "Not off the shelf." (p. 49)	In conversations, distributors indicated they do not have product stocked or available from the manufacturer	**DFHPRTUs and ERVs**: Both distributors indicated they do not have product stocked or available from the manufacturer.	Distributor survey/conversations
OC2. Awareness of products, benefits, and energy savings increases among manufacturers, distributors, and contractors				
C. Increasing #/% of market actors reporting familiarity with dual fuel heat pump RTU products	**Manufacturers:** 6/7 manufacturers "Either have dual-fuel products available today or are actively developing them." (p. 40)	Not planned for 2024	100% of **manufacturers** (n=3) have some familiarity with DFHPRTUs.	Manufacturer survey
	Distributors: "There was a lot of product awareness and enthusiasm." (p. 48)	**Distributor conversations,** distributors indicated they were aware of products, but do not have products stocked or	**100% of distributors (n=3) have some familiarity with DFHPRTUs.**	Distributor survey/conversations

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
		available from the manufacturer; some do stock ERVs		
	Contractors: "There was a lot of product awareness and enthusiasm." (p. 48)	**Contractors:** 42% of contractors (8 of 19) said they are aware of DFHPRTUs RTU products currently on the market (p. 8)	**Contractors**: 81% of contractors (17 of 21) said they had at least looked into DFHPRTUs products. 48% indicated that they had installed at least one	Contractor survey
D. Increasing #/% of market actors reporting agreement that ERVs are beneficial for different applications (e.g., outdoor air requirements, existing buildings, new construction performance pathways)[b]	**Manufacturers:** "Perception that ERVs are for 100% OA units or DOAS (three responses that sales are 1-2% for light commercial RTU)"; "Benefits of ERV: Energy savings, meets code when required, can extend the operating range (OQ temperature range) of an air-source heat pump, possible to downsize the unit's mechanical heating/cooling capacity, helps keep demand charges down for end users, better option for dehumidification (less energy intensive and no occupant comfort issues", reduced emissions" and "Perception that ERVs are for 100% OA units or DOAS (three responses that sales are 1-2% for light commercial RTU)" (pp. 41-42)"	Not planned for 2024	**Manufacturers** indicated that ERVs are somewhat beneficial. Two out of the three manufacturers indicated their high favorability of RTUs with integrated ERVs and emphasized their value in DOAS-type systems and institutional buildings where ventilation and energy recovery needs are high. Distributors and contractors reinforced this application-specific perspective. Contractor responses highlighted RTUs with integrated ERVs as beneficial in tight or energy-efficient buildings, projects with high ventilation or air exchange requirements, and in settings such as offices, schools, and daycares. Contractors also distinguished between integrated and bolt-on ERVs by use case (40% of contractors), noting a preference for integrated ERVs in new construction and bolt-on ERVs in certain retrofit scenarios.	Manufacturer survey; Contractor survey and interviews

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
	Distributors: "While respondents did have positive things to say about the [ERV] technology, it is not currently very popular with either distributors or contractors." (p. 49)	**Distributor conversations:** Somewhat mixed perception - Of 3, one said widely beneficial, one said generally beneficial, and seeing more of them due to air quality/air exchange requirements, and one said they were really only beneficial for DOAS or over 30% OA.	**Distributors** indicated that RTUs with integrated ERVs are somewhat beneficial. Two of the three distributors indicated strong high favorability (4 out of 5) toward RTUs with integrated ERVs and their benefits. (Question: "On a scale from 1 to 5 with 1 being *very unfavorable* and 5 being *very favorable*, how would you rate your overall opinion of RTUs with integrated ERVs?)	Distributor survey/conversations
	Contractors: "While respondents did have positive things to say about the technology, it is not currently very popular with either distributors or contractors" (p. 49); the 2024 baseline will be more valuable.	**Contractors:** Out of 17 contractors, the majority (82%) were very (n=7) or somewhat likely (n=7) to recommend ERVs in buildings with greater than 30% outdoor air requirements. 41% were very (n=1) or somewhat likely (n=6) to recommend ERVs in buildings with 30% or less outdoor air requirements. Another 41% were very (n=1) or somewhat likely (n=6) to recommend ERVs when they are not required by code (p. 17)	**Contractors** : 40% (10 out of 25) responded to the interview and survey question: "Are there any specific applications or scenarios where ERVs are particularly beneficial or where you would be more likely to recommend them? (either integrated or bolt-on)." Respondents noted that buildings that are densely packed, such as offices, daycares, schools, hospitals, and restaurants, are prime examples of building types that would benefit from ERVs.	Contractor survey/Interviews
E. Increasing #/% of market actors report that selling Next Gen RTUs is valuable to their business	**Manufacturers:** Do not have explicit value, but 6/7 "either have dual-fuel products available today or are actively developing them" (p. 40), which indicates they are worth	Not planned for 2024	**DFHPRTUs:** All three **manufacturers** indicated that dual-fuel heat pumps have little to no influence on their business model and they do offer these products.	Manufacturer survey

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
	investing in, but no additional data on value.		**Integrated ERVs:** Two manufacturers reported that this technology holds more importance for their business model in comparison to DFHPRTUs. **Bolt-on ERVs:** Manufacturers reported RTUs with bolt-on ERVs do not add value to any of the manufacturers' business models.	
	Distributors: Use 2024 as baseline.	**Distributor conversations:** 3/4 distributors said that next-generation RTUs were valuable to their business, discussing that for DFHPRTUs, they are interested in being ahead of the curve, but waiting for demand to increase. One strongly preferred geothermal to ASHP RTU but did value ERVs.	**DFHPRTUs** Two **distributors** reported that selling **DFHPRTUs** are of low importance to their business model, while the third distributor mentioned they were somewhat to slightly important to their business. **Integrated ERVs:** Perceived value of selling RTUs with integrated ERVs varied among distributors. One said the sale of RTUs with integrated ERVs was *very important to essential* to their business model, citing relevance for specific applications such as DOAS and institutional buildings. The remaining two distributors said selling integrated ERVs were *not very important* and *not at all important*. **Bolt-on ERVs:** Distributors reported the lowest perceived business value for bolt-on ERVs. Two	Distributor survey/conversations

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
			distributors said the sale of this product was *not at all important* for their business models. The third said *not at all to not very important* to their business model, emphasizing limited demand and preference for integrated solutions when ERVs are required.	
	Contractors: Use 2024 as baseline	**Contractors:** **DFHPRTUs:** Out of 6 contractors who sold DFHPRTUs, 1 said the tech is *very important* to their business model, 3 said it is *somewhat important*, and 2 said it is *not very important* (p. 11) **ERVs:** Out of 9 contractors who sold bolt-on ERVs or RTU products with integrated ERVs, 6 said they are *somewhat important* to their business model, and 3 said they are *not very important* (p. 19)	**DFHPRTUs:** Out of 21 **contractors** who sold RTUs, 3 (14%) said that selling DFHPRTUs was *very important*, 5 (24%) said *somewhat important*, 4 (19%) said *not very important*, and 9 (43%)said *not at all important* to their business model. **Integrated ERVs:** Out of 18 contractors who sold RTUs, 7 (39%) said that selling integrated ERVs was *somewhat important*, 2 (11%) said *not very important*, and 9 (50%) said *not at all important* to their business model. **Bolt-on ERVs**. Out of 15 contractors who sold RTUS, 4 (27%) said that selling bolt-on ERVs was *somewhat important*, 6 (40%) said *not very important*, and 5 (33%) said *not at all important* to their business model.	Contractor survey

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
OC3. Market actor confidence in Next Gen RTUs increases, and market actors promote Next Gen RTUs				
F. Contractors report greater preparedness/confidence in installing Next Gen RTUs	Use 2024 as a baseline.	**DFHPRTUs:** Out of 8 contractors aware of DFHPRTUs, 3 said they felt *very prepared* to install the technology, and 4 said they felt *somewhat prepared* to install the technology (1 did not respond) (p. 8) **ERVs:** Did not inquire	**DFHPRTUs:** out of 20, 11 (55%) said they were *very prepared*, 8 (40%) said *somewhat prepared*, and 1 (5%) said *not very prepared* to install a DFHPRTUs. **Bolt-on ERV:** out of 10, 3 contractors (30%) said they were *very prepared*, 4 were *somewhat prepared*, 2 were not *very prepared*, and 1 was *not at all prepared* to install a bolt-on ERV	Contractor survey
G. Market actors increasingly report promotion of Next Gen RTUs (e.g., in bids, better/best lineup)	Use 2024 as a baseline.	**DFHPRTUs:** Out of 6 contractors who sold DFHPRTUs, 5 said that they sometimes include DFHPRTUs in their standard bidding processes, and 1 said they do not often include it (p. 11) **ERVs:** Out of 9 contractors who sold ERVs, 1 said they include bolt-on ERVs or RTU products with integrated ERVs in their bidding process very often, 3 said they include them sometimes, 5 said they include them not very often or not at all (p. 19)	**DFHPRTUs:** Out of 19, 16% promote DFHPRTUs often, 21% sometimes, 26% rarely, and 37% never. **Integrated ERVs:** Out of 19, 2 (11%) reported promoting RTUs with integrated ERVs often, 4 (21%) said sometimes, 5 (26%) said rarely, and 8 (42%) said never promoting **Bolt-on ERVs.** Out of 19, 0 reported promoting bolt-on ERVs often, 4 (21%) said sometimes, 7 (37%) said rarely, and 8 (42%) said never promoting	Contractor survey
H. Market actors increasingly report a	**Manufacturers'** perception of dual-fuel heat pumps was	Not planned for 2024	All three **manufacturers** indicated some favorable opinions of	Manufacturer survey

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
favorable opinion of Next Gen RTUs	overall positive. They stated many benefits to dual fuel and thought that they were a good solution for increased heat pump adoption in cold climates" (p. 40)		DFHPRTUs. Two reported highly favorable opinions of RTUs with integrated ERVs. All three manufacturers reported neutral to negative opinions of RTUs with bolt-on ERVs.	
	Distributors: **DFHPRTUs:** "There was a lot of product awareness and enthusiasm" (p. 48). **ERVs:** "While respondents did have positive things to say about the technology, it is not currently very popular with either distributors or contractors." (p. 49)	**Distributor conversations:** 3/4 distributors held generally favorable opinions, one had an unfavorable opinion of HP RTUs, but was favorable toward ERV	Two **distributors** reported highly favorable opinions of DFHPRTUs, while one reported a more neutral opinion towards them, as they stated, "some are good, some are bad." Two distributors reported that they are in favor of RTUs with integrated ERVs. All three did not have favorable opinions of Bolt-on ERVs.	Distributor survey/ conversations
	Contractors: **DFHPRTUs:** "There was a lot of product awareness and enthusiasm." (p. 48). **ERVs:** "While respondents did have positive things to say about the technology, it is not currently very popular with either distributors or contractors" (p. 49)	**Contractors:** **DFHPRTUs:** We did not inquire about DFHPRTUs, specifically as the tech is nascent; however, we did ask contractor opinions of heat pump technology in general. Out of 18 contractors, 2 said they have a very favorable opinion, 9 had a favorable opinion, 5 had a neither favorable nor unfavorable opinion, and 2 had an unfavorable opinion (p. 9) **ERVs:** Out of 17 contractors, 2 reported a very favorable opinion, 10 reported a favorable	**DFHPRTUs:** Out of 21 contractors, 2 (10%) had a very favorable, 9 (43%) had a favorable, 4 (19%) had a neutral, and 6 (29%) had an unfavorable opinion. Some questioned their heating capacity relative to gas units. **Integrated ERVs:** Out of 20, 1 (5%) had a very favorable, 8 (40%) had a favorable, 9 (45%) had neutral, and 2 (10%) had unfavorable opinion. **Bolt-on ERVs:** Out of 16, 1 (6%) had a very favorable, 3 (19%) had a favorable, 8 (50%) had a neutral,	Contractor survey

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
		opinion, 4 reported a neither favorable nor unfavorable opinion, and 1 reported an unfavorable opinion (p. 15)	and 4 (25%) had an unfavorable opinion.	
OC4. Next Gen RTU sales increase				
I. Increase in # and share of Next Gen RTUs sold	To be retroactively included once data for energy savings are available and reported.	**To be retroactively included once data for energy savings are available and reported. Qualitatively, DFHPRTUs:** Out of 6 contractors who sold DFHPRTUs, 1 said they have seen sales increase a lot over the last few years, 1 said they have seen sales increase a little, and 4 said they have seen them stay the same (p. 11) **ERVs:** Out of 9 contractors who sold ERVs, 5 said they have seen sales increase a little over the last few years, and 4 said their sales have stayed the same (p. 18)	**DFHPRTUs:** out of 22 contractors, 12 (55%) stated they had sold zero in the past 12 months, 8 (36%) sold 1 or 2, 1 sold between 3 and 5, and 1 (5%) said they sold 11 more **Integrated ERVs:** of the 22 contractors, 11 (50%) had sold zero, 6 (27%) sold 1 or 2, 2 (9%) sold between 3 and 5, and 3 (14%) sold between 6 and 10. **Bolt-on**: of the 19 contractors, 15 (79%) sold zero, 1 (5%) sold 1 or 2, 1 (5%) sold between 3 and 5, and 1 (5%) said they sold 11 or more	Sales data, contractor survey
OC5. Targeted consumers* increase awareness of Next Gen RTUs products, programs, and benefits (e.g., as a climate and EE business strategy)				
J. Increasing # of consumers aware of Next Gen RTU products	See Figure 10 - Nine out of 16 participants (56%) were familiar with an energy recovery ventilator, four out of 16 (25%) building representatives were familiar with DFHPRTUs (pp. 62-63)	Not planned for 2024:	16 out of 65 (25%) surveyed building owners were familiar with DFHPRTUs; 12 out of 65 (18%) were familiar with ERVs.	Consumer survey

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
K. Increasing # of consumers are aware of a program or incentive around Next Gen RTUs	No baseline available	Not planned for 2024	18 out of 65 (28%) surveyed respondents reported being aware of utility rebates for higher-efficiency RTU equipment, while 33 out of 65 (51%) were not aware, and 14 out of 65 (22%) were unsure.	Consumer survey
L. Increasing # of consumers report that Next Gen RTUs can be helpful in reaching company goals	No baseline available	Not planned for 2024	Overall, 35% (n=65) of building owners noted that their company has one of the following: sustainability, energy efficiency, climate impact or other related goals; 65% said no. Of those with these goals, more than four in five respondents (n=23) agree that high-efficiency or next-generation RTUs could help their company meet sustainability or climate-related goals. Specifically, 44% strongly agree, and 39% somewhat agree, while 17% are unsure.	Consumer survey
OC6. Contractors offer Next Gen RTUs in their bids.				
M. Increasing #/% of consumers report satisfaction with their bids and contractor search - ADJUSTED: Increasing % of contractors offer RTUs in their bids.	"Only 2 out of 17 participants said they did not have a trusted contractor or vendor relationship that they could lean on during the bid review process… Participants listed many different challenges, and often listed multiple challenges, that they faced during the bid review process" (p. 58)	Not planned for 2024	17% of surveyed building owners indicated that RTU bids have included heat pump RTUs, and 14% reported seeing RTUs with bolt-on or integrated ERVs. However, a substantial share of respondents were unsure - 24% for heat pump RTUs and 45% for ERVs.	Consumer survey

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
OC7. Manufacturers receive clear signal for Next Gen RTUs				
N. Manufacturers report that they are seeing an increased demand for Next Gen RTUs	Estimated sales figure to be very low - <2% for ERVs, but expect growth. "Manufacturers expect the market for RTUs will remain strong. They expect similar sales or even increased sales of RTUs… dual-fuel heat pump RTU market is expected to increase rapidly. One manufacturer expected their dual fuel sales to see 50% growth in the next three years." (p. 46)	Not planned for 2024	One manufacturer (N=3) expects demand for Next Gen RTUs (DFHPRTUs) to increase, citing expanding product offerings and growing emphasis on higher-efficiency technologies. The remaining manufacturers did not provide a specific forecast for increased demand; instead, they described demand as stable or emerging and emphasized preparedness through portfolio expansion and inclusion of Next Gen RTUs as market conditions evolve.	Manufacturer survey
OC8. ERVs and heat pumps are incorporated into incentive programs and programs are used by consumers				
O. Utility or other programs include ERVs and heat pumps	**2023 incentives** **DFHPRTUs** CPE - custom rebates **ERVs** Xcel - prescriptive MERC - prescriptive CPE – prescriptive **HVAC custom/general** OTP, MN Power, Dakota Electric	**2024 incentives** **DFHPRTUs** Xcel - prescriptive (added in 2024) CPE - custom rebates **ERVs** Xcel - prescriptive MERC - prescriptive CPE – prescriptive **HVAC custom/general** OTP, MN Power, Dakota Electric	Not covered in this report.	Program documentation

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
	RTUs also qualify for federal 179d tax credit (will end in 2025)	**RTUs also qualify for federal 179d tax credit (will end in 2025)**		
P. Increasing # of program participants		To be retroactively included once data for energy savings are available and reported.	Not covered in this report.	Program documentation
OC9. Market actors are aware of and leverage financial incentives				
Q. Increasing #/% of market actors familiar with financial incentives	**Contractors:** Use 2024 as baseline	**Contractors:** Out of 16 contractors, 1 said they were very familiar with customers' utility rates, 7 said they were somewhat familiar, 5 said they were not very familiar, and 3 said they were not at all familiar (p. 13) (50% reporting some familiarity)	**Contractors**: Out of 18 contractors, 2 (11%) said they were very familiar with customers' utility rates, 10 (56%) said they were somewhat familiar, 4 (22%) said they were not very familiar, and 2 (11%) said they were not at all familiar. (67% reporting some familiarity)	Contractor survey
	Distributor: Use 2024 as baseline	**Distributor conversations:** Appears to be mixed. Only 2 were asked about this, and one said they were familiar, one was not.	All three distributors were familiar with financial incentives for these technologies, and two indicated that financial incentives that are received by the end user/customer would be most beneficial for RTU and ERV adoption.	Distributor survey/ conversations
OC10. Manufacturers offer more RTUs with efficient features (e.g., integrated ERV and bolt-on options, cold climate, demand response, controls, and easier installation)				
R. Increasing % of products that align with our recommended features/specifications	At the end of 2023, 52 dual fuel heat pump RTU products were known to be available. See	At the end of 2024, 63 DFHPRTU products were known to be available (increase of 11 products over baseline);	Not covered in this report.	See 2024 Heat Pump RTU Product List

MPI	Baseline / Pre-2024 Data	2024 data	2025 data	2025 data source
	2023 Product List. Do not have information on ERVs.	see 2024 Product List. Do not have information on ERVs.		
S. # of manufacturers offering Next Gen RTUs increases	4 manufacturers have DFHPRTU products, with an additional 3 manufacturers with all-electric only heat pump products; do not have information on ERVs	No change in 2024 - 4 manufacturers have DFHPRTU products, with an additional 3 manufacturers with all-electric only heat pump products; Do not have information on ERVs	Not covered in this report.	AHRI product directory scan
OC11. Coordination efforts occur across regional and national stakeholders				
T. Unified input to manufacturers and other market actors (memos, specs, etc.)	N/A	No major documentation for 2024	Not covered in this report.	Program documentation; Program partner survey
U. # of national or regional stakeholders participating in coordinating efforts	N/A	ETA began a national heat pump RTU working group with VEIC; it has now managed by the Consortium for Energy Efficiency with roughly 12 members (CEE Commercial Air Conditioning and Heat Pumps Committee)	Not covered in this report.	Program documentation
OC12. Codes and standards encourage Next Gen RTUs where appropriate				
V. Code or appliance standard encourages Next Gen RTUs	**MN Commercial Energy Code:** 6.5.6 Energy Recovery 6.5.6.1 Exhaust Air to Outdoor Air Energy Recovery	No change planned for 2024	Not covered in this report.	Code or standard

APPENDIX B: MPI ANALYSIS

Outcome 1 (OC1): Next Gen RTUs are Readily Available (reasonable wait time and some stocked)

MPI A: Increasing percentage of contractors report that Next Gen RTUs are readily available with reasonable lead times

Verdict: Undetermined

The proportion of contractors (with some experience installing dual fuel heat pump RTUs) who indicated that dual fuel heat pump RTUs were readily available did not discernibly increase since last year; however, lead times appear to be shorter and more reasonable in some cases. Of the nine contractors who offered a response, three stated that lead times for dual fuel heat pump RTUs were within three weeks, two stated three to four weeks, two said one to two months, and two said three to six months. Seven contractors commented on the reasonableness of the lead time for a dual fuel heat pump RTUs, with one stating it was *reasonable,* five stating *somewhat reasonable*, and one stating it was *unreasonable.* Compared to 2024, when contractors primarily reported longer lead times (three of seven contractors estimated a three- to six-month wait, and four were unsure, with some noting an availability challenge), the 2025 responses include a greater share reporting lead times under one month, suggesting some improvement in availability, though based on a small sample.

As for ERVs, the proportion of contractors (with some experience installing ERVs) who indicated that integrated ERVs were readily available did not increase markedly since last year. Only one (of eight) contractors said that ERVs were readily available, two said one to two weeks, one estimated three to four weeks, whereas four said that lead times were at least one month (up to six months). Seven contractors commented on the reasonableness of the lead time for an ERV, with five stating it was somewhat reasonable and two stating it was reasonable. No contractor said the lead time was unreasonable.

MPI B: Increasing percentage of distributors stock Next Gen RTUs that align with our recommended specifications

Verdict: No increase

As in previous years, no distributors (of three) reported stocking dual fuel heat pump RTUs and ERVs or having them readily available.

Outcome 2: Awareness of Products, Benefits, and Energy Savings Increases Among Manufacturers, Distributors, and Contractors

MPI C: Increasing proportion of market actors reporting familiarity with dual fuel heat pump RTU products

Verdict: Increase among contractors based on stated familiarity and experience installing dual fuel heat pump RTUs

The proportion of contractors who reported having some familiarity with dual fuel heat pump RTUs was greater in 2025, with 81% (N=21) stating that they had at least looked into them and 48% indicating that they had installed at least one dual fuel heat pump RTU. In 2024, 42% (N=19) said they were aware of dual fuel heat pump RTUs. Manufacturers and distributors said they were aware of dual fuel heat pump RTUs in both 2024 and 2025.

MPI D: Increasing #/% of market actors reporting agreement that ERVs are beneficial for different applications (e.g., outdoor air requirements, existing buildings, new construction performance pathways)

Verdict: Moderate agreement among market actors; benefits are recognized for RTUs with integrated ERVs for specific applications.

Manufacturers expressed general agreement that ERVs are beneficial, particularly for applications with high outdoor air requirements. Two of the three manufacturers interviewed reported high favorability toward RTUs with integrated ERVs and emphasized their value in DOAS-type systems and institutional buildings where ventilation and energy recovery needs are high.

Distributors and contractors reinforced this application-specific perspective. Contractor responses highlighted RTUs with integrated ERVs as beneficial in tight or energy efficient buildings, projects with high ventilation or air exchange requirements, and in settings such as offices, schools, and daycares. Contractors also distinguished between integrated and bolt-on ERVs by use case, noting that integrated ERVs are more commonly recommended in new construction, while bolt-on ERVs may be more feasible in certain retrofit scenarios.

MPI E: Increasing proportion of market actors report that selling Next Gen RTUs is valuable to their business

Verdict: No discernable increase in Next Gen RTUs perceived value among market actors

The proportion of contractors who stated that selling dual fuel heat pump RTUs was important to their business model was mixed. Out of 21 responses, 13 (62%) stated that dual fuel heat pump RTUs were *not very important* or *not at all important*, while eight said that they were *somewhat important* or *very important* to their business. In 2024, six contractors offered responses, with only one saying that dual fuel heat pump RTUs were *very important,* three saying *somewhat important*, and two stating *not very important.* Manufacturers and distributors did not view dual fuel heat pump RTUs as important to their business models, with all three manufacturers and two of three distributors stating that dual fuel heat pump RTUs add little to no value to their business model. Only one distributor held that dual fuel heat pump RTUs added moderate value.

For integrated ERVs, seven out of 18 (39%) contractors said that selling integrated ERVs was *somewhat important* to their business model, while two said they were *not very important,* and nine said *not at all important.* Contractors generally held similar views on bolt-on ERVs, with only four of 15 (27%) saying that bolt-on ERVs were *somewhat important*, six saying *not very important*, and five saying *not at all important* to their business model.

Outcome 3: Market Actor Confidence in Next Gen RTUs Increases, and Market Actors Promote Next Gen RTUs

MPI F: Contractors report greater preparedness/confidence in installing Next Gen RTUs

Verdict: Contractor preparedness to install dual fuel heat pump RTUs slightly increased in 2025

The proportion of contractors who reported being prepared to install a dual fuel heat pump RTUs was slightly higher in 2025 than in 2024. In 2025, 55% of contractors (N=20) said they were *very prepared,* and another eight said they felt *somewhat prepared*, whereas only one said they felt *not very prepared* to install a dual fuel heat pump RTUs. Conversely, in 2024, three out of eight contractors felt *very prepared,* whereas four felt *somewhat prepared*. One did not offer a response.

For bolt-on ERVs, out of 10 contractors who offered a response, three said they felt *very prepared*, four were *somewhat prepared*, two were *not very prepared*, and one was *not at all prepared*. Data was not available for 2024.

MPI G: Market actors increasingly report promotion of Next Gen RTUs (e.g., in bids, better/best lineup)

Verdict: There was a marginal uptick in the proportion of contractors who 'often' include dual fuel heat pump RTUs in their bids

The proportion of contractors who reported promoting dual fuel heat pump RTUs in their bids always or often slightly increased in 2025. Out of 19 contractors, three reported promoting dual fuel heat pump RTUs *often*, four promoted *sometimes*, whereas five promoted *rarely,* and seven reported *never* promoting dual fuel heat pump RTUs. In 2024, five of six who sold dual fuel heat pump RTUs (of 19 surveyed) reported promoting *sometimes,* whereas one *never* promoted and none *often* promoted dual fuel heat pump RTUs.

There was no discernable change for ERVs.

MPI H: Market actors increasingly report a favorable opinion of Next Gen RTUs

Verdict: Undetermined

For dual fuel heat pump RTUs, 11 of 21 (52%) contractors held *very favorable* or *favorable* opinions, four held a neutral position, and six held *unfavorable* opinions of dual fuel heat pump RTUs. Data was not gathered in 2024 for comparison. However, it is worth noting that attitudes toward heat pump technology in general were recorded. Out of 18 contractors, 11 held very favorable or favorable opinions of heat pump technology (61%). Manufacturers and distributors held generally positive opinions in 2025.

For integrated ERVs, one contractor (out of 20) held a *very favorable* opinion, eight held *favorable*, nine held a neutral opinion, and two held *unfavorable* opinions.

For bolt-on ERVs, one contractor (out of 16) held a *very favorable*, three held *favorable*, eight held neutral, and four held *unfavorable* opinions.

In 2024, opinions of ERV technology were generally favorable, with 12 out of 17 stating they were favorable or very favorable toward ERVs; however, there was no discernment between integrated and bolt-on.

Outcome 4: Next Gen RTU Sales Increase

MPI I: Increase in # and share of Next Gen RTUs sold

Verdict: Early signs of sales activity, but overall uptake remains limited

Available data indicate that Next Gen RTUs continue to represent a small share of total contractor sales, with limited but observable sales activity across both dual fuel heat pump RTUs and ERV technologies. Many contractors 12 out of 22 (55%) reported selling no dual fuel heat pump RTUs or

ERVs in the prior 12 months, while a smaller subset reported selling limited quantities. For dual fuel heat pump RTUs, most remaining sellers report only one to two units. A similar pattern was observed for integrated ERVs; for those who reported sales, low volumes were reported. Bolt-on ERVs exhibited the lowest level of market activity, with nearly 80% of contractors reporting no sales.

These findings suggest that while awareness and sales of Next Gen RTUs exist among a subset of contractors, overall market penetration remains low. Reported sales activity points to early adoption rather than broad-based increases in the number or share of units sold.

Outcome 5: Targeted Consumers Increase Awareness of Next Gen RTUs Products, Programs, and Benefits (e.g., as a climate and energy efficiency business strategy)

MPI J: Increasing number of consumers aware of Next Gen RTU products

Verdict: Consumer familiarity was relatively low (2025). There was no change in familiarity with dual fuel heat pump RTUs from pre-2024 data to 2025; however, there was a decrease in familiarity in ERVs.

Familiarity with Next Gen RTUs was relatively low among surveyed building owners. One-quarter of respondents (25%; 16 out of 65) reported being familiar with dual-fuel heat pump RTUs, while 18% (12 out of 65) indicated general familiarity with ERVs (not specific to integrated or bolt-on).

Baseline (pre-2024) data indicates that four out of 16 (25%) building representatives were familiar with dual fuel heat pump RTUs and nine of 16 (56%) were familiar with ERVs. This could be due to a smaller sample size rather than a true decrease in familiarity, and while ERVs were described to respondents as an RTU feature, this question was not specifically framed as an RTU with an integrated ERV or bolt-on ERV. Given that ERVs are incorporated into multiple equipment types beyond RTUs, it could be that building representatives were familiar with ERVs more in general.

MPI K: Increasing number of consumers are aware of a program or incentive around Next Gen RTUs

Verdict: No data was collected in 2024 for comparison; consumer awareness of program incentives around Next Gen RTUs was mixed (2025)

Awareness of utility rebates for Next Gen RTUs was mixed. Just over one-quarter of respondents (28%; 18 out of 65) reported being aware of available incentives, while a majority either were unaware (51%; 33 out of 65) or unsure (22%; 14 out of 65).

MPI L: Increasing number of consumers report that Next Gen RTUs can be helpful in reaching company goals

Verdict: No data was collected in 2024 for comparison; Consumers tend to be positive in their views that Next Gen RTUs could benefit their sustainability goals (2025)

Most respondents expressed positive views about the sustainability benefits of Next Gen RTUs. However, only 35% of building owners stated that they had implemented sustainability goals. Among the 23 building owners with sustainability goals, more than 80% agreed that these technologies could help their organization meet climate or sustainability goals, including 44% who strongly agreed and 39% who somewhat agreed; an additional 17% reported being unsure.

Outcome 6: Contractors Offer Next Gen RTUs in their Bids.

MPI M: Increasing percentage of contractors offering RTUs in their bids

Verdict: Limited Exposure to Next Gen RTUs in Bid Packages

Only a small share of building owner respondents reported seeing Next Gen RTU technologies included in recent bid packages. Seventeen percent indicated that bids had included heat pump RTUs, and 14% reported seeing RTUs with bolt-on or integrated ERVs. However, a substantial portion of respondents were uncertain whether these technologies had been included — 24% for heat pump RTUs and 45% for ERVs — suggesting limited visibility or familiarity during the procurement process.

Outcome 7: Manufacturers Receive a Clear Signal for Next Gen RTUs

MPI N: Manufacturers report that they are seeing an increased demand for Next Gen RTUs

Verdict: Undetermined

Only one manufacturer out of three reported their prediction of Next Gen RTU demand, stating that demand for RTUs will increase as more brands expand their product lists and include more efficient options. Estimated sales figures from baseline data were at less than 2% for ERVs and expectations were that sales would remain stable or increase for ERVs and dual fuel heat pump RTUs. Thus, optimism remains, while sales are still low.

Outcome 9: Market Actors Are Aware of and Leverage Financial Incentives

MPI Q: Increasing proportion of market actors familiar with financial incentives

Verdict: A greater proportion of contractors reported familiarity with consumer utility rates in 2025 (67%) than in 2024 (50%)

Familiarity with consumer utility rates was mixed among contractors. Out of 18 contractors, 12 reported being either *very familiar* or *somewhat familiar* with utility rates, accounting for 67% reporting at least some familiarity. In 2024, 50% (8 of 16) reported being at least *somewhat familiar*. However, sample sizes were small, so this increase should be viewed with caution.

APPENDIX C: DETAILED METHODOLOGY

Several methods were used to conduct research and collect data for this report. Information on each of the research efforts is included below.

1. Manufacturer Interviews

- **Purpose and scope.** Cadmus conducted in-depth interviews with manufacturers to understand upstream perspectives on production decisions, technology configurations, pricing, availability, incentives, and perceived market demand for dual fuel heat pump RTUs and ERVs. Participants received a $100 Tango gift card for completing the interview.
- **Sample and recruitment.** Three commercial RTU manufacturers participated in interviews. Participants were selected for their active production of RTUs, dual fuel heat pump RTUs, and ERV options (integrated and bolt-on). The initial population list was compiled using information provided by the ETA team on manufacturers they have worked with, along with manufacturers Cadmus has previously engaged. In total, Cadmus contacted eight manufacturers to participate in interviews, of which three responded.
- **Instrument and topics.** The interview guide covered production constraints, stocking practices, purchasing practices, opinions of dual fuel heat pump RTUs and ERVs, and views on the point in the supply chain where incentives would have the greatest impact.
- **Analysis approach.** Interview notes were synthesized thematically to surface common patterns (e.g., "cost as primary barrier," mixed favorability by technology) and to provide upstream context for distributor and contractor findings.

2. Distributor Interviews

- **Purpose and scope.** Distributor interviews were used to capture midstream dynamics — stocking decisions, lead times, purchasing logistics, perceived barriers, and incentive leverage points — given distributors' central role in equipment availability. Participants received a $100 Tango gift card for completing the interview.
- **Sample and recruitment.** Three distributors were interviewed. Population information was compiled through a list provided by the ETA team of commercial distributors they have worked with, and commercial distributors Cadmus has worked with. In total, Cadmus reached out to eight commercial distributors for interviews and three responded.
- **Instrument and topics.** The interview guide addressed familiarity and opinions of dual fuel heat pump RTUs and ERVs, stocking practices and their demand drivers, typical lead times, delivery logistics (e.g., direct ship to job site, crane coordination), and views on incentive placement (i.e., upstream/midstream/downstream).
- **Analysis approach.** Qualitative responses were coded against core themes (e.g., awareness, cost, availability/logistics, incentives) and triangulated with manufacturer and contractor data. Findings emphasize that stocking is demand-driven, that dual fuel heat pump RTUs/ERVs are

generally not stocked, and that typical lead times are “less than two months,” but manufacturer-dependent.

3. Contractor Interviews

- **Purpose and scope.** In-depth interviews with commercial contractors explored decision-making at the point of sale, including promotion and sales of dual fuel heat pump RTUs and ERVs, perceived applicability, installation preparedness, lead times, sourcing pathways, and discussions of bill savings and incentives. Participants received a $100 Tango gift card for completing the interview.
- **Sample and recruitment.** Thirteen contractors with Minnesota mechanical contractor bonds were interviewed. Eligibility required experience installing or selling commercial RTUs in Minnesota. Population information was comprised of a list of all mechanically bonded contractors in Minnesota per the Department of Labor and Industry, provided by the ETA team. This list includes both residential and commercial contractors and was reviewed and prioritized by Cadmus for likely commercial contractors. In total, Cadmus contacted 179 contractors for interviews and 13 responded (7% response rate).
- **Instrument and topics.** Interviews covered familiarity and experience with dual fuel heat pump RTUs and ERVs; promotion/importance and sales levels, applicability by building type and configuration (integrated vs. bolt-on), lead-time estimates, sourcing channels, familiarity with utility rates, and incentive leverage points.
- **Analysis approach.** Interview themes were summarized to contextualize survey findings. For example, generally low promotion and sales, mixed favorability, selective applicability for ERVs, broad use of distributors for sourcing, and perceived importance of incentives.

4. Contractor Survey

- **Purpose and scope.** To increase inputs from the commercial contractor population, a follow-up online survey (containing largely the same questions covered in the commercial contractor interviews) was offered to expand quantitative coverage of contractor perspectives to complement interview insights and provide a stronger basis for descriptive statistics on awareness, sales, opinions, preparedness, and promotion. The survey was only administered to those who had not completed an interview. Participants received a $50 Tango gift card for completing the survey.
- **Sample and fielding.** Twelve contractors holding a Minnesota mechanical contractor bond completed the survey. Results were combined with aligned interview questions to increase the analytic sample size for key metrics (e.g., n values for figures vary by question). Population information was provided by the ETA team from the full list of mechanically bonded contractors in Minnesota, per the Department of Labor and Industry. In total, Cadmus contacted approximately 2,000 contractors from the recruitment list to participate in the survey, however, again this list consisted of both commercial and residential contractors.

- **Question domains.** The survey included modules on contractor characteristics and RTU installation volumes; promotion and business model importance of dual fuel heat pump RTUs and ERVs; sales volumes; preparedness to install; perceived changes in market demand; opinions of dual fuel heat pump RTUs and ERVs; product availability and lead times; sourcing channels; familiarity with customer utility rates; frequency of bill-savings discussions; and views on the point in the supply chain where incentives would have the greatest impact.
- **Analysis approach.** Quantitative responses were summarized with simple descriptive statistics and presented as figures/tables throughout the report; when the same constructs appeared in both methods, aligned items from interviews and surveys were pooled to provide directional, cross-sectional insights.

5. Expert Interviews

- **Purpose and scope.** Cadmus interviewed two subject-matter experts (SMEs) to provide a cross-cutting market view — clarifying technology applications, supply-chain leverage points, and expectations for future adoption — complementing perspectives from other market actors. Participants received a $100 Tango gift card for completing the interview.
- **Sample and profiles.** Two SMEs: one a principal product manager at a nonprofit focused on market transformation and the other a manager at an investor-owned electric and gas utility. Population information was provided by the ETA team and Cadmus contacts in the commercial HVAC space nationwide. In total 13 experts were contacted for an interview and two responded.
- **Instrument and topics.** Interviews covered relative familiarity by actor (i.e., manufacturers, distributors, contractors, customers), ERV demand and stocking in Minnesota, lead times, sales/penetration estimates, and the comparative impact of incentive placement across the chain.
- **Analysis approach.** Findings were synthesized thematically and used to interpret and stress-test conclusions from manufacturer, distributor, and contractor research (e.g., low/flat demand for ERVs, limited stocking, midstream leverage for education and availability).

6. Building Owner Survey

- **Purpose and scope.** A downstream survey captured decision-maker perspectives on RTU replacement drivers, bid practices, technology awareness and use (dual fuel heat pump RTUs, ERVs), decision criteria, sustainability goals, and rebate awareness/interest. The survey was hosted on Qualtrics and managed by Cadmus. Participants received a $100 Tango gift card for completing the survey.
- **Sample and recruitment.** We received 65 complete responses from building owners, facility managers, and related roles across Minnesota. Recruitment leveraged ETA-provided lists and partner newsletters; respondents were involved with operation and maintenance of HVAC equipment in their properties. Building owner contact information was derived from utility program contacts from a program serving small/medium-sized commercial contractors

focusing on lighting, HVAC and refrigeration energy savings, primarily in the Twin Cities metro area. The term “building owners” is used throughout the report and collectively refers to all survey respondents including building owners, facility managers, engineers, and property managers (listed in Figure 1) who participate in decision-making around HVAC matters. In total, 2,600 building owners were contacted and sent a personalized link to complete the Qualtrics survey. To broaden the reach and sample, a targeted ad was also placed in the ASHRAE Minnesota Chapter e-newsletter and the St. Paul BOMA Blast e-newsletter, which was distributed to about 1,500 building owners. In total, 65 respondents completed the survey for a response rate of 1.6%; the majority of respondents were originally on the utility program list.

- **Question domains.** Key modules included: prevalence of RTUs in portfolios; respondent roles; portfolio size; timing/triggers for replacement; bid composition and who recommends equipment; importance and prioritization of selection factors (e.g., first cost, energy bills, maintenance); awareness and use of dual fuel heat pump RTUs/ERVs; sustainability goals; and rebate awareness/likelihood to use.
- **Analysis approach.** Results were summarized as descriptive statistics with figures throughout the Building Owner Insights section; several figures report total n alongside percentages to aid interpretation where item non-response or skip logic applied. Qualitative responses were organized thematically to reveal insights and to provide downstream context for manufacturer, distributor, and contractor findings.

Integration and Study Period

Across methods, data collection occurred in 2025 to provide an updated snapshot of Minnesota’s commercial RTU market for the Next Gen RTU initiative. Findings were synthesized in late 2025 and early 2026 to inform conclusions, recommendations and interpretation of market progress indicators.

Notes on Use and Limitations

The research was designed to inform program strategy rather than to yield statistically representative estimates. Several groups (e.g., manufacturers, distributors, experts) had small sample sizes and self-reported data; results should be interpreted as directional indicators of market conditions.

APPENDIX D: INTERVIEW AND SURVEY GUIDES

Links the interview guides and surveys used are provided below:

- Commercial Contractor Interview Guide
- Commercial Contractor Survey
- Manufacturer/Distributor Interview Guide
- Building Owner Survey
- Expert Interview Guide

CEE Commercial HVAC Contractor Interview Survey [2025]

A. Introduction

Cadmus is conducting interviews with contractors across Minnesota to better understand the state of the commercial HVAC market. We're looking to identify key manufacturers and distributors and better understand data gaps, including developing estimates of market share by manufacturers and distributors for RTUs, dual-fuel heat pump RTUs, and ERVs. We are also interested in understanding perceptions of these technologies in terms of their performance and accessibility.

We will not share your specific comments with anyone. We will use the information you provide to inform our understanding of the Minnesota HVAC market so we can provide well-rounded and balanced observations and recommendations.

The interview should last about 45-60 minutes. If it's okay with you, I'd like to record our session, so I don't miss any of your comments. Is it okay with you if we record the interview?

[START THE RECORDING]

All responses will be kept confidential and your responses will be aggregated with other responses in our report, so nothing identifies you personally as the respondent.

Great! Let's get started.

B. Screening (Confirmation)

Before we begin the actual interview, we would like to ask you a couple of questions to make sure you qualify.

B1. About what percent of your work is in commercial vs residential? [Must have current work in commercial]

1. Commercial: _____
2. Residential: _____

B2. Do you install or recommend rooftop units (RTUs)? [If no: sorry, our questions are for contractors with experience working with RTUs]

C. Business characteristics

In this section, we would like to know about your business and the areas you serve.

C1. What region(s) of Minnesota do you serve?

C2. Where is your business located? Please provide a **zip code**

C3. About how many employees at your company work on **commercial** HVAC?

C4. Please estimate what percentage of your HVAC **commercial** replacements are planned versus replace-on-fail:
   1. Planned (new construction or planned replacement): _____
   2. Unplanned or emergency replacement: _____

C5. Approximately how many commercial rooftop units did your company install within the past 12 months? (including all types of rooftop units – gas, electric, dual-fuel)
   1. Is this typical of your average annual sales over the last few years?

D. Familiarity, promotion, and sales

In this section, we would like to learn about your experience with **dual fuel heat pump RTUs** and **energy recovery ventilators (ERVs).**

First, let's focus on **dual fuel heat pump RTUs**

D1. **How much experience do you have with dual fuel heat pumps RTUs?**?
   1. Not at all – you have never looked into them nor installed any
   2. Not much – you have looked into them, but have not installed any
   3. Somewhat – you have installed a few, but do not install them regularly
   4. A lot – you install dual fuel heat pump RTUs regularly

Description [if needed]: A dual fuel heat pump RTU uses an electric heat pump as the primary heating component and includes a gas furnace for auxiliary or back up heat, if needed, on the coldest days.

D2. As part of your business strategy, how often do you or your company promote **dual fuel heat pump RTUs** as an option for your installation services? [Allow participants to explore answer and take notes - also bracket their answers for back-end analysis]
   1. Never
   2. Rarely
   3. Sometimes
   4. Often
   5. Always

D3. How prepared are you to install **dual fuel heat pump RTUs**? [Interviewer should explore "prepared" probe with necessary level of training and inquire what else may impact preparedness. Allow participants to explore answer and take notes - also bracket their answers for back-end analysis]
   1. Not at all prepared
   2. Not very prepared
   3. Somewhat prepared
   4. Very prepared

D4. Approximately how many **dual-fuel heat pump RTUs** has your company installed within the past 12

months?

1. [if greater than 0] To your knowledge, what percentage of your current RTU installations are **dual fuel heat pump RTUs**?

D5. How important would you say **dual fuel heat pump RTUs** are for your business model? [Allow participants to explore answer and take notes - also bracket their answers for back-end analysis]

1. Not at all important
2. Not very important
3. Somewhat important
4. Very important
5. Essential

D6. Over the last two years, how has customer demand for **dual fuel heat pump RTUs** changed, if at all?

1. How do you expect the market for dual fuel heat pump RTUs to change, if at all, in the next 5 years?

Now let's focus on **Energy Recovery Ventilators (ERVs)**

D7. How much experience do you have with **Energy Recovery Ventilators (ERVs)**?

1. Not at all – you have never looked into them nor installed
2. Not much – you have looked into them, but have not installed any
3. Somewhat – you have installed a few, but do not install them regularly
4. A lot – you install ERVs regularly

Description [if needed]: In systems with ventilation air, energy recovery ventilators (ERVs) recover energy from exhaust air and transfer it to the incoming fresh air stream. This can either be sensible or latent recovery.

ERVs can be sold as a standalone product, integrated within an RTU (Factory installed), or bolted on to an existing RTU (field installed). For the purposes of this research, we are interested in how ERVs operate as part of an RTU system, thus we will discuss both integrated ERVs and bolt-on ERVs and **not** ERVs as standalone products.

D8. As part of your business strategy, how often do you or your company promote RTUs with **integrated ERVs** as an option for your installation services? [Allow participants to answer and make note. Bracket their answers for back-end analysis]

1. Never
2. Rarely
3. Sometimes
4. Often
5. Always

D9. Does the inclusion of an integrated ERV or bolt-on ERV change your level of preparedness to install

dual-fuel heat pumps or RTUs generally?

D10. Approximately how many **integrated ERVs** has your company installed within the past 12 months?

1. [if greater than 0] To your knowledge, what percentage of your current RTU installations include RTUs with **integrated ERVs**?

D11. How important would you say RTUs with integrated ERVs are for your business model?

1. Not very important
2. Somewhat important
3. Very important
4. Essential

D12. Over the last two years, how has customer demand for RTUs with **integrated ERVs** changed, if at all?

1. How do you expect the market for **integrated ERVs** to change, if at all, in the next 5 years?

D13. Approximately how many **bolt-on ERVs** has your company installed within the past 12 months?

1. [if greater than 0] To your knowledge, what percentage of your current RTU installations include **bolt-on ERVs**?

D14. As part of your business strategy, how often do you or your company promote **bolt-on ERVs** as an option for your installation services?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Always

D15. How important would you say **bolt-on ERVs** are for your business model?

1. Not at all important
2. Not very important
3. Somewhat important
4. Very important
5. Essential

D16. Over the last two years, how has customer demand for **bolt-on ERVs** changed, if at all?

1. How do you expect the market for **bolt-on ERVs** to change, if at all, in the next 5 years?

D17. How important, if at all, are available incentives or rebates when deciding to recommend HVAC equipment to customers?

1. On approximately what percentage of HVAC sales do you use an available incentive or rebate offer?
2. How would you describe the process of obtaining incentives or rebates?

3. Are they easy or difficult to find?
   (1) How would you describe the application process?
4. In your opinion, at what point in the supply chain would incentives have the greatest impact toward increasing the market presence of dual-fuel heat pumps and ERVs, and why? [probe: upstream, midstream, downstream]

D18. How familiar are you with your customers' utility rate options?
1. Not at all familiar
2. Not very familiar
3. Somewhat familiar
4. Very familiar

D19. Do you explore opportunities for energy and bill saving with customers? [Allow participants to answer and make note]

E. Sourcing channels and market share

In this section we would like to find out about your experience with the supply chain you work in and your estimations for manufacturer and distributor market shares **within Minnesota.**

PERSONAL/COMPANY EXPERIENCE

First, we would like to know who you and your company do business with.

E1. How do you or your company typically source **RTU** equipment? Through manufacturers directly or through an intermediary source such as a distributor or retailer?
1. Please list up to five manufacturers (brands) based on the total volume of your orders.
   (1) If possible, please estimate the percentage of your RTU purchases each one represents.
2. [if applicable] Please list up to five distributors you purchase from. Please list them based on the total volume of your orders.

E2. **[ASK IF D4 ≠ 1 (0% SALES)]** How do you or your company typically source **dual fuel heat pump RTUs** specifically? Through manufacturers directly or through an intermediary source such as a distributor or retailer?
1. Please list up to five manufacturers (brands) based on the total volume of your orders.
   (1) If possible, please estimate the percentage of your dual fuel heat pump RTU purchases each one represents.
2. [if applicable] Please list up to five distributors you purchase from. Please list them based on the total volume of your orders.

E3. **[ASK IF D10 ≠ 1 (0% SALES)]** How do you or your company typically source RTUs with **integrated ERVs** specifically? Through manufacturers directly or through an intermediary source such as a distributor or retailer?
1. Please list up to five manufacturers (brands) based on the total volume of your orders.

(1) If possible, please estimate the percentage of your RTU with **integrated ERV** purchases each one represents.

2. [if applicable] Please list up to five distributors you purchase from. Please list them based on the total volume of your orders.

E4. **[ASK IF D13 ≠ 1 (0% SALES)]** How do you or your company typically source **bolt-on ERVs** specifically? Through manufacturers directly or through an intermediary source such as a distributor or retailer?

1. Please list up to five manufacturers (brands) based on the total volume of your orders.
   (1) If possible, please estimate the percentage of your **bolt-on ERV** purchases each one represents.
2. [if applicable] Please list up to five distributors you purchase from. Please list them based on the total volume of your orders.
3. [Probe: provide pre-populated list of manufacturers or distributors and ask participant to re-rank and/or provide estimates of market share]

E5. Why do you typically do business with the manufacturers and distributors you work with? (probe if there is a difference in the trends based on technology and why that is)

PERCEPTIONS ABOUT MARKET AS A WHOLE

Thank you, that's very helpful for understanding your company's experience. Now, based on what you see in the market – perhaps through conversations with peers, what distributors are promoting, or what projects you hear about – we'd like to get your best estimate of the overall market as a whole in Minnesota. Your own preferences may or may not align with how the overall market tends to act.

Please rank the top (up to 5) **manufacturers** and top (up to 5) **distributors** based on **Minnesota** market share, and if possible, please provide a percentage estimate of market share for each. This is an objective estimation based on what you know about the market and not necessarily who you do business with – rough estimates are fine.

E6. We will start with the **overall commercial RTU market**

	RTUs (overall) Market Share % (based on units sold in Minnesota)
Manufacturers	
1.	
2.	
3.	
4.	
5.	
Distributors	
1.	
2.	

3.	
4.	
5.	

E7. **[ASK IF D1 ≠ 1 (NO EXPERIENCE WITH THEM)]** Next, let's address the **commercial dual-fuel heat pump RTU market specifically**

	DFHP (specifically) Market Share % (based on units sold in Minnesota)
Manufacturers	
1.	
2.	
3.	
4.	
5.	
Distributors	
1.	
2.	
3.	
4.	
5.	

E8. **[ASK IF D7 ≠ 1 (NO EXPERIENCE WITH THEM)]** Now, the **commercial market for RTUs with integrated ERVs**

	Integrated-ERV Market Share % (based on units sold in Minnesota)
Manufacturers	
1.	
2.	
3.	
4.	
5.	
Distributors	
1.	
2.	
3.	
4.	
5.	

E9. **[ASK IF D7 ≠ 1 (NO EXPERIENCE WITH THEM)]** finally, the **commercial bolt-on ERV market**

	Bolt-on ERV Market Share % (based on units sold in Minnesota)
Manufacturers	
1.	

2.	
3.	
4.	
5.	
Distributors	
1.	
2.	
3.	
4.	
5.	

F. Product Availability

F1. What is the current lead time for **standard gas RTUs** (not dual fuel heat pump RTUs)?

1. If not immediately, how reasonable or unreasonable do you find these lead times?
2. If less than reasonable, are there any specific segments of your business where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)

F2. **[ASK IF D4 ≠ 1 (0% SALES)]** What is the current lead time for **dual-fuel heat pump RTUs**?

1. If not immediately, how reasonable or unreasonable do you find these lead times?
2. If less than reasonable, are there any specific segments of your business where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)

F3. **[ASK IF D10 ≠ 1 (0% SALES)]** What is the current lead time for RTUs with **integrated ERVs**?

1. If not immediately, how reasonable or unreasonable do you find these lead times?
2. If less than reasonable, are there any specific segments of your business where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)

F4. **[ASK IF D13 ≠ 1 (0% SALES)]** What is the current lead time for **bolt-on ERVs**?

1. If not immediately, how reasonable or unreasonable do you find these lead times?
2. If less than reasonable, are there any specific segments of your business where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)

G. Impressions of dual fuel heat pumps and ERVs

Based on the technology descriptions provided or on your preexisting knowledge of dual fuel heat pumps and ERVs, we would like to understand your impressions of these technologies.

G1. Based on what you know or have heard about **dual fuel heat pump RTUs**, what is your impression of their **cooling** capabilities?

G2. Based on what you know or have heard about **dual fuel heat pump RTUs**, what is your impression of their **heating** capabilities?
On a scale from 1 to 5 with 1 being very unfavorable and 5 being very favorable, how would you rate your overall opinion of dual fuel heat pump RTUs as an RTU option?

1. Very unfavorable
2. Unfavorable
3. Neither unfavorable nor favorable
4. Favorable
5. Very Favorable

G3. How would you compare and contrast the benefits or drawbacks of a dual fuel model versus a standard gas or full electric model?

G4. On a scale from 1 to 5 with 1 being very unfavorable and 5 being very favorable, how would you rate your overall opinion of RTUs with **integrated ERVs?**

1. Very unfavorable
2. Unfavorable
3. Neither unfavorable nor favorable
4. Favorable
5. Very Favorable

(1) Are there any specific applications where they are particularly beneficial or where you are more likely to recommend the inclusion of an integrated ERV? (probe: outdoor air requirements, existing buildings, new construction)

G5. On a scale from 1 to 5 with 1 being very unfavorable and 5 being very favorable, how would you rate your overall opinion of **bolt-on ERVs?**

1. Very unfavorable
2. Unfavorable
3. Neither unfavorable nor favorable
4. Favorable
5. Very Favorable

(1) Are there any specific applications where they are particularly beneficial or where you are more likely to recommend the addition of a bolt-on ERV? (probe: outdoor air requirements, existing buildings, new construction)

H. Barriers toward widespread adoption

In this section, we would like to discuss potential challenges toward widespread adoption of dual-fuel heat pump RTUs and ERVs.

H1. What challenges, if any, do you see preventing **dual fuel heat pump RTUs** from having a greater market share among RTU products in Minnesota? [probe energy costs, heating performance, cooling performance, availability, initial cost, electrical or structural upgrades, maintenance]

1. [If they specify multiple challenges] Which of the challenges you mentioned, would you say is the biggest challenge preventing **dual fuel heat pump RTUs** from having a greater market share among RTU products in Minnesota?
2. If the challenges you mentioned were removed, how do you think the RTU market would change, if at all?

H2. What challenges, if any, do you see preventing RTUs with **integrated ERVs** from having a greater market share among RTU products in Minnesota? [probe energy costs, heating performance, cooling performance, availability, initial cost, electrical or structural upgrades, maintenance]

1. [If they specify multiple challenges] Which of the challenges you mentioned, would you say is the biggest challenge preventing RTUs with **integrated ERVs** from having a greater market share among RTU products in Minnesota?
2. If the challenges you mentioned were removed, how do you think the market for RTUs with **integrated ERVs** would change, if at all?

H3. What challenges, if any, do you see preventing **bolt-on ERVs** from having a greater market share among RTU products in Minnesota? [probe energy costs, heating performance, cooling performance, availability, initial cost, electrical or structural upgrades, maintenance]

1. [If they specify multiple challenges] which of the challenges you mentioned, would you say is the biggest challenge preventing **bolt-on ERVs** from having a greater market share among RTU products in Minnesota?
2. If the challenges you mentioned were removed, how do you think the market for **bolt-on ERVs** would change, if at all?

I. Closing

Thank you for participating in this interview. Just a couple more questions before we wrap up.

I1. Is there anything else you'd like to share about the commercial HVAC market in Minnesota?

I2. Do you have any contacts, who are contractors you do not work with directly, who might be interested in taking part in an interview?

I3. To thank you for your time completing this interview, we would like to send you a $50 electronic gift card. Please provide the best email address to send the card. [If they do both residential and commercial: ask if they would be interested in doing the residential. If yes, ask if they want to do it now or schedule it]

I4. Email:

Again, thank you so much for your time and input; we really appreciate it. Feel free to contact me if you think of anything else or have any questions. Have a nice day.

CEE Commercial HVAC Contractor Survey [2025]

A. Introduction

Welcome! The survey will take 20 minutes, and your responses will be used for research purposes only. Thank you.

B. Screening

Before we begin the actual survey, we would like to ask you a couple of questions to make sure you qualify.

B1. Are you an HVAC contractor who works in the state of Minnesota? **FORCE RESPONSE**

1. Yes
2. No **[THANK AND TERMINATE]**

B2. Do you install or recommend rooftop units (RTUs)? **FORCE RESPONSE**

1. Yes
2. No **[THANK AND TERMINATE]**

98. Don't know **[THANK AND TERMINATE]**

B3. Approximately what percentage of your HVAC work is commercial? **FORCE RESPONSE**

1. 0% **[THANK AND TERMINATE]**
2. 1-10%
3. 11-25%
4. 26-50%
5. 51% or greater

98. Don't' know **[THANK AND TERMINATE]**

Termination message: Sorry you do not qualify to take this survey. If you have any questions, please contact Thomas Staunton at thomas.staunton@cadmusgroup.com

C. Business characteristics

In this section, we would like to know about your business and the areas you serve.

C1. What region(s) of Minnesota do you serve? **TEXT ENTRY**

C2. Where is your business located? Please provide a **zip code**

1. Enter zip code: _____

C3. Including yourself, how many employees at your company work on **commercial** HVAC?

1. 1-5
2. 5-9

3. 10-19
4. 20-49
5. 50-99
6. 100-249
7. More than 250

C4. Please estimate the percentage of your HVAC **commercial** replacements are planned versus replace-on-fail? Please enter a percentage for each – **MUST ADD UP TO 100%**
   1. Planned (new construction or planned replacement): _____
   2. Unplanned or emergency replacement: _____

C5. Approximately how many commercial rooftop units did your company install within the past 12 months? (including all types of rooftop units – gas, electric, dual-fuel)

D. Familiarity, promotion, and sales

In this section, we would like to learn about your experience with **dual fuel heat pump RTUs** and **energy recovery ventilators (ERVs).**

First, let's focus on **dual fuel heat pump RTUs**

D1. How much experience do you have with **dual fuel heat pumps RTUs?**?
   1. Not at all – you have never looked into them nor installed any **[SKIP TO D8]**
   2. Not much – you have looked into them, but have not installed any
   3. Somewhat – you have installed a few, but do not install them regularly
   4. A lot – you install dual fuel heat pump RTUs regularly

Description: A dual fuel heat pump RTU uses an electric heat pump as the primary heating component and includes a gas furnace for auxiliary or back up heat, if needed, on the coldest days.

D2. As part of your business strategy, how often do you or your company promote **dual fuel heat pump RTUs** as an option for your installation services?
   1. Never
   2. Rarely
   3. Sometimes
   4. Often
   5. Always
   98. Don't know

D3. Approximately how many **dual-fuel heat pump RTUs** has your company installed within the past 12 months?
   1. 0
   2. 1-2

3. 3-5
4. 6-10
5. 11 or more
98. Don't know

D4. To your knowledge, what percentage of your current RTU installations are **dual fuel heat pump RTUs**?

1. 0%
2. 1-2%
3. 3-5%
4. 6-10%
5. 11-20%
6. Greater than 20%
98. Don't know

D5. How prepared are you to install **dual fuel heat pump RTUs**?

1. Not at all prepared
2. Not very prepared
3. Somewhat prepared
4. Very prepared
98. Don't know

D6. Over the last two years, how has customer demand for **dual fuel heat pump RTUs** changed, if at all?

1. Decreased a lot
2. Decreased a little
3. Stayed the same
4. Increased a little
5. Increased a lot
98. Don't know

D7. How do you expect the market for **dual fuel heat pump RTUs** to change in the next 5 years, if at all?

1. Decrease a lot
2. Decrease a little
3. Stay the same
4. Increase a little
5. Increase a lot
98. Don't know

Now let's focus on **Energy Recovery Ventilators (ERVs)**

D8. How much experience do you have with **Energy Recovery Ventilators (ERVs)**?

1. Not at all – you have never looked into them nor installed **[SKIP TO SECTION D9]**
2. Not much – you have looked into them, but have not installed any

3. Somewhat – you have installed a few, but do not install them regularly
4. A lot – you install ERVs regularly

Description [if needed]: In systems with ventilation air, energy recovery ventilators or ERVs recover energy from exhaust air and transfers it to the incoming fresh-air stream. This can either be sensible or latent recovery.

ERVs can be sold as a standalone product, integrated within an RTU (Factory installed), or bolted on to an existing RTU (field installed). For the purposes of this research, we are interested in how ERVs operate as part of an RTU system, thus we will discuss **both** integrated ERVs and bolt-on ERVs.

First, we will ask about **integrated ERVs** (i.e., ERVs that are integrated within the RTU – factory installed)

D9. As part of your business strategy, how often do you or your company promote **integrated ERVs** as an option for your installation services?

1. Never
2. Rarely
3. Sometimes
4. Often
5. Always

98. Don't know

D10. Approximately how many **integrated ERVs** has your company installed within the past 12 months?

1. 0
2. 1-2
3. 3-5
4. 6-10
5. 11 or more

98. Don't know

D11. To your knowledge, what percentage of your current RTU installations are **integrated ERVs**?

1. 0%
2. 1-2%
3. 3-5%
4. 6-10%
5. 11-20%
6. Greater than 20%

98. Don't know

D12. How prepared are you to install **integrated ERVs**?

1. Not at all prepared
2. Not very prepared
3. Somewhat prepared

4. Very prepared
98. Don't know

D13. Over the last two years, how has customer demand for **integrated ERVs** changed, if at all?
1. Decreased a lot
2. Decreased a little
3. Stayed the same
4. Increased a little
5. Increased a lot
98. Don't know

D14. How do you expect the market for **integrated ERVs** to change in the next 5 years, if at all?
1. Decrease a lot
2. Decrease a little
3. Stay the same
4. Increase a little
5. Increase a lot
98. Don't know

[PAGE BREAK]

Next, please focus on **bolt-on ERVs** (i.e., ERVs that are bolted on to an existing RTU - field installed)

D15. As part of your business strategy, how often do you or your company promote **bolt-on ERVs** as an option for your installation services?
1. Never
2. Rarely
3. Sometimes
4. Often
5. Always
98. Don't know

D16. Approximately how many **bolt-on ERVs** has your company installed within the past 12 months?
1. 0
2. 1-2
3. 3-5
4. 6-10
5. 11 or more
98. Don't know

D17. To your knowledge, what percentage of your current RTU installations are **bolt-on ERVs**?
1. 0%

2. 1-2%
3. 3-5%
4. 6-10%
5. 11-20%
6. Greater than 20%
98. Don't know

D18. How prepared are you to install **bolt-on ERVs**?

1. Not at all prepared
2. Not very prepared
3. Somewhat prepared
4. Very prepared
98. Don't know

D19. Over the last two years, how has customer demand for **bolt-on ERVs** changed, if at all?

1. Decreased a lot
2. Decreased a little
3. Stayed the same
4. Increased a little
5. Increased a lot
98. Don't know

D20. How do you expect the market for **bolt-on ERVs** to change in the next 5 years, if at all?

1. Decrease a lot
2. Decrease a little
3. Stay the same
4. Increase a little
5. Increase a lot
98. Don't know

E. Sourcing channels and market share

In this section we would like to find out about your experience with and knowledge of the supply chain for commercial HVAC equipment **within Minnesota.**

E1. How do **you or your company** typically source RTU equipment? Select all that apply.

1. Distributor/wholesaler
2. Manufacturer representative
3. Directly from manufacturer
4. Other (Specify: _____)

98. Don't know

E2. **[ASK IF E1 HAS MULTIPLE RESPONSES]** What is your primary source for RTU equipment?

1. Distributor/wholesaler
2. Manufacturer representative
3. Directly from manufacturer
4. Other (Specify: _____)

98. Don't know

[PAGE BREAK]

E3. How familiar are you with the **dual-fuel heat pump** commercial RTU market?

1. Not at all familiar
2. Not very familiar
3. Somewhat familiar
4. Very familiar

E4. Based on your knowledge of the market, please rank the top (up to 5) **manufacturers that produce and sell dual-fuel heat pumps** and if possible, please provide a percentage estimate of market share for each.

Please also then rank the top (up to 5) **distributors** based on **Minnesota** market share**,** and if possible, please provide a percentage estimate of market share for each.

	Dual Fuel Heat Pump Market Share % (based on units sold)
Manufacturers	
1.	
2.	
3.	
4.	
5.	
Distributors	
1.	
2.	
3.	
4.	
5.	

E5. What is the current lead time for **dual fuel heat pump RTU** product delivery?

1. Immediate (readily available)
2. 1-2 weeks
3. 3-4 weeks
4. 1-2 months
5. 3-6 months
6. 7-12 months
7. More than a year

98. Don't know

E6. **[ASK IF E5 ≠ 1]** How would you characterize the availability of **dual fuel heat pumps RTUs** from manufacturers/distributors?

1. Unreasonable
2. Somewhat unreasonable
3. Somewhat reasonable
4. Reasonable

98. Don't know

[PAGE BREAK]

E7. How familiar are you with the **integrated ERVs** commercial RTU market?

1. Not at all familiar
2. Not very familiar
3. Somewhat familiar
4. Very familiar

E8. Based on your knowledge of the market, please rank the top (up to 5) **manufacturers that produce and sell integrated ERVs** and if possible, please provide a percentage estimate of market share for each.

Please also then rank the top (up to 5) **distributors** based on **Minnesota** market share**,** and if possible, please provide a percentage estimate of market share for each.

	Integrated ERVs Market Share %
Manufacturers	
1.	
2.	
3.	
4.	
5.	
Distributors	
1.	

2.	
3.	
4.	
5.	

E9. What is the current lead time for **integrated ERVs**?

1. Immediate (readily available)
2. 1-2 weeks
3. 3-4 weeks
4. 1-2 months
5. 3-6 months
6. 7-12 months
7. More than a year

98. Don't know

E10. **[ASK IF E9 ≠ 1]** How would you characterize the availability of **integrated ERVs** from manufacturers/distributors?

1. Unreasonable
2. Somewhat unreasonable
3. Somewhat reasonable
4. Reasonable

98. Don't know

[PAGE BREAK]

E11. How familiar are you with the **bolt-on ERV** commercial RTU market?

1. Not at all familiar
2. Not very familiar
3. Somewhat familiar
4. Very familiar

E12. Based on your knowledge of the market, please rank the top (up to 5) **manufacturers that produce and sell bolt-on ERVs** and if possible, please provide a percentage estimate of market share for each.

Please also then rank the top (up to 5) **distributors** based on **Minnesota** market share**,** and if possible, please provide a percentage estimate of market share for each.

	Bolt-on ERV Market Share %
Manufacturers	
1.	
2.	
3.	

4.	
5.	
Distributors	
1.	
2.	
3.	
4.	
5.	

E13. What is the current lead time for **bolt-on ERVs**?

1. Immediate (readily available)
2. 1-2 weeks
3. 3-4 weeks
4. 1-2 months
5. 3-6 months
6. 7-12 months
7. More than a year

98. Don't know

E14. **[ASK IF E13 ≠ 1]** How would you characterize the availability of **bolt-on ERVs** from manufacturers/distributors?

1. Unreasonable
2. Somewhat unreasonable
3. Somewhat reasonable
4. Reasonable

98. Don't know

F. Impressions of dual fuel heat pumps and ERVs

Based on the technology descriptions provided or on your preexisting knowledge of dual fuel heat pumps and ERVs, we would like to understand your impressions of these technologies.

F1. Based on what you know or have heard about **dual fuel heat pump RTUs**, what is your impression of their **cooling** capabilities?

1. Very weak
2. Somewhat weak
3. Neither weak nor strong
4. Somewhat strong
5. Very strong

98. Don't know

F2. Based on what you know or have heard about **dual fuel heat pump RTUs**, what is your impression of their **heating** capabilities?

1. Very weak
2. Somewhat weak
3. Neither weak nor strong
4. Somewhat strong
5. Very strong

98. Don't know

F3. What is your overall opinion of **dual fuel heat pump RTUs** as an RTU option?

1. Very unfavorable
2. Unfavorable
3. Neither unfordable nor favorable
4. Favorable
5. Very favorable

98. Don't know

F4. What is your overall opinion of **integrated ERVs**?

1. Very unfavorable
2. Unfavorable
3. Neither unfordable nor favorable
4. Favorable
5. Very favorable

98. Don't know

F5. What is your overall opinion of **bolt-on ERVs**?

1. Very unfavorable
2. Unfavorable
3. Neither unfordable nor favorable

4. Favorable
5. Very favorable
98. Don't know

F6. Are there any specific applications or scenarios where ERVs are particularly beneficial or where you would be more likely to recommend them? (either integrated or bolt-on) **TEXT ENTRY**

G. Barriers toward widespread adoption

G1. What challenges, if any, do you see preventing **dual fuel heat pump RTUs** from having a greater market share among RTU products in Minnesota? Select all that apply. **[MULTIPLE SELECT]** **[RANDOMIZE 1-11]**

1. Require electrical upgrades
2. Require structural upgrades
3. Consumer awareness
4. Cooling performance
5. Heating performance
6. Energy costs
7. Initial cost
8. Maintenance required
9. Lack of quality training/education on the product
10. Lack of qualified installers
11. Product availability
12. Other (Specify: _____)
13. No challenges **[MAKE EXCLUSIVE SELECTION]**
98. Don't know **[MAKE EXCLUSIVE SELECTION]**

G2. **[ASK IF G1 HAS MULTIPLE SELECTIONS]** Which of the challenges you selected would you say is the biggest challenge preventing **dual fuel heat pump RTUs** from having a greater market share among RTU products in Minnesota?

G3. **[ASK IF ANY CHALLENGE WAS SELECTED]** If the challenges you selected were removed, how do you think the RTU market would likely change in Minnesota?

1. Dual fuel heat pump sales would increase significantly
2. Dual fuel heat pump sales would increase somewhat
3. Dual fuel heat pump sales would not change
98. Don't know

[PAGE BREAK]

G4. What challenges, if any, do you see preventing **ERVs (either integrated or bolt-on)** from having a greater market share among RTU products in Minnesota? Select all that apply. **[MULTIPLE SELECT]** **[RANDOMIZE 1-11]**

1. Require electrical upgrades
2. Require structural upgrades
3. Consumer awareness
4. Cooling performance
5. Heating performance
6. Energy costs
7. Initial cost
8. Maintenance required
9. Lack of quality training/education on the product
10. Lack of qualified installers
11. Product availability
12. Other (Specify: _____)
13. No challenges **[MAKE EXCLUSIVE SELECTION]**

98. Don't know **[MAKE EXCLUSIVE SELECTION]**

G5. **[ASK IF G4 HAS MULTIPLE SELECTIONS]** Which of the challenges you selected would you say is the biggest challenge preventing **ERVs (either integrated or bolt-on)** from having a greater market share among RTU products in Minnesota?

G6. **[ASK IF ANY CHALLENGE WAS SELECTED]** If the challenges you selected were removed, how do you think the RTU market would likely change in Minnesota?

1. ERV sales would increase significantly
2. ERV sales would increase somewhat
3. ERV sales would not change

98. Don't know

H. Closing

Thank you for participating in this survey. Just a couple more questions before we wrap up.

H1. Is there anything else you'd like to share about the residential cooling market in Minnesota?

H2. To thank you for your time completing this interview, we would like to send you a $50 electronic gift card. Please provide the best email address to send the card.

1. Email:

Again, thank you so much for your time and input; we really appreciate it. Feel free to contact me if you think of anything else or have any questions. Have a nice day.

Manufacturer/ Distributor Interview Guide

A. Introduction (5 min)

Cadmus is conducting in-depth interviews with manufacturers and distributors that provide equipment to Minnesota to better understand the state of the commercial and residential HVAC markets, specifically for the commercial market we are seeking to understand the market for Efficient Rooftop Units (ERTUs) and Integrated and Bolt-on Energy Recovery Ventilators (ERVs); and for the residential market, we are interested in ducted ASHPs and Central ACs. We're looking to gain insights into market dynamics and preferences, and help inform estimates of market share for HVAC equipment for manufacturers and distributors.

[If the participant's company serves WI] Our team is also collecting information on the Wisconsin market to inform potential Market Transformation (MT) initiatives for the following opportunities: Efficient Rooftop Units (ERTUs), Residential Heat Pumps (Air Source Heat Pumps); and Packaged Terminal Heat Pumps and Window/Saddle style Heat Pumps. Some of our questions seek to understand Wisconsin-specific market nuances, as well as similarities between the Wisconsin and Minnesota markets.

Your responses will remain anonymous. We will use the information you provide to inform our understanding of the Minnesota and Wisconsin HVAC markets so we can provide well-rounded and balanced observations and insights.

The interview should last up to 60 minutes. If it's okay with you, we will be recording the session, so I don't miss any of your comments. Is it okay with you if we record the interview?

[START THE RECORDING]

All responses will be kept confidential and your responses will be aggregated with other responses in our report, so nothing identifies you personally as the respondent.

Great! Let's get started.

B. Screening

Before we begin the actual survey, we would like to ask you a couple of questions to make sure you qualify.

A1. Do you represent a HVAC manufacturer who supplies the states of Minnesota or Wisconsin?

1. Yes, we serve both Minnesota and Wisconsin
2. No, we work only in Minnesota
3. No, we work only in Wisconsin
4. No, no we do not work in Minnesota nor Wisconsin **[THANK AND TERMINATE]**

A2. Which market sector do you work within? **[FORCED]**

1. Residential, specifically Central Air and ASHPs **[GUIDE A]**
2. Commercial, specifically RTUs, dual fuel heat pump RTUs and integrated or bolt on ERVs **[GUIDE B]**
3. Both commercial and residential **[GUIDE A AND B]**

B. Guide A Residential

[SECTION REMOVED for brevity – not used in this report, used in ASHP reporting]

C. Commercial

C1. **[If needed to clarify]** Does your company manufacture or distribute RTUs, Dual Fuel Heat Pump RTUs, Bolt-on ERVs, or RTUs with Integrated ERVs? [note the products they manufacture and distribute]

1. Manufacturer
2. Distributor
3. No

C2. Are you familiar with the commercial RTU/ERV market in Minnesota?

1. Yes
2. No

C3. Are you familiar with the commercial RTU/ERV market in Wisconsin?

1. Yes
2. No **[IF C2 AND C3 = NO (UNAWARE OF BOTH MARKETS) THANK AND TERMINTATE]**

SCREEN OUT MESSAGE: Thank you for your willingness to participate. Unfortunately, you do not qualify for this survey.

[Note to interviewer: MN and WI specific question batteries should be asked based on the participants knowledge of the MN, WI, or both markets]

Market-Share Estimates (10 min)

In the following series of questions, we are going to estimate market share by Manufacturers and Distributors for RTUs and ERVs.

[SECTION REMOVED for brevity – collected proprietary information not used in this report]

WISCONSIN [Ask if participant works in or is knowledgeable of WI]

[SECTION REMOVED for brevity – not used in this report]

WISCONSIN OR MINNESOTA [Ask if participant works in or is knowledgeable in either WI or MN]

C4. Can you provide insight into your estimates of market size and potential in Minnesota and/or Wisconsin?

C5. What key factors explain why the top manufacturer(s)/distributor(s) hold the share you just named?

C6. Have you seen noticeable shifts in that share mix over the last 2–3 years? What caused those changes? [Interviewer note: Ask is they are seeing increasing demand across the board, or for specific technologies of interest]

C7. Are there any new entrants gaining traction or legacy brands losing ground? Why?

C8. Looking 3 years ahead, who is poised to gain or lose share and what would drive that?

C9. What role do utility incentives, IRA tax credits, or energy efficiency regulations play in shifting share?

C10. **For Manufacturers:** What new technologies or features are you exploring to make RTUs more efficient? What appears to be most promising and why? (Ask about sealed or low-leakage outside air dampers, enclosure insulation, variable speed fans, etc.)

C11. What are the technical or performance concerns and considerations specific to cold climates like Wisconsin and Minnesota?

C12. [Ask applicable question]

1. **For manufacturers:** In your view, how familiar are distributors with dual fuel heat pump RTUs? Bolt-on or Integrated ERVs?
   (1) Not at all familiar
   (2) Slightly familiar
   (3) Moderately familiar
   (4) Very familiar
   (5) Extremely familiar
2. **For distributors:** In your view, how familiar are installers/contractors with dual fuel heat pump RTUs? Bolt-on or Integrated ERVs ?
3. Not at all familiar
   (1) Slightly familiar
   (2) Moderately familiar

(3) Very familiar
(4) Extremely familiar

4. **For both:** In your view, how familiar are consumers (e.g., building owners) with dual fuel heat pump RTUs? Bolt-on or Integrated ERVs ?
5. Not at all familiar
   (1) Slightly familiar
   (2) Moderately familiar
   (3) Very familiar
   (4) Extremely familiar

C13. What trends in the market are you seeing and following? How are these trends impacting product development?

C14. From your perspective, what are the barriers to increased market adoption of dual-fuel heat pump RTUs? Other high-performance features?

C15. Who are the key market actors you engage with? What approaches are more or less successful?

C16. What are the main challenges or barriers your customers face when considering upgrading to efficient RTUs?

C17. Do you provide technical support or education to market actors about high-performance RTUs? If so, how?

C18. What opportunities or leverage points do you see to increase adoption of ERTUs?

C19. In your opinion, what types of interventions/support would be most effective to support sales?

C20. How important would you say selling **dual fuel heat pump RTUs** is for your business model?

1. Not at all important
2. Not very important
3. Somewhat important
4. Very important
5. Essential

C21. On a scale from 1 to 5 with 1 being very unfavorable and 5 being very favorable, how would you rate your overall opinion of **dual fuel heat pump RTUs**?

1. Very unfavorable
2. Unfavorable
3. Neither unfavorable nor favorable
4. Favorable

5. Very Favorable

C22. How important would you say **RTUs with integrated ERVs** are for your business model?
1. Not at all important
2. Not very important
3. Somewhat important
4. Very important
5. Essential

C23. On a scale from 1 to 5 with 1 being very unfavorable and 5 being very favorable, how would you rate your overall opinion of **RTUs with integrated ERVs**?
1. Very unfavorable
2. Unfavorable
3. Neither unfavorable nor favorable
4. Favorable
5. Very Favorable

C24. How important would you say **Bolt-on ERVs** are for your business model?
1. Not at all important
2. Not very important
3. Somewhat important
4. Very important
5. Essential

C25. On a scale from 1 to 5 with 1 being very unfavorable and 5 being very favorable, how would you rate your overall opinion of **Bolt-on ERVs**?
1. Very unfavorable
2. Unfavorable
3. Neither unfavorable nor favorable
4. Favorable
5. Very Favorable

C26. Are there any specific applications where RTUs with integrated ERVs or bolt-on ERVs are particularly beneficial? (probe: outdoor air requirements, existing buildings, new construction)

WISCONSIN and MINNESOTA [Ask if participant works in or is knowledgeable in both WI and MN]

C27. **[ASK IF WORKS IN BOTH]** Are there key similarities or differences between the WI and MN markets? If so, what are they?

C28. **[ASK IF WORKS IN EITHER]** How does the Minnesota and/or Wisconsin picture differ from the national market?

C29. Does your company stay informed of commercial tariffs/energy rates?

1. Does your company consider those rates and associated bill impacts in any aspect of your business? What to manufacture? What to sell in a particular market?

Stocking Practices [Ask all participants]

Ask Distributors

C30. What are the primary drivers of stocking decisions (contractor demand, OEM terms, capital, floor-plan costs)?

C31. Approx. what % of stocked RTUs are dual fuel heat pump RTUs?

C32. Approx. What % of stocked RTUs have an integrated ERV?

C33. Approximately what % of stocked RTUs have ERVs bolted-on?

C34. What are the typical lead times for planned vs. emergency replacements.

1. Do lead times very between RTUs and dual fuel heat Pump RTUs?
2. Do lead times change when considering including a bolt-on or integrated ERV?

C35. What lead time would contractors call 'reasonable' for an emergency replacement? Planned?

C36. Are there any changes planned to stocking mix?

Ask Manufacturers

C37. Are there stocking allowances, consignment, or buy-back terms offered to distributors?

C38. Are there minimum order quantities (MOQs) for RTUs / ERVs.

Purchasing Process [Ask all participants]

For the next series of questions I will give you a prompt and would like to get your thoughts.

C39. How are the units sourced and delivered: Ship to branch, direct ship to job, drop-ship?
1. RTUs
2. Dual fuel heat pump RTUs
3. RTUs with integrated ERVS
4. Bolt-on ERVs

C40. Can you discuss pricing, including cost structure, unit price vs. freight, markup, financing terms?
1. Does it differ among technologies?

C41. Are there differences for licensed vs. unlicensed (bonded or not) contractors in obtaining equipment or cost?

C42. What are some of the common pain points (lead time, coordination with RTU, controls integration)?

Incentive Leverage Points and Market Sentiment [Ask all participants]

C43. At which tier—upstream (to manufacturers), midstream (distributor/contractor), or downstream (building owner)—would a new or larger incentive most influence high-performance RTU and ERV sales? Why?

C44. In your view, how familiar are contractors with dual-fuel HP-RTUs?
1. Not familiar at all
2. Not too familiar
3. Somewhat familiar
4. Familiar
5. Very familiar

C45. On a 1-5 scale where 1 is very negative and 5 is very positive, how would you rate **contractor** sentiment toward dual fuel HP RTUs vs. standard?
1. Very negative
2. Negative
3. Neither negative nor positive
4. Positive
5. Very positive

C46. On a 1-5 scale where 1 is very negative and 5 is very positive, how would you rate **contractor** sentiment toward bolt-on or integrated ERVs?
1. Very negative
2. Negative
3. Neither negative nor positive

4. Positive
5. Very positive

C47. How could utilities, program administrators, or collaboratives best support manufacturers, distributors and contractors to promote ERTU adoption?

Building Owner Survey – RTU Focus

Introduction

Hello! Thank you for your willingness to complete this survey. The survey should take about 20 minutes and will ask your perspectives around lighting systems, including lighting controls, and Heating Ventilation Air Conditioning (HVAC) equipment, especially Rooftop Units (RTU), in commercial or other non-residential buildings in Minnesota. Responses will be aggregated and compiled into a public report, and will help us better shape programs to help buildings like yours.

As a thank you for completing both the lighting and HVAC sections of the survey, you may be eligible to receive a **$100 gift card through Tango, an online gift card provider where you can select a $100 voucher to a store of your choosing.** Gift card availability is limited and offered while supplies last. The administrator reserves the right to withhold incentives for incomplete, duplicate, or ineligible responses.

This research is being conducted on behalf of the Efficient Technology Accelerator, a program funded by the state's investor-owned utilities, administered by the Minnesota Department of Commerce, Division of Energy Resources, and implemented by Center for Energy and Environment (CEE). Your participation is completely voluntary and will not affect any services you receive from any of these entities. Responses will remain anonymous - we will not attach your name to any responses for public reporting. However, you may opt-in to be contacted in the future with additional resources, trainings, and other program offerings.

Screeners (Section S)

1. Are you responsible for the operations or equipment specification decisions in a commercial or other non-residential facility in Minnesota? [Force response]
    a. Yes
    b. No [If Q1=b, thank and term]
        i. Term: Unfortunately, this survey is only for those who are responsible for operations or equipment specification decisions for non-residential buildings in Minnesota and you do not qualify. Thank you for your willingness to participate.

2. Are you involved with specifying, operating, maintaining, or interacting with lighting systems or HVAC equipment for your building? [Force response]
    a. Yes, lighting systems only
    b. Yes, HVAC equipment only
    c. Yes, lighting systems and HVAC equipment
    d. No, I am not involved with either of these [If Q2=d, thank and term]
        i. Term: Unfortunately, this survey is only for those responsible for these technologies and you do not qualify. Thank you for your willingness to participate.
3. [If Q2=b or c] Do any of the buildings in your portfolio have rooftop units (RTUs)? [Force response]
    a. Yes [continue to Q4]
    b. No [if Q2=b AND Q3=b or c, thank and term]
    c. I don't know [if Q2=b AND Q3=b or c, thank and term]
        i. Term: Unfortunately, it will be difficult to answer the survey questions without having RTUs on buildings in your portfolio. Thank you for your willingness to participate.
4. When considering lighting systems and HVAC equipment, which of the following do you work on? Please select all that apply. [RANDOMIZE A-E] [Force response]
    a. Specifying or selecting new, upgraded, or replacement equipment
    b. Operation & Maintenance
    c. Building automation/controls
    d. Pursuing utility rebates
    e. Reducing energy consumption or corporate sustainability
    f. Something else – Please explain _____
    g. None of the above [thank and term]
        i. If NONE OF THE ABOVE: Unfortunately, this survey is only for those responsible for lighting and HVAC equipment and you do not qualify. Thank you for your willingness to participate.

Role (for both – Section B)

5. What is your role? Please select all that apply.
    a. Building owner
    b. Third-party property manager
    c. Facility manager
    d. Building engineer
    e. Something else – Please explain _____

6. Do you work with or manage one building or a portfolio?
    a. One building
    b. Portfolio of buildings
        i. If portfolio: how many buildings do you work with or manage?
7. What type of building(s) do you work with/manage? Please select all that apply. [RANDOMIZE A-H]
    a. Commercial office spaces
    b. Non-profit offices and facilities
    c. Retail, including strip malls
    d. Medical, including hospitals
    e. Public school buildings (classrooms, administrative offices, garages, athletic facilities)
    f. City and county municipal buildings (fire, police, jails, office, libraries, parks and recreation facilities, animal control facilities)
    g. Hospitality
    h. Large apartment or residential buildings
    i. Something else – Please explain _____

Lighting only (Section L)

[NOTE: program only for people whose response to S2 = a or c.]

[SECTION REMOVED for brevity – this section was not used in this report.]

HVAC only (Section R)

[NOTE: program only for people whose response to S2=b or c and S3=a]

The rest of the survey will ask about your opinions and experiences with HVAC equipment, in particular RTUs.

Equipment specifications and decisions

8. When do you typically replace RTU equipment?
    a. Through a planned replacement schedule
    b. When a system is approaching the end of its useful life
    c. When an RTU unit fails
    d. Only when multiple HVAC units fail
    e. Some other time (please describe)_____
    f. I don't know

9. [If Q31=a] What is your typical replacement schedule? [OE]
10. Where would you turn for information on new or replacement equipment options and features? (select all that apply) [RANDOMIZE A-I]
    a. Contractor
    b. Building engineer or maintenance crew
    c. Design/mechanical engineer
    d. HVAC distributor
    e. Outside consultants
    f. Manufacturer
    g. Utility
    h. Google search
    i. Other building owners
    j. Somewhere else (please describe_____)
    k. None of these [EXCLUSIVE RESPONSE]
11. Have you replaced or installed any RTU equipment in the last three years?
    a. Yes
    b. No [skip to Q39]
12. When you get contractor bids for RTUs, how often do contractors provide you with multiple options, like a good, better, best lineup?
    a. Most of the time
    b. Sometimes
    c. Rarely
    d. Never
    e. I don't know
13. When you ask for a bid, is the equipment included mostly specific equipment that you have asked for (e.g. specific brand, features), or mostly equipment that the contractor suggests for your situation?
    a. Mostly my suggestions
    b. A mix of my suggestions and contractor suggestions
    c. Mostly contractor suggestions
    d. I don't know
14. To your knowledge, have RTU bids ever included heat pump RTUs?
    a. Yes
    b. No
    c. I don't know
15. To your knowledge, have RTU bids ever included RTUs with a bolt-on or an integrated energy recovery ventilator (ERV)?
    a. Yes

b. No
c. I don't know

16. Have you ever asked for a particular type of equipment and received pushback from a contractor?
    a. Yes – If yes, please describe.
    b. No
    c. I don't know/Can't remember
17. How important would you say the following are to your organization when selecting new RTU equipment?

	Essential	Very important	Somewhat important	Not very important	Not at all important
Equipment **availability** (short wait times)					
Improving indoor **air quality**					
Improving occupant **comfort**					
Improving the **reliability** of the system					
Lowering **energy bills**					
Lowering **maintenance costs**					
Minimizing the **first cost** (purchase and installation)					
Getting a **similar system** to what you already have					
Working with a **contractor/dealer** you trust					
Carbon emissions reduction or **sustainability**					
Something else – Please explain					

18. You indicated that the following factors are important when selecting new RTU equipment. Of these, which would you say is the **most** important when selecting new RTU equipment? [pipe in responses from very important, essential]

Efficient equipment

The next few questions ask about your familiarity and experience with different high-efficiency RTU equipment.

19. Before this survey, had you ever heard of (or were you aware of) dual fuel heat pump RTUs (also called hybrid heat pump RTUs)?
    a. Yes
    b. No
    c. I'm not sure

20. Dual fuel heat pump RTUs (also called hybrid heat pump RTUs) are rooftop HVAC systems that can provide heating through both an electric heat pump and traditional combustion heat with natural gas or propane. Do any of the buildings in your portfolio have dual fuel heat pump RTUs?
    a. Yes
    b. No [skip to 45]
    c. I do not know [skip to 45]
21. [If Q43=a]: Who is the manufacturer or brand and how many of each do you have across your portfolio? [text box grid]

Brand	Number
AAON	
Bryant	
Carrier	
Daikin	
Goodman	
Johnson Controls	
Lennox	
McQuay	
Trane	
York	
Another brand (Please describe)	
Unknown brand	

22. Before this survey, had you ever heard of energy recovery ventilators (ERVs)?
    a. Yes
    b. No [Skip to 49]
    c. I'm not sure
23. Energy Recovery Ventilators, or ERVs, add heat and humidity from exhaust air to incoming supply air via a plate, membrane, or wheel, reducing energy use. Do any of your RTUs have energy recovery ventilators (ERVs) integrated or bolted on?
    a. Yes
    b. No [skip to 48]
    c. I do not know [skip to 48]
24. [If Q46=a]: Who is the manufacturer or brand of the RTU(s) with the integrated ERV or the bolted on ERV, and how many of each do you have across your portfolio? [text box grid]

Brand	Number
AAON	
Addison	
Bryant	
Carrier	

Daikin	
Goodman	
Greenheck	
Johnson Controls	
Lennox	
Rheem/Ruud	
Renewaire	
Semco	
Trane	
Valent	
York	
Another brand (Please describe)	
Unknown brand	

25. Does your company have any sustainability, energy efficiency, climate impact or other related goals?
    a. Yes: If yes, please describe.
    b. No
26. To what extent do you agree with the following statement: "High efficiency or Next Gen RTUS—including DFHPRTUs and ERVs—could help my company meet its sustainability or climate related goals?"
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree
    f. Not sure

Rebates

27. Are you aware of any utility rebates for higher efficiency RTU equipment?
    a. Yes
    b. No
    c. I'm not sure
28. How likely would you be to use a utility rebate that would refund $1,000 for higher efficiency RTU equipment?
    a. Very likely
    b. Somewhat likely
    c. Not very likely
    d. Not at all likely

e. Not applicable/I don't know

29. [If Q51=b, c, d] Why might you not apply for RTU utility rebates? (select all that apply) [RANDOMIZE A-F]
    a. I don't know where to look for information
    b. The paperwork is too burdensome
    c. Too many equipment requirements
    d. The dollar amount is not worth it
    e. I don't like using utility rebates
    f. I have too many other priorities on my plate
    g. Another reason (please describe_____)
    h. None of these – I would likely apply [EXCLUSIVE RESPONSE]

Conclusion

Thank you so much for sharing your thoughts! This information will help us better understand building owner and operator opinions and experiences and shape programming and offerings to support others like you.

30. Would you like to enter your contact information to receive your $100 Tango gift card?
    a. Yes
    b. I do not want a gift card

IF YES: Please enter your contact information to receive your gift card. We will not share or sell your information, and it will not be attached to your responses.

Gift cards will be sent to you via Tango, an online gift card provider where you can select a $100 voucher to a store of your choosing. Please note, gift cards will be processed manually – you should receive an email from Tango in 1-2 weeks. **Please contact Katie Spillenkothen at katie.spillenkothen@cadmusgroup.com if you do not receive anything after this time frame.**

First Name_____

Last Name _____

Email _____

Email Confirmation_____

Phone_____

31. Would you be interested in participating in a follow-up interview about your responses? Please note that selecting "yes" does not guarantee you will be contacted.
    a. Yes
    b. No

IF YES AND DID NOT SUBMIT CONTACT INFO FOR GIFT CARD:

Please enter your contact information. We will not share or sell your information, and it will not be attached to your responses.

First Name_____

Last Name _____

Email _____

Email Confirmation_____

Phone_____

32. Would you like to be contacted with additional resources, trainings, and other program offerings?
    a. Yes
    b. No

IF YES AND DID NOT SUBMIT CONTACT INFO FOR GIFT CARD OR FOLLOW-UP:

Please enter your contact information. We will not share or sell your information, and it will not be attached to your responses.

First Name_____

Last Name _____

Email _____

Email Confirmation_____

Phone_____

If you are interested in learning more about luminaire level lighting controls or RTUs, please visit our webpages for LLLC or Next Gen Rooftop Units initiatives, two programs that are implemented by CEE. Thank you!

CEE Expert Interview Guide [2025]

A. Introduction

Cadmus is conducting interviews with subject matter experts with knowledge of the commercial HVAC market in Minnesota, specifically technologies including dual fuel heat pump rooftop units (RTUs) and Energy Recovery Ventilators (ERVs). We are hoping to acquire a better understanding of market dynamics including stocking practices, purchasing and procurement processes, and leverage points that could potentially influence the market.

We will not share your specific comments with anyone. We will use the information you provide to inform our understanding of the Minnesota HVAC market so we can provide well-rounded and balanced observations and recommendations.

The interview should last about 60-minutes. If it's okay with you, I'd like to record our session, so I don't miss any of your comments. Is it okay with you if we record the interview?

[START THE RECORDING]

All responses will be kept confidential and your responses will be aggregated with other responses in our report, so nothing identifies you personally as the respondent.

Great! Let's get started.

A0. First, can you please describe your experience and position with respect to the commercial HVAC market in Minnesota. And your familiarity with **dual fuel heat pump RTUs** and **ERVs** on RTUs(either integrated or bolt-on ERVs).

B. Familiarity, promotion, and impressions of technologies

In this section, we would like to learn about your experience with **dual fuel heat pump RTUs** and **energy recovery ventilators (ERVs) bolted on or integrated in RTUs.**

First, let's focus on **dual fuel heat pump RTUs**

B0. Description [if needed]: A dual fuel heat pump RTU uses an electric heat pump as the primary heating component and includes a gas furnace for auxiliary or back up heat, if needed, on the coldest days. On a scale from 1 to 5, with 1 being not at all familiar and 5 being very familiar, how would you rate market actors' level of familiarity with dual fuel heat pump RTUs?

(1) Manufacturers
(2) Distributors
(3) Contractors/Installers
(4) Customers
    (a) Why?

B1.

0. Based on what you know or have heard about **dual fuel heat pump RTUs**, what is the market's impression of their **cooling** capabilities? Does this differ between market actors? How do they differ and why do you say that?
1. Based on what you know or have heard about **dual fuel heat pump RTUs**, what is the market's impression of their **heating** capabilities? Does this differ between market actors? How do they differ and why do you say that?
2. What do you believe is the market's overall impression of **dual fuel heat pump RTUs** as an RTU option? Does this differ between market actors? How do they differ and why do you say that?[probe: relative to the capabilities of gas, are there circumstances where they are particularly beneficial/applicable, in particular in the MN market, versus situations they are not]

B2. How are **dual fuel heat pump RTUs** promoted in Minnesota?

0. In your view, which market actors are most responsible for promoting **dual fuel heat pump RTUs**? Why?
1. How well do you think they have done in increasing awareness of **dual fuel heat pump RTUs**?
   (1) [If not] what could be improved?

B3. In your view, are contractors or installers prepared to promote and install **dual fuel heat pump RTUs**? [probe: level of training; incentives]

0. [If not well prepared] what might be done to increase their preparedness to promote and sell **dual fuel heat pump RTUs**?

B4. Over the last two years, how has customer demand for **dual fuel heat pump RTUs** changed, if at all?

0. How do you expect the market for **dual fuel heat pump** RTUs to change, if at all, in the next 5 years? Why?

Now let's focus on **Energy Recovery Ventilators (ERVs)**

Description [if needed]: In systems with ventilation air, energy recovery ventilators (ERVs) recover energy from exhaust air and transfer it to the incoming fresh air stream. ERVs recover both latent and sensible energy. ERVs can be sold as a standalone product, integrated within an RTU (Factory installed), or bolted on to an existing RTU (field installed). For the purposes of this research, we are interested in how ERVs operate as part of an RTU system, thus we will discuss both integrated ERVs and bolt-on ERVs and **not** ERVs as standalone products.

B5. On a scale from 1 to 5, with 1 being not at all and 5 being very familiar, how would you rate market actors' level of familiarity with **energy recovery ventilators (ERVs)**?
   (1) Manufacturers
   (2) Distributors

(3) Contractors/Installers
(4) Customers
(a) Why?

1.
2. What is the market's overall impression of ERVs? Does this differ between market actors? How do they differ and why do you say that?
3. Do impressions differ based on whether ERVs are integrated in an RTU (pre-packaged) or bolted on (postproduction)? If yes, how so?
4. Are there any specific applications where ERVs (either bolt-on or integrated) are particularly beneficial in the MN ? (probe: outdoor air requirements, existing buildings, new construction

B6. How are **ERVs** promoted in Minnesota?
0. In your view, which market actors are most responsible for promoting **ERVs**?
1. Do you think they have effectively increased awareness of ERVs?
(1) [If not] what could be improved?

B7. In your view, are contractors or installers prepared to promote and install **ERVs**? [probe: level of training; incentives]
0. [If not well prepared] what might be done to increase their preparedness to promote and sell dual fuel heat pumps?

B8. Over the last two years, how has customer demand for **ERVs** changed, if at all?
0. How do you expect the market for **ERVs** to change, if at all, in the next 5 years? Why?

C. Sourcing channels and market share

In this section we would like to find out about your knowledge of the supply chain and if possible, your estimations for manufacturer and distributor market shares of HVAC equipment within Minnesota.

[SECTION LARGELY REMOVED for brevity – collected proprietary information not used in this report]

Based on what you know about the market, we'd like to get your best estimate of the overall market as a whole in Minnesota.

C0. To your knowledge, what percentage of current commercial RTU installations in Minnesota are **dual fuel heat pump RTUs?**

C1. To your knowledge, what percentage of current commercial RTU installations in Minnesota incorporate an **integrated ERV**?

C2. To your knowledge, what percentage of current commercial RTU installations in Minnesota incorporate a **bolt-on ERV**?

D. Stocking practices and Purchasing Process

In this section, we would like to examine the current product availability and purchasing and distribution processes of dual fuel heat pump RTUs and ERVs.

D0. Can you describe the purchasing process for standard gas RTUs? [probe: who or what channels do people purchase from?]

0. Are incentives or rebates easily accessible and available?
   Approximately what percentage of standard gas RTU sales leverage incentives or rebates?
   Overall, would you say the procurement process is difficult? Easy? Why?
1. To your knowledge, approximately what percentage of commercial HVAC equipment manufacturers produce standard gas RTUs?
2. Approximately what percentage of distributors in Minnesota sell standard gas RTUs?
3. Approximately what percentage of distributors stock standard gas RTUs? That is, are they readily available?
4. If not, or when not readily available, what is the current lead time for **standard gas RTUs**?
5. If not immediately, how reasonable or unreasonable do you believe customers find these lead times? Does this differ in any way for distributors, contractors, or end-users?

6. What is the current lead time for **standard gas RTUs** (not dual fuel heat pump RTUs)?
   (1) If not immediately, how reasonable or unreasonable do you believe customers find these lead times? Does this differ in any way for distributors, contractors, or end-users?
   (2) If less than reasonable, are there any specific segments where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)

D1. Can you describe the purchasing process for **dual-fuel heat pump RTUs**? [probe: who or what channels do people purchase from?]

0. How does this process differ, if at all, from other commercial HVAC equipment?
1. To your knowledge, approximately what percentage of commercial HVAC equipment manufacturers produce dual-fuel heat pump RTUs?
2. Approximately what percentage of distributors in Minnesota sell dual-fuel heat pumps?
3. Approximately what percentage of distributors stock dual fuel heat pumps? That is, are they readily available?
4. If not, or when not readily available, what is the current lead time for **dual-fuel heat pump RTUs**?
5. If not immediately, how reasonable or unreasonable do you believe customers find these lead times? Does this differ in any way for distributors, contractors, or end-users?
6. If less than reasonable, are there any specific segments where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)
7. Have these estimates changed over the past 5 years? If so, how?
8. Are incentives or rebates easily accessible and available?
   Approximately what percentage of **dual-fuel heat pump RTU** sales leverage incentives

or rebates?
Overall, would you say the procurement process is difficult? Easy? Why?

D2. Can you describe the purchasing process for RTUs with **integrated ERVs**? [probe: who or what channel do people purchase from?]

0. How does this process differ, if at all, from other commercial HVAC equipment?
1. To your knowledge, approximately what percentage of commercial HVAC equipment manufacturers produce **integrated ERVs**?
2. Approximately what percentage of distributors in Minnesota sell dual-fuel heat pumps?
3. Approximately what percentage of distributors stock **integrated ERVs**? That is, are they readily available?
4. If not, or when not readily available, what is the current lead time for **integrated ERVs**?
5. If not immediately, how reasonable or unreasonable do you believe customers find these lead times? Does this differ in any way for distributors, contractors, or end-users?
6. If less than reasonable, are there any specific segments where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)
7. Have these estimates changed over the past 5 years? If so, how?
8. Are incentives or rebates easily accessible and available?

Approximately what percentage of **integrated ERV** sales leverage incentives or rebates?
Overall, would you say the procurement process is difficult? Easy? Why?

D3. Can you describe the purchasing process for RTUs with **bolt-on ERVs**? [probe: who or what channel do people purchase from?]

0. How does this process differ, if at all, from other commercial HVAC equipment?
1. To your knowledge, approximately what percentage of commercial HVAC equipment manufacturers produce **bolt-on ERVs**?
2. Approximately what percentage of distributors in Minnesota sell dual-fuel heat pumps?
3. Approximately what percentage of distributors stock **bolt-on ERVs**? That is, are they readily available?
4. If not, or when not readily available, what is the current lead time for **bolt-on ERVs**?
5. If not immediately, how reasonable or unreasonable do you believe customers find these lead times? Does this differ in any way for distributors, contractors, or end-users?
6. If less than reasonable, are there any specific segments where these lead times are particularly problematic? (probe: planned vs unplanned; specific building types)
7.
8. Have these estimates changed over the past 5 years? If so, how?
9.
10. Are incentives or rebates easily accessible and available?

Approximately what percentage of **bolt-on ERV** sales leverage incentives or rebates?
Overall, would you say the procurement process is difficult? Easy? Why?

E. Opportunities

In this section, we would like to hear about your thoughts on opportunities for growth in the market for the technologies we have been discussing.

E0. In your view, do you think that **manufacturers** are motivated to develop and produce **dual fuel heat pump RTUs**?
   0. Why or why not?
   1. [If not] What might incentivize them to do so?
   2. What about **ERVs**?

E1. In your view, do you think **distributors and retailers** are motivated to promote, stock, and sell **dual fuel heat pump RTUs**?
   0. Why or why not?
   1. [If not] What might incentivize them to do so?
   2. What about **ERVs**?

E2. In your view, do you think **contractors and installers** are motivated to promote, sell, and install **dual fuel heat pump RTUs**?
   0. Why or why not?
   1. [If not] What might incentivize them to do so?
   2. What about **ERVs**?

E3. In your view, do you think **consumers** are interested in purchasing and installing **dual fuel heat pump RTUs**?
   0. Why or why not?
   1. [If not] What might incentivize them to do so?
   2. What about **ERVs**?

E4. At which point in the supply chain (i.e., upstream, midstream, or downstream) do you believe incentives would have the greatest impact on increasing sales of high-performance equipment? Why?
   0. Do you think this approach applies to all technologies or would it differ based on the product? (i.e., DFHP RTUs, ERVs)

E5. What role do incentives, tax credits, and energy efficiency regulations play in potentially shifting market share for these products?
   0. Are the current structures of incentives, tax credits, and regulations enough to stimulate change in the market?
      (1) [If not] How can these structures be altered to stimulate change in the market?

E6. Are there any other opportunities or leverage points that you see as promising strategies to increase adoption of dual fuel heat pump RTUs? ERVs? [probe: intervention, market transformation initiatives]

0. How could utilities, program administrators, or collaboratives best support manufacturers, distributors, and contractors in supporting these technologies?

E7. Do you think market actors are aware of or consider bill impacts for these technologies?

F. Barriers toward widespread adoption

In this section, we would like to discuss potential challenges toward widespread adoption of dual-fuel heat pump RTUs and ERVs.

F0. What challenges, if any, do you see preventing **dual fuel heat pump RTUs** from having a greater market share among RTU products in Minnesota? [probe energy costs, availability, initial cost, electrical or structural upgrades, maintenance, technical performance based on Minnesota climate]

0. [If they specify multiple challenges] Which of the challenges you mentioned, would you say is the biggest challenge preventing **dual fuel heat pump RTUs** from having a greater market share among RTU products in Minnesota? Why?
1. If the challenges you mentioned were removed, how do you think the RTU market would change, if at all? Why?

F1. What challenges, if any, do you see preventing RTUs with **integrated ERVs** from having a greater market share among RTU products in Minnesota? [probe energy costs, availability, initial cost, electrical or structural upgrades, maintenance, technical performance based on Minnesota climate

0. [If they specify multiple challenges] Which of the challenges you mentioned, would you say is the biggest challenge preventing RTUs with **integrated ERVs** from having a greater market share among RTU products in Minnesota? Why?
1. If the challenges you mentioned were removed, how do you think the market for RTUs with **integrated ERVs** would change, if at all? Why?

F2. What challenges, if any, do you see preventing **bolt-on ERVs** from having a greater market share among RTU products in Minnesota? [probe energy costs, availability, initial cost, electrical or structural upgrades, maintenance, technical performance based on Minnesota climate

0. [If they specify multiple challenges] which of the challenges you mentioned, would you say is the biggest challenge preventing **bolt-on ERVs** from having a greater market share among RTU products in Minnesota? Why?
1. If the challenges you mentioned were removed, how do you think the market for **bolt-on ERVs** would change, if at all? Why?

G. Closing

Thank you for participating in this interview. Just a couple more questions before we wrap up.

G0. Is there anything else you'd like to share about the commercial HVAC market in Minnesota?

G1. Do you have any contacts, whom you do not work with directly, who might be interested in taking part in an interview?

G2. To thank you for your time completing this interview, we would like to send you a $200 electronic gift card. Please provide the best email address to send the card.

G3. Email:

Again, thank you so much for your time and input; we really appreciate it. Feel free to contact me if you think of anything else or have any questions. Have a nice day.