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Efficient Rooftop Units Market Progress Evaluation Report #1

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Executive Summary

This report presents findings from the first Market Progress Evaluation Report (MPER) of the Northwest Energy Efficiency Alliance's (NEEA) Efficient Rooftop Units (ERTU) program. Apex Analytics conducted this evaluation between June 2023 and May 2025.

ERTUs provide greater energy efficiency than standard rooftop units (RTUs) by incorporating cabinet insulation and low-leakage dampers (Tier 1 ERTUs) and, potentially, adding energy recovery ventilators (ERVs) or heat recovery ventilators (HRVs) (Tier 2 ERTUs), either as an integrated component or as a bolt-on addition. NEEA created a specification defining Tier 1 and Tier 2 ERTUs and maintains a compliant products list (CPL) of models meeting that specification. NEEA staff have worked with ERTU manufacturers to identify and certify compliant models and encourage the manufacturers to expand their ERTU offerings. NEEA has also worked with manufacturers' representatives (reps) and distributors to increase awareness of ERTUs and encourage adoption. In addition to these market actors, NEEA has engaged with program administrators in the Northwest and around the country to coordinate on ERTU program efforts.

MPERs assess a program's progress toward market transformation by tracking its accomplishments against relevant Market Progress Indicators associated with outcomes described in the program's logic model. The ERTU program's MPIs broadly address efforts to:

- Increase market awareness of ERTUs, especially as a replacement option for standard RTUs,
- Increase availability of ERTUs in the market, including both the number of options available and the timeframe required to obtain them,
- Increase uptake of ERTUs both generally and more specifically through large maintenance contractor recommendations and inclusion of ERTUs in large organizations' equipment specifications and purchase agreements,
- Encourage efficiency programs to support ERTUs in a coordinated way, both in the Northwest and nationally.

Findings related to each area are summarized below. It is important to note that, as the program's first MPER, comparison values are not available for many of the MPIs assessed. As a result, the values assessed in this report can serve as a baseline for future tracking.

Research Approach

The Apex team conducted primary data collection with four market actor populations to inform this evaluation, as summarized in Table 1. Apex supplemented this primary data collection with a review of program documents and market actor websites.

Table 1: Data Collection Summary

Population	Data Collection Mode	Timeframe	Number of Complete Responses
HVAC Contractors	Survey	Oct. – Dec. 2023	74
	In-depth Interview	May – Jul. 2024	10
Distributors	Survey	Nov. 2023 – Jan. 2024	23
	In-depth Interview	May – Jun. 2024	6
Building Decision-Makers	Focus Groups	Feb. 2024	9 (2 groups)
	Survey	Mar. – Apr. 2024	52
Manufacturers’ Reps	In-depth interview	Dec. 2024 – Jan. 2025	9

Key Findings

Market actors are largely aware of ERTU product lines but consider them niche solutions rather than standard RTU replacement options due to incremental costs and structural challenges

While awareness of NEEA’s specification and whole-unit heating efficiency metrics for RTUs is limited, majorities of surveyed contractors, building decision makers, and distributors had at least a general awareness of at least one product line that included models on NEEA’s ERTU compliant products list (referred to as ERTUs in the remainder of this document). However, market actors largely described ERTUs as niche products for applications with high airflow needs, rather than as a more efficient replacement option for a standard RTU. Market actors described a variety of barriers to ERTU adoption that may prevent them from viewing ERTUs as a viable replacement option for standard RTUs. These barriers included high incremental costs as well as the potential for heavier equipment to trigger the need for a structural review, further increasing costs.

ERTU availability is limited, but timeframes to receive ERTUs are comparable to other special ordered equipment.

ERTU availability is limited, particularly through distributors. A total of six manufacturers offer ERTUs, but most of those are smaller producers. Only two of the five leading RTU manufacturers offer ERTU product lines. A relatively small proportion of interviewed distributors reported offering ERTUs, and those that did reported they purchased ERTU models through special order rather than keeping them in stock. Nonetheless, distributors with experience ordering ERTUs reported that the timeframe to receive them was consistent with the timeframe to receive a standard RTU that needed to be special ordered. Interviewed manufacturers’ reps had greater familiarity and experience with ERTUs than distributors.

ERTU uptake is small, but manufacturers' reps see demand for ERTUs with integrated ERVs or HRVs in certain situations

While NEEA's market data collection is in its early stages and estimates from MPER survey data carry significant uncertainty, evidence indicates that ERTU adoption in the Northwest remains relatively low. Manufacturers' reps reported somewhat greater uptake for ERTUs with integrated ERVs or HRVs, noting that integrated units were more popular than bolt-on options. NEEA has made limited progress in its efforts to drive uptake through large maintenance contractor recommendations and by encouraging large organizations to include ERTUs in their purchase agreements or equipment specifications. Building decision-maker survey findings suggest that most organizations do not list specific RTU product lines in their agreements or specifications, and those that do list specific product lines may include multiple options.

Program Support

While NEEA has not found a national organization to take ownership of the ERTU specification and compliant products list, the program has actively coordinated with program administrators around the country that have incorporated ERTUs into their commercial HVAC programs. NEEA has worked with the Minnesota Center for Energy and Environment (MN CEE) and Nicor Gas to support those organizations in developing programs aligned with NEEA's ERTU efforts and has regular contact with the California Market Transformation Authority (CalMTA) on ERTU efforts. NEEA has begun working with the Regional Technical Forum (RTF) to develop a Unit Energy Savings (UES) measure for ERTUs, which would facilitate adoption of ERTUs among efficiency programs in the Northwest, but a measure has not yet been developed. In the absence of a UES measure, Northwest utilities have not adopted prescriptive incentives for ERTUs, although some offer incentives for RTU components related to efficiency like condensing gas furnaces and inclusion of ERVs.

Conclusions & Recommendations

Conclusion 1: Market actors viewed ERTUs as specialized products for use in applications requiring large amounts of airflow, or where building owners were particularly efficiency focused, not as replacement options for standard RTUs. While most market actors were aware of ERTU product lines, they generally did not discuss ERTUs as replacement options for standard RTUs, describing them instead as niche products for specialized applications. Incremental cost and weight concerns exacerbate a general lack of awareness to prevent market actors from viewing ERTUs as replacement options.

Recommendation 1a: NEEA should pursue additional demonstration projects and case studies to demonstrate the viability of ERTUs as standard RTU replacement options and identify value propositions.

Recommendation 1b: NEEA should prioritize strategies to reduce the incremental cost of ERTUs. Over the medium- and long-term, this includes working with manufacturers to encourage the development of value ERTU models. In the short term, continuing to support the development of a Regional Technical Forum Unit Energy Savings measure could facilitate utility incentives to encourage adoption.

Conclusion 2: Inclusion of ERTUs in organizations' equipment specifications and purchase agreements may not be enough to ensure adoption within those organizations. One program strategy to drive ERTU adoption has been to encourage large organizations to include ERTUs in their HVAC equipment specifications or purchase agreements. Survey findings suggest that these equipment specifications and purchase agreements may define a range of equipment that is allowed, rather than specifying individual models or product lines that are required. If these agreements allow for multiple equipment options in a given installation scenario, there may be additional steps needed to drive ERTU adoption beyond inclusion of ERTUs in an organization's policies.

Recommendation 2: NEEA should consider if and how the program may need to adjust its strategies encouraging inclusion of ERTUs in equipment specifications and purchase agreements to ensure any resulting organizational policy changes result in ERTU installations.

Conclusion 3: The program does not clearly differentiate between three ERTU technologies that have distinct roles in the commercial HVAC market and may require distinct intervention strategies. The program encompasses Tier 1 ERTUs that primarily gain efficiency from enclosure improvements and may be the most direct substitute for standard RTUs, Tier 2 ERTUs with integrated ERVs or HRVs, for which uptake is often driven by air requirements or building codes, and bolt-on ERVs or HRVs, which may go through different distribution channels than integrated units. Given these differences, it is important to understand and approach the market for each equipment type individually.

Recommendation 3: NEEA should consider whether distinct intervention strategies would be appropriate for one or more ERTU technologies. It would benefit the program to define applications in which each technology is particularly well suited and to target intervention strategies to those installations, potentially targeting different market actors for different technologies.

1. Introduction

This report presents findings from the Market Progress Evaluation Report (MPER) for the Northwest Energy Efficiency Alliance's (NEEA's) Efficient Rooftop Units (ERTU) program. NEEA contracted with Apex Analytics and NMR Group (collectively, the Apex team) to complete this evaluation.

1.1 Program Description

NEEA's Efficient Rooftop Unit (ERTU) Program seeks to increase the energy efficiency of rooftop units (RTUs) installed on commercial buildings. The program has defined two tiers of compliant RTUs:¹

- Tier 1 RTUs gain efficiency from improvements to the enclosure, including cabinet insulation and low-leakage dampers.
- Tier 2 RTUs must meet the Tier 1 requirements and include a heat or energy recovery ventilator, which can be either integrated into the device or added separately as a "bolt-on" unit, or a condensing heat exchanger.

There is also an option for RTUs to qualify for each tier using a performance path based on the Canadian Standards Association (CSA) P.8 efficiency metric, which NEEA was involved in developing.

The program seeks to drive adoption of ERTUs by increasing awareness of RTU heating efficiency among market actors, increasing availability of ERTUs, and encouraging energy efficiency program administrators to include ERTUs in their commercial incentive programs. Ultimately, the program hopes to support the adoption of a federal standard leading to increased RTU efficiency.

1.2 Research Objectives

This report presents an assessment of the program's progress against its Market Progress Indicators (MPIs). MPIs are associated with the outcomes described in the program's logic model and allow NEEA to track the extent to which a program is progressing toward its ultimate, market transformation objectives. The ERTU program's MPIs are listed in Table 2.

Table 2: ERTU MPIs

#	Outcome	MPI
I	Owners of commercial building portfolios and/or major maintenance contractors implement	a. Increasing # of maintenance contractors working in large commercial buildings recommend qualifying equipment year-over-year
		b. Increasing # of national and/or regional agreements and/or procurement policy changes year-over-year

¹ Earlier in the program's history, there was also a focus on increasing adoption of RTUs using more efficient, condensing gas furnaces. Recognizing significant barriers to installation of condensing RTUs, the program has shifted away from its focus on this equipment.

#	Outcome	MPI
	purchase agreements and/or procurement policy changes to include ERTUs	c. Increasing # of national and/or regional purchases through purchase agreements year-over-year
		d. Increasing # of owners of commercial building portfolios include qualifying equipment in their national and/or regional building specifications year-over-year
II	Voluntary standard and CPL exist and are maintained	a. Voluntary standard and CPL based on NEEA's specification are adopted by a partner/owner.
		b. Standard is updated on a regular basis by its owner.
		c. CPL is updated on a regular basis by its owner.
III	Qualifying ERTUs are available from more major suppliers and in a greater range of capacities and price points over time, especially light commercial units (3-25 ton) in the most common capacities	a. Increasing # of the top five manufacturers produce at least one light commercial Tier 1 ERTU model (performance or prescriptive path).
		b. Increasing # of the top five manufacturers produce at least one light commercial Tier 2 ERTU model (performance or prescriptive path).
		c. Increasing # of manufacturers offer bolt-on E/HRVs for 3–25-ton RTUs.
		d. Distributors and/or manufacturers' representatives offer an increasing # of Tier 2 ERTU options (models or with bolt-on E/HRV).
		e. Manufacturers produce an increasing # of light commercial Tier 1 ERTU models.
		f. Manufacturers produce an increasing # of light commercial Tier 2 ERTU models.
		g. At least one manufacturer offers a value Tier 1 ERTU model.
IV	Awareness of ERTUs and their value propositions increase over time across key audiences (distributors, HVAC contractors including maintenance	a. Increasing # of distributor and/or manufacturers' representative sales managers (across branches) are aware of NEEA's specification and/or at least one ERTU model.
		b. Increasing # of distributor and/or manufacturers' representative sales managers (across branches) are aware of whole unit efficiency for heating.
		c. Increasing # of HVAC contractors (including maintenance contractors) are aware of NEEA's specification and/or at least one ERTU model.

#	Outcome	MPI
	contractors, and building decision makers)	d. Increasing # of HVAC contractors (including maintenance contractors) are aware of whole unit efficiency for heating. e. Increasing # of distributor and/or manufacturers' representative sales managers (across branches) can name at least one value proposition for any ERTU. f. Increasing # of commercial building decision makers can name at least one value proposition for any ERTU. g. Increasing # of HVAC contractors (including maintenance contractors) can name at least one value proposition for any ERTU. h. Increasing # of HVAC contractors (including maintenance contractors) perceive of ERTUs as like-for-like replacements for traditional ERTUs.
V	Supply chain increasingly stocks, sells, and installs ERTUs	a. Distributors and/or manufacturers' representative stock (or can provide with lead-time comparable to a standard RTU) an increasing # of Tier 1 ERTU models. b. Distributors stock an increasing # of Tier 2 ERTU models. c. Distributors stock an increasing # of bolt-on E/HRVs. d. Increasing year-over-year sales of Tier 1 ERTUs. e. Increasing year-over-year sales of Tier 2 ERTUs. f. Increasing year-over-year bolt-on E/HRV installations.
VI	Voluntary programs in and outside the region reference, promote, and incentivize products that meet the standard	a. An increasing number of NW gas utility commercial HVAC programs (NEEA and non-NEEA) include products that meet the standard in their specifications, messaging, and/or incentives. b. At least 80% of NW gas utility commercial HVAC programs include products that meet the standard in their specifications, messaging, and/or incentives. c. An increasing number of priority extra-regional gas utility commercial HVAC programs include products that meet the standard in their specifications, messaging, and/or incentives.

2. Research Approach

This evaluation drew on both survey research and in-depth, qualitative research (focus groups and interviews). The following sections provide detail on each primary data collection effort.

2.1 Market Actor Surveys

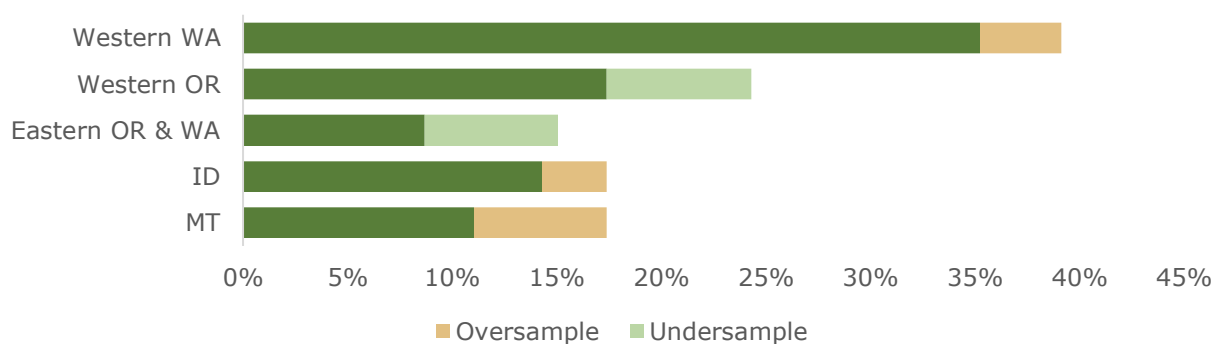
The Apex team conducted surveys with contractors, distributors, and building decision-makers. These surveys primarily sought to gather market-level information to assess the program's progress against its MPIs.

2.1.1 Contractors

Apex conducted a survey of contractors installing light commercial (3-25 ton) RTUs with gas heating in the Northwest. Data collection occurred between October and December 2023. The Apex team sent contractors email and postcard invitations to complete an online survey and conducted phone outreach, completing the survey by phone when possible or emailing a survey link when requested. Seventy-four contractors ultimately completed the survey, with 48 responding by phone and 26 responding online.

Apex sought to capture a sample of contractors that was representative of the geographic distribution of contractors in the Northwest. The contractors who responded to the survey were relatively representative of the geographic distribution of HVAC contractors across the Northwest, with a slight under sampling in Western Oregon (17% of sample vs. 24% of population) and Eastern Oregon and Washington (9% of sample vs. 15% of population) and a slight oversampling in Western Washington, Idaho, and Montana. Figure 1 demonstrates the distribution of survey respondents relative to the population in each region.

Figure 1: Geographic Distribution of Contractor Survey Respondents



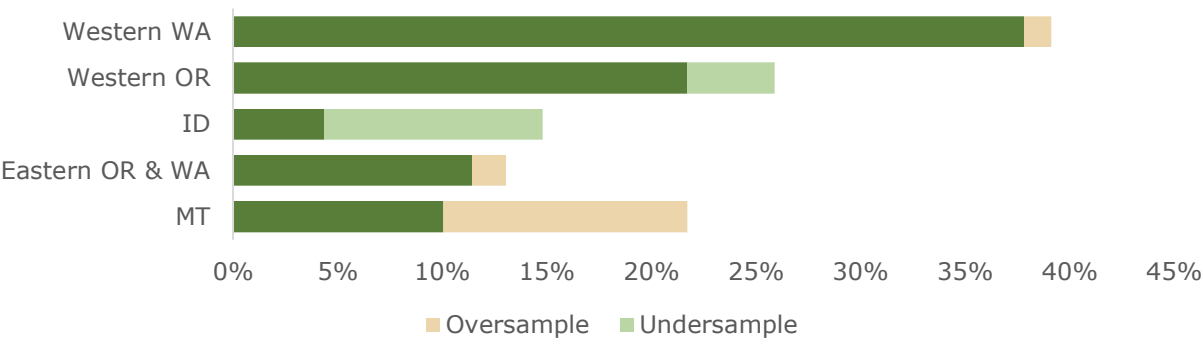
2.1.2 Distributors

Apex conducted a survey of distributors offering light commercial rooftop units (3-25 tons) in the Northwest. Data collection occurred between November 2023 and January 2024. The Apex team sent distributors email invitations to complete an online survey and conducted phone outreach, completing the survey by phone when possible and sending a survey link on request. Twenty-three distributors ultimately completed the survey, split between 11 phone respondents and 12 online respondents.

As with contractors, the Apex team sought to capture a geographically representative mix of distributors across five defined areas of the Northwest. The sample ultimately underrepresented Idaho while overrepresenting Montana, with response from other regions relatively proportionate to their share of

the population. Figure 2 illustrates the distribution of survey respondents relative to the population in each region.

Figure 2: Geographic Distribution of Distributor Survey Respondents



2.1.3 Building Decision-Makers

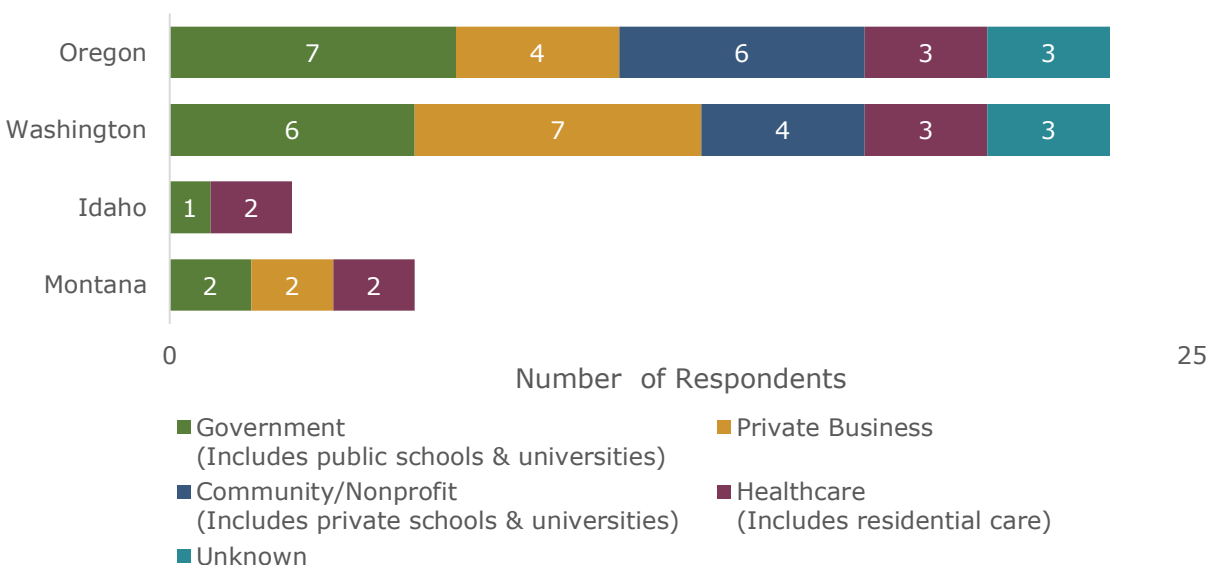
In March and April of 2024, Apex conducted a survey of decision-makers involved in HVAC equipment replacement decisions in commercial buildings in the Northwest that use gas rooftop units. Apex conducted the survey by phone and ultimately received 52 complete responses. As shown in Table 3, most of the survey respondents worked in their organizations’ facilities department.

Table 3: Building Decision-Maker Respondent Titles

Area	Example Titles	Respondents
Facilities	Director, Manager, Supervisor, Coordinator, etc.	31
Management	Operations, Asset, Portfolio, Property, etc.	9
Maintenance	Director, Manager, Supervisor, Foreman, etc.	8
HVAC	Engineer, Lead	2
Other		2

Survey respondents were more heavily concentrated in Oregon and Washington. Government was the most common organization type, comprising 16 of the 52 respondents, followed by private businesses, with 13 respondents (Figure 3).

Figure 3: Building Decision-Maker Respondent Location and Organization Type



2.2 In-Depth Qualitative Research

The Apex team conducted qualitative research to provide additional context to findings from the surveys and identify formative feedback to support program development. Table 4 summarizes these activities. Interviewed contractors and distributors were recruited from among survey respondents, while building decision-makers and manufacturers' representatives were recruited independently.

Table 4: Qualitative Research Summary

Population	Data Collection Timeframe	Data Collection Mode	Number of Respondents
Contractors	May – Jul. 2024	In-depth interviews	10
Distributors	May – Jun. 2024	In-depth Interviews	6
Building Decision-Makers	Feb. 2024	Focus Groups	9 in 2 groups
Manufacturers' Representatives	Dec. 2024 – Jan. 2025	In-depth Interviews	9

2.3 Document Review and Secondary Research

Apex reviewed a range of secondary data sources to inform the assessment of the program's progress against its MPis. The document review provided insight into MPis measuring product availability, as well as some data for uptake measures. Table 5 lists the secondary data sources that Apex included in this review as well as the types of information each source provided.

Table 5: Secondary Data Sources Reviewed

Source	Objective
NEEA's BetterBricks ERTU specification requirements and Compliant Products List	Understand existing ERTU offerings.
Websites of five major Pacific Northwest distributors (Thermal Supply Inc., Johnstone Supply, DSG Supply, RSD, Glacier Supply Group)	Assess offerings of ERTU models and qualified bolt-on energy and heat recovery ventilators
Manufacturer product catalogs (Daikin Applied, Carrier, Johnson Controls, Trane, Lennox)	Assess available ERTU offerings
Program documentation and NEEA staff notes related to market actor engagement	Understand current market partner ERTU sales, market engagement efforts, and barriers
Market Progress Reports	Track key program activities and progress against milestones

3. Findings and Discussion

Apex classified the ERTU program's MPIs into four categories, based on their focus:

- Awareness
- Availability
- Uptake
- Program support

The following sections provide an overall assessment of progress against the MPIs defined for each category, followed by a more detailed discussion of the activities and outputs designed to address each objective and the findings related to program outcomes and MPIs.

3.1 Awareness

NEEA has worked with a variety of HVAC market actors to increase awareness of ERTUs and the value proposition they offer as a replacement option for standard RTUs. Table 6 lists the MPIs associated with the program's efforts to build awareness of ERTUs in the market and provides a high-level assessment of the program's progress toward each. The following sections discuss findings related to ERTU awareness in greater detail.

Table 6: Awareness MPis

MPI		Finding	Detail
4a	Increasing # of distributor sales managers (across branches) are aware of NEEA's specification and/or at least one ERTU model.	Baseline: Very high ERTU model awareness	95.5% (n=22) of surveyed distributors are familiar with at least one ERTU product line
		Baseline: Very low NEEA specification awareness	8% (n=23) of distributors are familiar with BetterBricks' ERTUs for Commercial Building System Requirements
4b	Increasing # of distributor sales managers (across branches) are aware of whole unit efficiency for heating.	Baseline: Low awareness	22% (n=23) of distributors are very or moderately familiar with TCOP _{HS} . 4% (n=23) of distributors are moderately familiar with Canadian Standards Association P.8 Standard.
4c	Increasing # of HVAC contractors (including maintenance contractors) are aware of NEEA's specifications and/or at least one ERTU model.	Baseline: Very high ERTU model awareness	95% (n=74) of contractors are familiar with ERTU models
		Baseline: High ERTU model awareness	68% (n=74) of contractors have direct experience with any qualifying product line
		Baseline: Very low NEEA specification awareness	7% (n=74) of contractors are familiar with BetterBricks' ERTUs for Commercial Building System Requirements
4d	Increasing # of HVAC contractors (including maintenance contractors) are aware of whole unit efficiency for heating.	Baseline: Moderate awareness	47% (n=73) of contractors are very or moderately familiar with TCOP _{HS} . 10% (n=74) of contractors are very or moderately familiar with Canadian Standards Association P.8 Standard.
4e	Increasing # of distributor sales managers (across branches) can name at least one value proposition for any ERTU.	Baseline: Low/moderate awareness	39% (n=23) of distributors can cite one or more benefit
4f	Increasing # of commercial building decision makers can name at least one value proposition for any ERTU.	Baseline: Low awareness	23% (n=52) of building decision makers can cite one or more benefits
4g	Increasing # of HVAC contractors (including maintenance contractors) can name at least one value proposition for any ERTU.	Baseline: Low awareness	36% (n=74) of contractors can cite one or more benefits

MPI		Finding	Detail
4h	Increasing # of HVAC contractors (including maintenance contractors) perceive of ERTUs as like-for-like replacements for traditional ERTUs.	Baseline: Moderate perception of similarity in installation process	27% (n=55) of contractors who are moderately familiar with BetterBricks requirements and/or ERTU product lines view installation as very similar, and an additional 15% view the process as extremely similar.

3.1.1 Activities and Outputs

The program works to build awareness among four market actor groups

Program staff developed an engagement plan to guide their outreach to market actors but reported that there may be an opportunity to update the plan. Staff reported that the outreach plan provided a staged approach, focused first on encouraging large manufacturers to develop and certify products, and then on engaging with manufacturers producing compliant products to increase market share. NEEA has also been working to develop collateral and educational materials, including field test materials and case studies, to distribute to market actors to support ERTU education.

Manufacturers were an initial focus of engagement

Efforts to build awareness among commercial HVAC manufacturers have included outreach efforts to connect with application engineers and identify and certify compliant models as well as efforts to encourage manufacturers to increase their outreach to manufacturers' reps about ERTUs. NEEA staff have also met with manufacturers to encourage them to increase the number of compliant models and consider compliance when developing new models.

Manufacturers' reps have been another important touchpoint

In addition to manufacturers, NEEA has conducted outreach to manufacturers' reps, both to build reps' awareness of ERTUs and to gather data on ERTU sales. NEEA staff reported that manufacturer rep engagement levels have varied. While reps have been willing to meet with program staff and some have provided data, some have been skeptical of ERTUs as a light commercial replacement product, as opposed to a more specialized equipment option.

Building decision-maker engagement has focused on professional organizations and local events

In addition to their outreach to upstream market actors, NEEA has worked to engage corporate building decision makers by attending local facilities expos and working to build connections through the Building Owners and Managers Association (BOMA). In the future, the program plans to identify priority partners

ERTU MPER #1

who might incorporate ERTUs into specifications when they are replacing ERTUs or installing systems in new facilities and develop engagement plans for these organizations.

Outreach to distributors has been more limited as the program refines ERTU value propositions

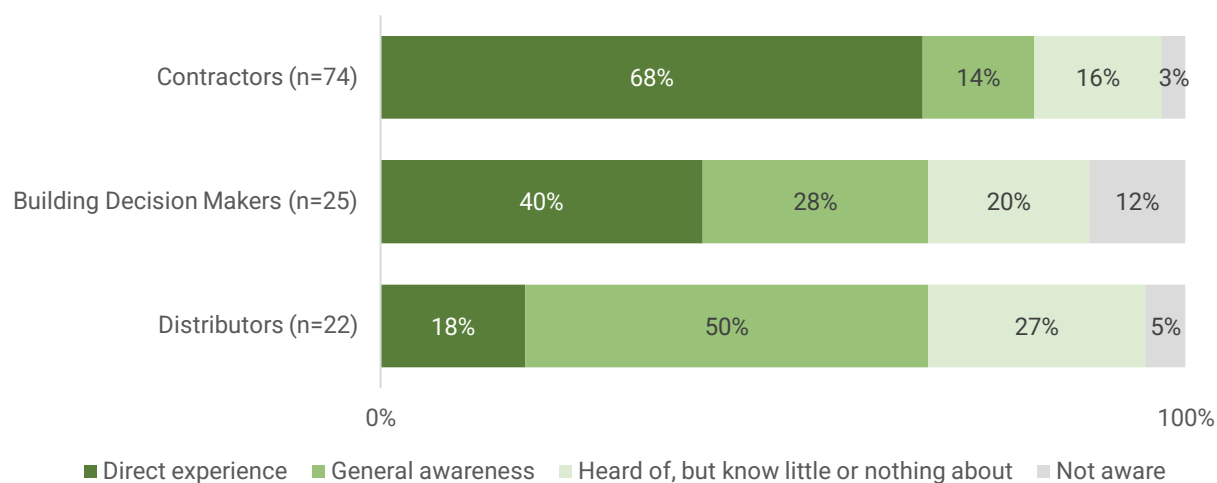
NEEA staff have also reached out to distributors but found that distributors may have limited influence in many ERTU replacements, largely filling orders and providing like-for-like replacement options. NEEA staff are still working to develop a business case for manufacturers' reps and distributors to promote ERTUs.

3.1.2 MPI Findings Discussion

Market actors have at least general awareness of ERTU product lines

Across surveyed market actor groups, a majority of respondents reported at least general awareness with one or more ERTU product lines (Figure 4).² Contractors and distributors primarily reported installing ERTUs as part of engineering specifications for projects. Distributors also reported providing ERTU units that were outside their typical product offerings in order to meet specification requirements. One distributor stated, "We're primarily a Carrier dealer. We have used AAON [an ERTU manufacturer] – we use them when we need some specific points they hit." Contractors also reported encountering ERTUs through their maintenance and repair work.

Figure 4: Market Actor Awareness of ERTU Product Lines



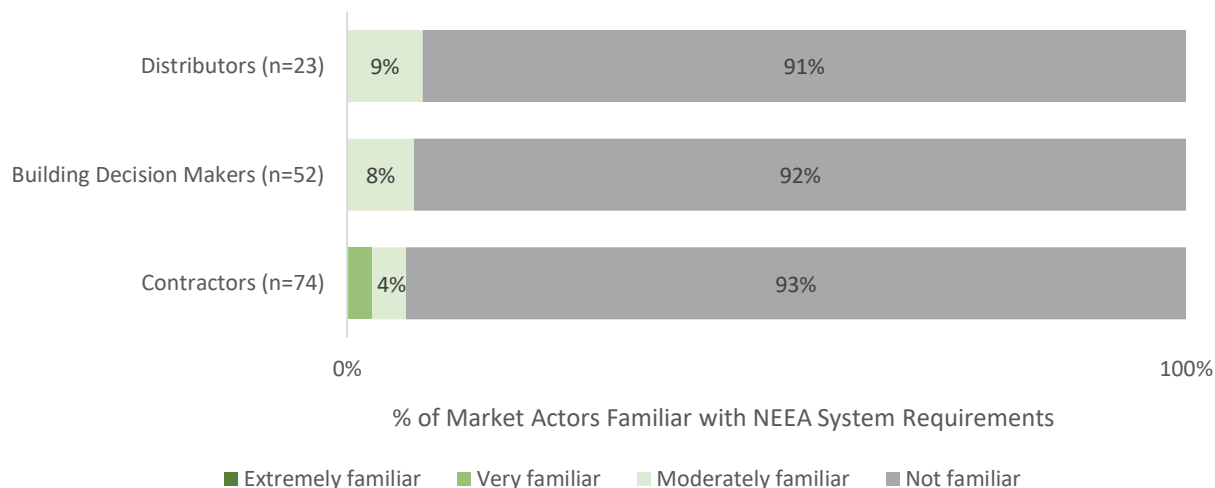
Source: Contractor Survey Q5, Distributor Survey Q5, Building Decision Maker Survey Q10. For building decision-maker survey, response options "Have some experience with this product line" and "Learned about this product line, but don't have experience with it" are combined in this figure as "General awareness."

² The ERTU product lines listed in the survey were: AAON's RQ, RN, RZ, or RZ-A product lines; Daikin Applied's Rebel or Rebel Applied product lines; Trane's Horizon product line; Valent's DOAS Rooftop product line; Greenheck's RVE DOAS product line; and Tempeff's RG DOAS product line.

Awareness of NEEA's ERTU specification & whole unit efficiency metrics was lower

Market actors demonstrated lower awareness of NEEA's ERTU system requirements and whole unit efficiency metrics than with individual ERTU product lines. Fewer than 10% reported even moderate familiarity with NEEA's system requirements, with none reporting they were extremely familiar (Figure 5).

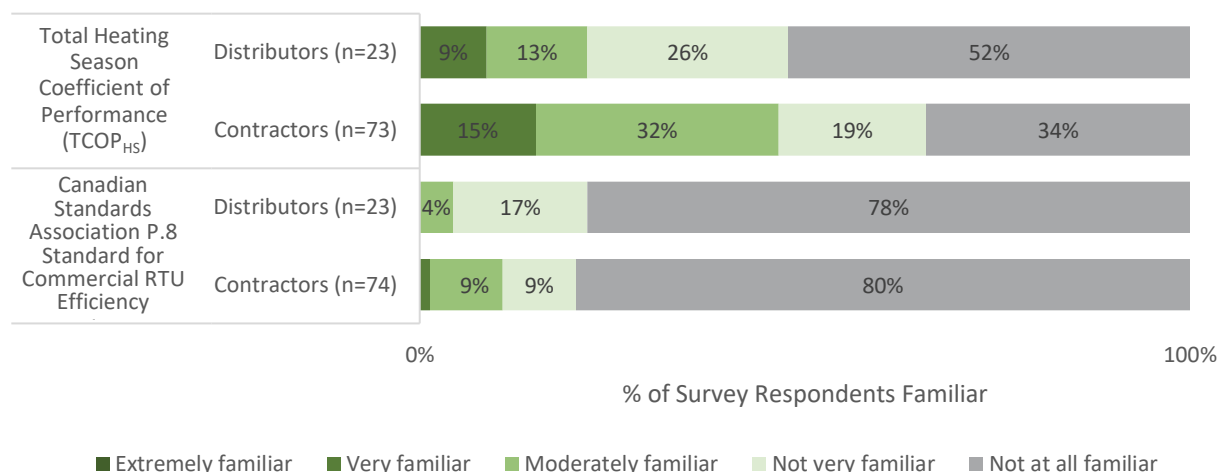
Figure 5: Market Actor Familiarity with NEEA's ERTU System Requirements



Awareness of whole unit efficiency metrics like the Total Heating Season Coefficient of Performance (TCOP_{HS}) and the Canadian Standards Association's P.8 Standard for Commercial RTU Efficiency, which are designed to recognize both heating and cooling efficiency in RTUs, was slightly higher than awareness of NEEA's ERTU system requirements (Figure 6).³ Nonetheless, fewer than half of contractors expressed even moderate familiarity, and no contractors or distributors rated themselves as extremely familiar.

³ Building decision-makers were not asked about awareness of whole unit efficiency metrics as it was not expected that they be familiar with these relatively technical metrics.

Figure 6: Contractor and Distributor Familiarity with Whole Unit Efficiency Metrics

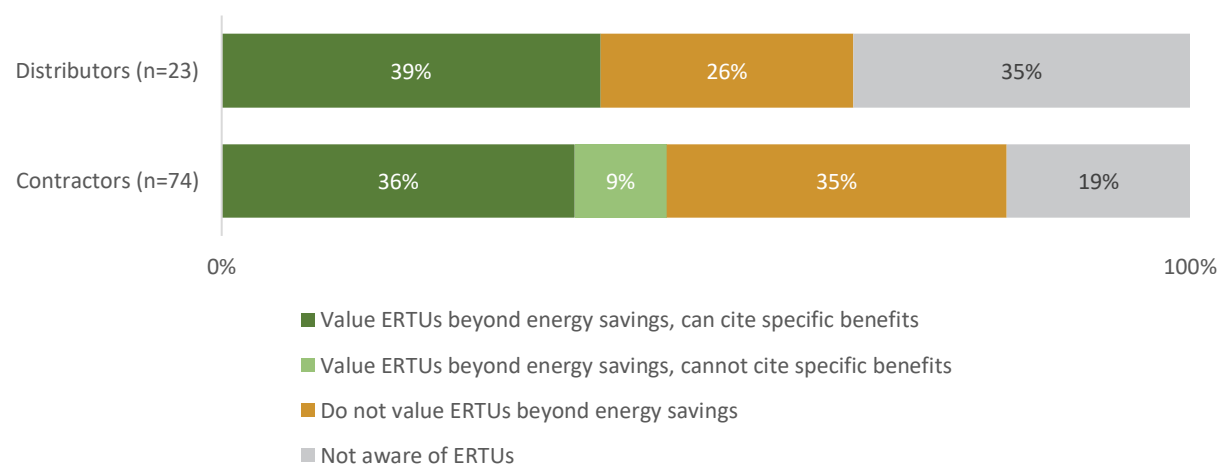


Source: Contractor Survey Q4; Distributor Survey Q4; Building Decision Maker Survey Q8

Contractors and distributors see value in ERTU product lines, but ability to name benefits is mixed

Surveyed contractors and distributors that were aware of ERTU product lines largely saw value in them. Most distributors that were aware of ERTUs were able to name specific benefits of the equipment, while contractors aware of ERTUs were more evenly divided in their ability to name specific benefits (Figure 7). Although the survey asked contractors and distributors to name benefits beyond energy efficiency, the most commonly cited benefits for both respondent groups focused on saving energy and money (cited by 26% of contractor respondents (n=27) and 56% of distributor respondents (n=9)). Other benefits cited included reliability and ease of installation and maintenance (22% of contractors and 22% of distributors, respectively) and comfort (19% of contractors, 11% of distributors).

Figure 7: Contractor and Distributor Ability to Name Benefits of ERTUs



Source: Contractor Survey Q19 & Q20; Distributor Survey Q18

Market actors see ERTUs as niche products for specialized applications, not general RTU replacement options

While they were generally aware of the equipment and its benefits, contractors and distributors largely discussed ERTUs as niche products for applications with high airflow needs rather than as a more efficient replacement option for a standard RTU. Interview respondents described ERTUs as a good fit for spaces like medical buildings, production facilities, and buildings with multi-occupancy restrooms. As one distributor described, “[The AAON units] have been when someone has specified it. It was more toward veterinarian clinics, things like that with higher air needs.” Similarly, a contractor reported that “[ERTUs are used where] they are dealing with surgical areas, cleaning tools. HEPA filtration is really critical.”

Fewer contractors and distributors discussed energy efficiency as a motivation for ERTU installations. Those that did so reported that these installations took place in facilities that were particularly motivated by energy savings. For example, one distributor described an ERTU installation at a local university, saying that “their facility manager at that time matched the unit with their public persona [as a sustainability-focused institution], what they put forward.”

Manufacturer’s reps also reported that sales of ERTUs were typically driven by airflow needs, rather than efficiency. As one manufacturer’s rep explained, “it is driven much more by application requirements; it is not driven by efficiency. I do not see it driven by better insulation from these guys, that rarely is a primary sell.”

Cost and installation barriers inhibit use of ERTUs as general replacement options

This limited recognition of ERTUs as a viable replacement option for standard RTUs among contractors and distributors likely reflects a combination of upfront cost and both practical and perceived barriers to ERTU installation. Interviewed contractors with recent experience installing ERTUs reported that their costs were 15% to 30% higher than a comparable standard RTU. Two manufacturers’ reps reported a similar range for ERTU cost premiums, estimating they were 20% to 30% more expensive than a standard alternative. Two other reps reported larger cost premiums, indicating that ERTUs could be twice as expensive or more than standard RTUs.

Interviewed market actors indicated that these cost premiums would make them reluctant to propose an ERTU in most typical replacement scenarios out of concern that their bid would not be competitive. One contractor reported that, “we literally do, 90% of the time, the cheapest that we can get,” while a distributor speculated that customers would not understand the value of an ERTU, saying “it looks pretty much the same...you basically have to understand HVAC to see the benefits of it.”

Manufacturers’ reps also reported pressure to offer lower prices in typical replacement scenarios. According to one manufacturer’s rep, “if it is a straight up replacement of a cheap unit, we would probably quote it with a cheap unit. We might give them an adder – ‘this is the cost to upgrade’ – if they are interested. There would have to be a reason to have them look at that.” Similarly, another manufacturer’s rep stated that, “if someone is looking for a cost effective five-ton replacement, the normal people that play are York, Trane, Lennox. Unless there is some reason to propose a higher efficiency AAON option, we would never bid that, because we would never win.”

Market actors suggested that split incentives between tenants and owners in commercial buildings can exacerbate upfront cost barriers to ERTU installation. As one contractor explained, “Typically, the guy

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that is paying the bill for the RTU is not the guy that is paying the monthly [utility] bill. The owner is paying me to change the rooftop out, but the building is leased out by multiple other people paying the monthly bill. The owner wants to get it as cheap as possible.” A manufacturer’s rep noted that, even in cases where tenants are responsible for the HVAC equipment, they may be reluctant to invest in more expensive options due to uncertainty around how long they will remain in the space.

Despite similarities in the installation process, weight differences can be a barrier to ERTU adoption

The process of installing an ERTU is similar to installing a standard RTU according to the contractors surveyed. Figure 8 shows that 92% of contractors reported that ERTU installation was at least moderately similar to installing a standard RTU.

Figure 8: Similarity of Installing an ERTU Relative to a Standard RTU



Source: Contractor Survey Q21

Despite similarities in the installation process, market actors reported they may be reluctant to suggest an ERTU in a replacement scenario due to concerns about the weight of the equipment. If the equipment being installed is significantly heavier than the equipment it replaces, the project may require permitting and engineering work to ensure the roof will support the additional weight. As a result, one manufacturer’s rep noted that “accommodating structural requirements for larger [ERTU] units is easier done on a new project than an existing one.” Program staff confirmed that ERTUs can be notably heavier than standard RTUs due to the addition of cabinet insulation and potentially an ERV or HRV.

Typical information flows about HVAC equipment may not effectively raise awareness of ERTUs as a replacement option

In-depth interviews confirmed that information about new HVAC technologies typically flows from manufacturers to distributors and manufacturers reps, who have direct lines of communication with manufacturers, and then on to contractors who advise building decision-makers on what equipment to install. However, interviewed contractors primarily reported learning about ERTU product lines through their experience installing those technologies in plan and specify projects, where an engineer details the equipment to be installed. According to one contractor, “generally, I’m not even the one detailing this all out [when installing an ERTU]: it’s the engineer, because of [the unique needs of healthcare facilities].” This exposure to ERTUs through plan and specify projects and maintenance work gave

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contractors a greater awareness of ERTUs than distributors, who were knowledgeable about their own product offerings, but had limited awareness of alternatives.

Interviewed manufacturers' reps demonstrated greater awareness of ERTUs than distributors. Manufacturers reps described taking a variety of efforts to inform their contractor and distributor customers about HVAC technologies, including direct outreach as well as hosting lunch-and-learns. However, some manufacturers reps suggested that they would be unlikely to be involved in a typical replacement of a standard RTU. According to one respondent, "We're not typically the first blush when someone is saying, 'I just need 300 tons of RTU under 10 tons a piece, what's the cheapest thing?' That isn't where we're brought into the equation." As a result, manufacturers reps may have limited opportunity to recommend ERTUs as a standard replacement option.

3.2 Availability

NEEA has worked with a variety of HVAC market actors to increase availability of ERTUs. Table 7 lists the MPis associated with the program's efforts to increase availability of ERTUs in the market and provides a high-level assessment of the program's progress toward each. The following sections discuss findings related to ERTU availability in greater detail.

Table 7. Availability MPis

MPI		Finding	Detail
3a	Increasing # of the top five manufacturers produce at least one light commercial Tier 1 ERTU model (performance or prescriptive path).	Baseline: Moderate availability	Two of the top five manufacturers (Daikin Applied, Carrier, Johnson Controls, Trane and Lennox) produce a light commercial Tier 1 ERTU: Daikin Applied has 2 Tier 1 ERTU models, the DPSA and DPS. Trane produces the Horizon OAXD.
3b	Increasing # of the top five manufacturers produce at least one light commercial Tier 2 ERTU model (performance or prescriptive path).	Baseline: Moderate availability	Two of the top five manufacturers produce a light commercial Tier 2 ERTU: Daikin Applied has 2 Tier 2 ERTU models, the DPSA and DPS with the ERV included. Trane produces the Horizon OAXD with the ERV included.
3c	Increasing # of manufacturers offer bolt-on E/HRVs for 3-25 ton RTUs.	Baseline: Low availability	At least four manufacturers (AAON, Daikin, Valent, and Trane) produce a bolt-on HRV/ERV compatible with small-to-medium ERTUs.
3d	Distributors offer an increasing # of Tier 2 ERTU options (models or with bolt-on E/HRV).	Baseline: Low availability	Thermal Supply Inc, Johnstone Supply, DSG Supply, RSD, and Glacier Supply Group do not stock Tier 2 ERTUs.
3e	Manufacturers produce an increasing # of light commercial Tier 1 ERTU models.	Baseline: Moderate availability	AAON, Daikin Applied, Trane and Valent all produce Tier 1 ERTUs (7 total models).

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MPI		Finding	Detail
3f	Manufacturers produce an increasing # of light commercial Tier 2 ERTU models.	Baseline: Moderate availability	AAON, Daikin Applied, Greenheck, Trane, Tempeff and Valent all produce Tier 2 ERTUs (9 total models).
3g	At least one manufacturer offers a value Tier 1 ERTU model.	No Progress	No manufacturers produce a value Tier 1 ERTU.
5a	Distributors stock an increasing # of Tier 1 ERTU models.	Baseline: Low availability	Thermal Supply Inc, Johnstone Supply, DSG Supply, RSD, and Glacier Supply Group do not stock Tier 1 ERTUs.
5b	Distributors stock an increasing # of Tier 2 ERTU models.	Baseline: Low availability	Thermal Supply Inc, Johnstone Supply, DSG Supply, RSD, and Glacier Supply Group do not stock Tier 2 ERTUs.
5c	Distributors stock an increasing # of bolt-on E/HRVs.	Baseline: Low availability	Thermal Supply Inc, Johnstone Supply, DSG Supply, RSD, and Glacier Supply Group do not stock bolt-on E/HRVs.

3.2.1 Activities and Outputs

One of NEEA's early efforts in its manufacturer outreach was to work with large manufacturers to identify any compliant products they already produced and ensure those products were certified. NEEA staff worked with manufacturers' application engineers to use the program's calculator to identify and certify compliant products. NEEA staff reported this effort was most successful with one large manufacturer in particular. Since then, NEEA staff have continued to work to encourage both large manufacturers and others to expand their offerings of ERTUs and RTUs with built-in energy recovery systems.

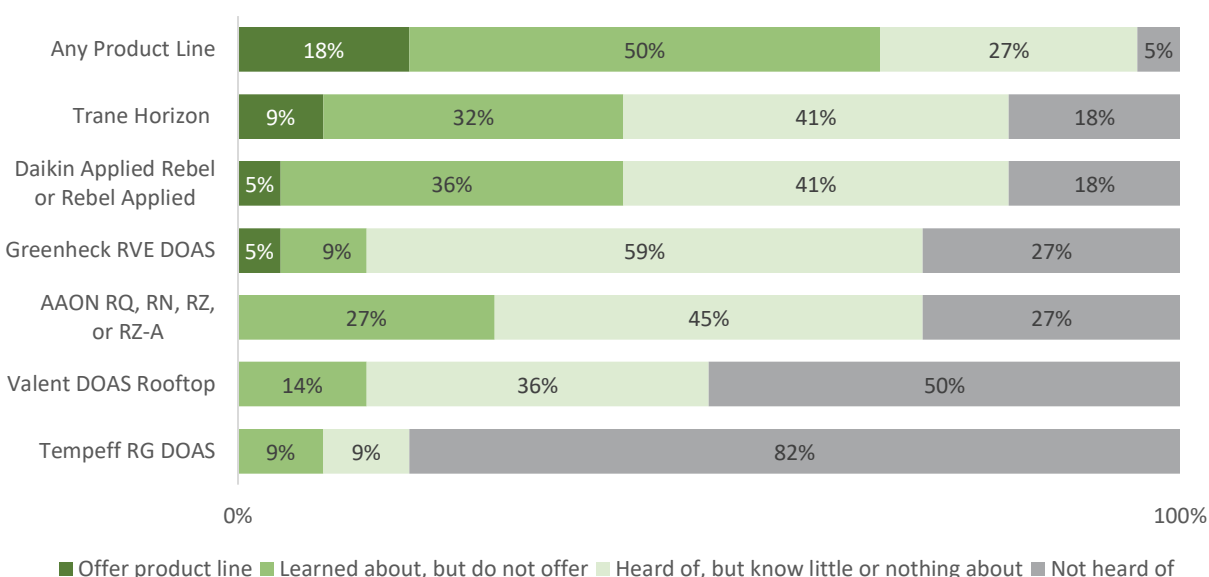
NEEA's outreach activities with manufacturers' reps and distributors also focus on increasing ERTU availability. NEEA is working to develop a business case for ERTUs that will encourage manufacturers' reps and distributors to increase availability of compliant products. NEEA staff noted that distributors are less likely to stock RTUs than they are to stock residential HVAC equipment, and they are particularly unlikely to stock ERTUs, which are higher-end, semi-custom equipment. As a result, the availability lead time for obtaining ERTUs is an important consideration in addition to whether the models are actually stocked.

3.2.2 MPI Findings Discussion

While market actors can obtain ERTUs for special projects, availability is not widespread

ERTU availability in the market is currently limited. A total of six manufacturers offer ERTUs,⁴ but only two of those (Daikin Applied and Trane) are among the top five RTU manufacturers.⁵ Fewer than one-fifth of the surveyed distributors (18%) reported offering one or more ERTU product lines (Figure 9). Distributors who had provided ERTUs reported they had special ordered them for specific projects and did not keep them in stock. The Apex team's review of regional distributors' online product catalogs corroborated these findings.⁶ None of the regional distributors reviewed listed ERTU product lines in their online product lists.

Figure 9: Share of Surveyed Distributors Offering ERTU Product Lines (n=22)



Source: Distributor Survey Q5

While no distributors reported stocking ERTUs, those who had experience selling them reported that ERTUs were available on a similar timeframe as standard RTU models. Distributors cited a range of timeframes for ERTU availability, with one reporting 12 weeks, another four weeks, and a third reporting that the timing could vary depending on the factory load. Nonetheless, all three distributors gave similar responses for standard ERTU availability. Given the timeframes cited, the standard RTUs these

⁴ Manufacturers offering ERTUs at the time of this MPER were AAON (RQ, RN, RZ, or RZ-A product lines), Daikin Applied (Rebel or Rebel Applied product lines), Trane (Horizon product line), Valent (DOAS Rooftop product line), Greenheck (RVE DOAS product line), and Tempeff (RG DOAS product line).

⁵ NEEA staff identified the top five RTU manufacturers as Daikin Applied, Carrier, Johnson Controls, Trane, and Lennox.

⁶ Reviewed distributors were: Thermal Supply Inc., Johnstone Supply, DSG Supply, RSD, and Glacier Supply Group.

distributors were using as a frame of comparison were likely also models available through special order.

3.3 Uptake

NEEA has worked with a variety of HVAC market actors to increase the uptake of ERTUs. Table 8 lists the MPIs associated with the program's efforts to accelerate uptake of ERTUs in the market and provides a high-level assessment of the program's progress toward each. The following sections discuss findings related to ERTU uptake in greater detail.

Table 8. Uptake MPIs

MPI		Finding	Detail
1a	Increasing # of large maintenance contractors recommend qualifying equipment year-over-year.	Baseline: Low uptake	18% (n=60) of large maintenance contractors recommend products from any qualifying product lines.
1b	Increasing # of national and/or regional agreements and/or procurement policy changes year-over-year.	Baseline: Moderate uptake	45% (n=42) of decision makers with multiple buildings equipped with gas RTUs have company policies regarding specific suppliers or contractors who maintain their equipment.
1c	Increasing # of national and/or regional purchases through purchase agreements year-over-year.	NA	This MPI is currently on hold for MPER 1.
1d	Increasing # of corporations include qualifying equipment in their national and/or regional building specifications year-over-year.	Baseline: High uptake	100% (n=4) of decision makers' companies with purchasing policies specifying product lines from manufacturers include qualifying equipment.
5d	Increasing year-over-year sales of Tier 1 ERTUs.	Moderate progress	According to NEEA data, there was an increase in Tier 1 ERTU sales from 2023 to 2024, going from 0 to 64 units.
5e	Increasing year-over-year sales of Tier 2 ERTUs.	Moderate progress	According to NEEA data, there was an increase in Tier 2 ERTU sales from 2023 to 2024, going from 7 to 20 units.
5f	Increasing year-over-year sales of bolt-on E/HRV installations.	Baseline: Low uptake	27% (n=11) of distributors selling bolt-on energy or heat recovery ventilators that sold bolt-ons installed on gas RTUs in the last year.

3.3.1 Activities and Outputs

As the number of ERTU installations increases, more contractors and distributors are likely to be exposed to ERTUs, further driving adoption of the technology in the market. NEEA identified two specific strategies to accelerate this cycle of ERTU adoption:

- **Large maintenance contractors** play an important role in identifying RTUs in need of replacement and potentially recommending replacement options. These organizations could generate notable demand for ERTUs by recommending them to owners of large building portfolios when RTUs need replacement.
- **Purchase agreements and equipment specifications** that large organizations maintain may determine which types of HVAC equipment those organizations install in a particular situation. By motivating these organizations to specify ERTUs for RTU replacements or to develop purchase agreements that include ERTUs, NEEA could increase uptake of RTUs in the region.

NEEA staff reported limited progress on these activities to date. Program staff have attended local meetings for facilities managers and have engaged with BOMA. However, program staff have not yet had a chance to analyze which organizations are most likely to have equipment specifications and might be good candidates for outreach to encourage inclusion of ERTUs in those specifications.

3.3.2 MPI Findings Discussion

While there is considerable uncertainty, the number of ERTUs sold in the Northwest in 2024 was likely approximately 100.

NEEA has been working with distributors to gather data on ERTU sales, although these efforts were relatively new and had provided limited data at the time of this MPER. As Table 9 shows, the sales estimates resulting from these efforts tracked more ERTU sales in 2024 relative to 2023, although the distributors reporting data also changed between the two years. As a result, these changes likely reflect the evolution of NEEA's data collection efforts over time to a greater extent than they reflect trends in market uptake of ERTUs.

Table 9: Estimated ERTU Sales Based on Distributor-Reported Data

Year	Number of Distributors Reporting	Estimated ERTU Sales by Participating Distributors	
		Tier 1	Tier 2
2023	1	0	7
2024	2*	64	20
*Note: Sales for all distributors were partial year. Figures reported here are extrapolated to full year based on average monthly sales.			

Surveys conducted for this MPER also collected data on whether and how many ERTUs respondents had sold in the past year. These findings can provide a rough estimate of the number of ERTUs sold in the region (Table 10). However, it is important to note that there is also uncertainty around these estimates.

For example, if survey samples overrepresented market actors that had sold ERTUs, they could provide inflated estimates of ERTU uptake.

Table 10: Estimated ERTU Sales Based on Distributor Survey Responses

Reference	Input	Distributor Survey Findings
A	% of respondents reporting any ERTU sales in past year	5%
B	Estimated population size in region	72
C	Estimated number of market actors in region selling ERTUs (A X B)	4
D	Average number of ERTUs sold in past year per market actor reporting sales	25
E	Estimated number of ERTUs sold in region in past year (C X D)	100

Large maintenance contractors are a potentially valuable partner for increasing ERTU adoption

Maintenance contractors serving portfolios of buildings were more favorable toward ERTUs, as demonstrated both by the greater familiarity they expressed and by more frequently recommending them than other contractors. NEEA and the Apex team were unable to identify a distinct group of large maintenance contractors, in the sense of contractors whose businesses explicitly focus on providing maintenance services to large building portfolios, among the larger contractor population. As a proxy, the Apex team identified contractors who reported both having maintenance contracts with clients and working with clients that own multiple commercial buildings (maintenance contractors serving portfolios). Contractors who met these criteria were more likely to be aware of ERTUs than other contractors, with 84% reporting awareness of at least one ERTU product line compared to 69% of other contractors. Nearly half (45%) of maintenance contractors serving portfolios reported always or often recommending ERTU product lines, while roughly one-third (31%) of other contractors reported recommending ERTU product lines that frequently.

Few organizations have equipment specifications or purchase agreements and those that do likely include multiple equipment options

NEEA staff reported limited progress to date in efforts to directly encourage large organizations to include ERTUs in their equipment specifications or purchase contracts. Building decision-maker survey findings suggest that most organizations do not specify individual product lines in their equipment specifications or purchase agreements, and those that do may include a range of product options. Fewer than half of the surveyed building decision-makers (43%) reported their organizations have equipment specifications or purchase agreements for HVAC equipment, and, of those, roughly one third (14% of all respondents) reported their equipment specifications or purchase agreements specify individual product lines.

All of the respondents who reported their organizations specify product lines indicated that those specifications or agreements included multiple ERTU product lines. The survey did not, however, ask

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whether the specifications or agreements included any non-ERTU product lines. As a result, it is possible that these agreements may allow for multiple equipment options rather than requiring RTUs from a single product line.

Manufacturers' reps reported greater uptake of RTUs with integrated ERVs or HRVs than of bolt-on ERVs or HRVs. Reps' estimates of sales of RTUs with integrated ERVs or HRVs ranged from "basically zero" to 40-50% of all RTU sales. Reps selling higher proportions of ERVs or HRVs noted that demand was driven by projects with high outside air needs and by building codes in the State of Washington.

Interviewed reps noted that RTUs with integrated ERVs or HRVs were easier to install than bolt-on units and avoided the risk that a bolt-on unit would be incompatible with the rest of the system. One rep noted, however, that while they did not sell many bolt-on ERVs or HRVs, they were aware of them being used in the market, suggesting that bolt-on units may go through other channels. Surveyed distributors also reported selling relatively few bolt-on ERVs and HRVs, with only three of 23 survey respondents reporting any sales in the past year. Estimates of the number of bolt-on ERVs or HRVs sold ranged across the distributors reporting sales from one to between ten and twenty units.

Reliability drives both the decision to replace an RTU and the equipment selected

While most replacements occur when the existing equipment fails, building decision-makers nonetheless face an active choice in whether to repair or replace the equipment. Focus group respondents suggested that the perceived reliability of the repaired equipment relative to new equipment was a key driver in that decision. As one respondent explained, "You can keep throwing money at these things for quite a while and keep them running. It just depends on how much you want to keep throwing at them."

Both building decision-makers and contractors described reliability as a key consideration in their selection of HVAC equipment to install. However, both groups also described a perception that energy efficient equipment tends to be more complex than standard equipment, and that more complex equipment tends to be less reliable. According to one contractor, "a mechanical unit that is fully mechanical will run a lot longer than the new stuff today." Similarly, a building decision-maker said, "the more efficient they are, the more complicated they get. And if they work, they're fantastic. If they don't, they get really complicated."

3.4 Program Support

NEEA has worked with a variety of HVAC market actors to create more program support for ERTUs. Table 11 lists the MPIs associated with the program's efforts to build program support for ERTUs in the market and provides a high-level assessment of the program's progress toward each. The following sections discuss findings related to ERTU program support in greater detail.

Table 11. Program Support MPIs

MPI		Finding	Detail
2a	Voluntary standard and CPL based on NEEA's specification are adopted by partner/owner.	Limited Progress	NEEA has identified one potential partner, Consortium for Energy Efficiency (CEE), but reports that CEE has indicated they would not

			host NEEA's specification that includes TCOP (Total Coefficient of Performance)
2b	Standard is updated on a regular basis by its owner.	On track	NEEA reviews the standard and makes necessary updates
2c	CPL is updated on a regular basis by its owner.	On track	The program conducts quarterly reviews of the CPL and makes updates as needed, though the most recent reviews have not identified new products to add
6a	An increasing number of NW gas utility commercial HVAC programs (NEEA and non-NEEA) include products that meet the standard in their specifications, messaging, and/or incentives.	See 6b	
6b	At least 80% of NW gas utility commercial HVAC programs include products that meet the standard in their specifications, messaging, and/or incentives.	Limited inclusion of products meeting NEEA standards	Baseline review of utility programs across WA, ID, MT, OR show very limited inclusion
6c	An increasing number of priority extra-regional gas utility commercial HVAC programs include products that meet the standard in their specifications, messaging, and/or incentives.	On Track	Nicor Gas, MN CEE, and CalMTA are developing programs focused on ERTUs.

3.4.1 Activities and Output

NEEA staff anticipated that manufacturers would be more responsive if programs across the country were aligned around a consistent assessment of efficiency in RTUs. To that end, NEEA developed a specification for ERTUs and maintains a compliant products list (CPL). NEEA initially hoped to transfer control of the specification and CPL to another organization that would provide a more national perspective. NEEA identified the Consortium for Energy Efficiency (CEE) as a potential partner to manage the specification, but NEEA staff reported that CEE ultimately declined to take on the specification and CPL due to concerns that it would conflict with other work they were doing to advance federal efficiency standards. As a result, NEEA has continued to maintain the specification and CPL.

NEEA has worked to encourage efficiency program administrators to include ERTUs in their incentive offerings, both in the Northwest and outside the region. NEEA works with program administrators around the country to develop consistent metrics for RTU efficiency. Manufacturers seek to develop products for use across a wide range of geographies, and program staff anticipate that they will be more likely to consider ERTU specifications if those specifications apply beyond the Northwest. The program has established strategic partnerships with Minnesota's Center for Energy and Environment (MN CEE) and Nicor Gas. As the co-chair of CEE's RTU project, under their Commercial Air Conditioning and Heat

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Pump committee, the program engages with many extra-regional utilities. Additionally, the program has regular meetings with the California Market Transformation Administrator (CalMTA).

In the Northwest, the program hopes to motivate gas utilities to include ERTUs in their commercial HVAC incentive programs. Adoption of ERTUs in utility incentive programs could help to reduce the upfront cost of installing an ERTU, making cost-sensitive contractors more likely to recommend an ERTU as a standard RTU replacement. It could also raise awareness of ERTUs as a standard RTU replacement option among contractors and distributors who may track local utility incentives more closely than emerging HVAC technologies. NEEA has worked with the Regional Technical Forum to begin the process of developing a Unit Energy Savings (UES) measure for ERTUs in order to facilitate inclusion of ERTUs in efficiency programs. NEEA has also collaborated on RTU energy modeling research, which will provide more rigorous savings estimates for ERTUs.

3.4.2 MPI Findings Discussion

NEEA has coordinated with program administrators around the country to align on ERTU specifications

While NEEA has not yet been able to transfer management of the ERTU specification and CPL to a national partner, NEEA staff noted that their engagement with CEE had provided an opportunity to coordinate with program administrators around the country on RTU efficiency. In particular, staff reported working closely with MN CEE and Nicor Gas, noting that Nicor's program was closely aligned with NEEA's ERTU program. Staff also reported regularly meetings to coordinate with the CalMTA.

Few gas utilities in the Northwest have included ERTUs in their commercial HVAC incentive programs to date

NEEA has begun the process of working with the Regional Technical Forum (RTF) to develop a Unit Energy Savings (UES) measure for ERTUs in order to facilitate ERTUs' incorporation into incentive programs in the Northwest.⁷ NEEA staff reported that the RTF has not yet had the bandwidth to develop an ERTU measure. The Apex team reviewed a range of regional gas utility commercial HVAC programs and found that, absent a UES measure from the RTF, none explicitly included products meeting NEEA's ERTU specifications. Nonetheless, some Washington and Oregon utilities included incentives for RTUs with condensing gas furnaces, and one Idaho utility offered incentives for RTUs with ERVs. Most utilities also offer custom incentives, which could apply to ERTU installations. However, the process to receive a custom incentive can be much more onerous than a prescriptive incentive, requiring energy modeling and monitoring of pre- and post-installation energy use.

4. Conclusions & Recommendations

The Apex team draws the following conclusions and recommendations from this research.

Conclusion 1: Market actors viewed ERTUs as specialized products for use in applications requiring large amounts of airflow, or where building owners were particularly efficiency focused, not as replacement options for standard RTUs. While majorities of surveyed contractors, distributors, and

⁷ The RTF's database of UES measures provides measure-level energy savings estimates that are widely accepted in the Northwest. Program administrators use these estimates to develop prescriptive incentive programs.

building decision makers reported at least general awareness of ERTU product lines, their lack of recognition of ERTUs as a viable replacement option for standard RTUs is a key barrier to increased adoption. To some extent, this lack of recognition of ERTUs as replacement options is an issue of awareness and perception. However, the incremental cost of ERTUs and their added weight, which can trigger a structural review that further increases costs relative to a like-for-like replacement, pose further barriers to the feasibility of ERTUs as a standard RTU replacement option.

Recommendation 1a: NEEA should pursue additional demonstration projects and case studies to demonstrate the viability of ERTUs as standard RTU replacement options and identify value propositions. In addition to raising awareness of the potential to use ERTUs as standard RTU replacement options, it will be important to identify compelling value propositions that will justify the added incremental cost of ERTU installation.

Recommendation 1b: NEEA should prioritize strategies to reduce the incremental cost of ERTUs. Over the medium and long-term, this includes working with manufacturers to encourage the development of value ERTU models. In the short term, continuing to support the development of an RTF UES measure for ERTUs could be beneficial in encouraging utility incentives that could help overcome the incremental cost of ERTUs and drive adoption. Regional utilities are more likely to offer prescriptive incentives if there is an RTF UES measure they can use to justify ERTU energy savings estimates.

Conclusion 2: Inclusion of ERTUs in organizations' equipment specifications and purchase agreements may not be enough to ensure adoption within those organizations. Some large organizations have purchase agreements to obtain specific types of HVAC equipment from their suppliers or specifications detailing the types of HVAC equipment to be installed in their facilities. The program has identified motivating these organizations to include ERTUs in their specifications or agreements as a strategy to drive adoption. However, building decision-maker survey findings suggest that these specifications or agreements may include both ERTUs and standard RTUs. As a result, listing ERTUs in an organization's policies or agreements may not be sufficient to drive adoption on its own. NEEA may need to identify additional strategies to encourage organizations to install ERTUs once those organizations put favorable policies in place.

Recommendation 2: NEEA should consider if and how the program may need to adjust its strategies to ensure that organizations select and install ERTUs once they have included qualified equipment in their equipment specifications or purchase agreements. It would be beneficial to understand how purchase agreements and equipment specifications define what equipment will be installed in a given situation and what additional interventions, if any, might be needed to shift installations toward ERTUs in those situations.

Conclusion 3: The program does not clearly differentiate between three ERTU technologies that have distinct roles in the commercial HVAC market and may require distinct intervention strategies. Tier 1 ERTUs primarily gain efficiency from enclosure improvements and provide the most direct substitute for standard RTUs. Tier 2 ERTUs have integrated ERVs or HRVs and are more specialized equipment, with installations more often driven by building codes or air flow needs. Bolt-on ERVs or HRVs could be installed with a new RTU, but may be more likely as a retrofit opportunity given the preference manufacturers' reps expressed for integrated units. Manufacturers' reps reported sales of Tier 2 ERTUs with integrated ERVs or HRVs, but few reported sales of bolt-on ERVs or HRVs, suggesting that bolt-on equipment may flow through other distribution channels. The ERTU program's logic model and

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documentation describe strategies like increasing ERTU recommendations from large maintenance contractors and inclusion of ERTUs in equipment specifications and purchase agreements as strategies to increase uptake, but do not address if or how those strategies may address each technology type differently.

Recommendation 3: NEEA should consider whether distinct intervention strategies would be appropriate for one or more ERTU technologies. If there are notable differences between the uptake drivers and barriers, it may be necessary for the program to develop more targeted intervention strategies for each technology. It would benefit the program to define applications in which each technology is particularly well suited and to target intervention strategies to those installations, potentially targeting different market actors for different technologies.

Appendix 1: Survey Instruments

Contractor Survey

Web Introduction

Thank you for your interest in our research. Your feedback will help the Northwest Energy Efficiency Alliance understand the market for efficient RTUs and better work with HVAC contractors and others in the market to promote them.

As a thank you for your time and information, we are offering everyone who qualifies for and completes the survey a \$100 incentive. The survey should take about 15 minutes to complete.

If you have any technical difficulties with this survey, please contact Joe Van Clock at Apex Analytics: joevc@apexanalyticsllc.com.

Phone Introduction

Hello, my name is [NAME], and I'm calling from [COMPANY] on behalf of the Northwest Energy Efficiency Alliance, NEEA. I'm calling because NEEA is studying efficient rooftop units and information from contractors like you will help them work with the market more effectively.

[If contact is not known:]

Who can I speak with that is involved in selling or specifying RTUs? *[Record contact name; in subsequent attempts, ask to speak to contact directly.]*

[If speaking with an identified contact:]

Do you have time to answer a few questions about your work with RTUs? It should take about 15 minutes, and we're offering an incentive of \$100 to thank you for your time. *[If not available to answer questions at the moment, ask to schedule an appointment.]*

Screening

[ASK ALL]

S1. To start with, I'd like to gather a little bit of background information about you and your company. In what states do you work?

[SELECT MULTIPLE]

1. Idaho
2. Montana
3. Oregon

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4. Washington

5. Other

[IF S1.1 OR S1.2 OR S1.3 OR S1.4 IS SELECTED]

S2. Does your company install rooftop units that include gas heating (for example, RTUs or gas packs)?

[SELECT ONE]

1. Yes

2. No

[IFS2=1]

S3. In which of the following building types does your company install gas RTUs?

[SELECT MULTIPLE]

1. Single-family residential homes, duplexes, triplexes, and quads

2. Multifamily residential buildings

3. Commercial or industrial buildings

[IF S3=2 OR 3 (Respondent installs RTUs in MF or C&I buildings)]

S4. Do you regularly install light commercial RTUs (3-25 tons)?

[SELECT ONE]

1. Yes

2. No

[IF S4=1 (Respondent installs RTUs in MF or C&I buildings)]

S5. Which of the following services does your company provide in commercial buildings? Please select all that apply:

[SELECT MULTIPLE]

1. Replacement of existing HVAC systems

2. Installation of HVAC systems in new buildings or major renovations

3. HVAC sales

4. HVAC system design
5. HVAC repairs
6. HVAC service contracts/ongoing maintenance
7. Other, please specify: [OPEN-ENDED RESPONSE]

[IF S4=1 (Respondent installs RTUs in MF or C&I buildings)]

S6. Approximately how many gas RTU installations did your company complete in commercial, industrial, or multifamily buildings in the last year? Your best guess is fine.

[SELECT ONE]

1. None
2. 10 or fewer
3. 11 to 50
4. 51 to 100
5. More than 100

[IF S4=1 (Respondent installs RTUs in MF or C&I buildings)]

S7. Of the gas RTU replacements your company completed, about how many replaced the gas RTU with an electric heating system, like a heat pump? Please enter the number of replacements.

[SELECT ONE]

1. All replacements were like-for-like (gas RTU replacing a gas RTU)
2. Enter number: [OPEN-ENDED RESPONSE]

[IF S4=1 (Respondent installs RTUs in MF or C&I buildings)]

S8. What is your role in your company's gas RTU replacement projects? Please select all that apply:

[SELECT MULTIPLE]

1. Installation
2. Sales
3. Specifying equipment
4. Management/oversight

ERTU MPER #1

5. Administrative, HR, back office, finance
6. Other, please describe: [OPEN-ENDED RESPONSE]
7. None – I am not involved in gas RTU replacement projects

[IF S1.1, S1.2, S1.3, OR S1.4 IS NOT SELECTED; OR S2=2, OR S3.1 OR S3.2 IS NOT SELECTED; OR S6=1 OR 2; OR S8.2 OR S8.3 OR S8.4 OR S8.96 IS NOT SELECTED (Respondent's company does not install gas RTUs in commercial buildings or respondent is not involved in equipment decision-making)]

S9. Thanks again for your interest in our research. Unfortunately, your experience does not quite fit with the types of information we are hoping to collect.

[TEXT ONLY – NO RESPONSE REQUIRED; TERMINATE SURVEY]

ERTU Awareness

[ASK ALL]

Q1. How often have you done each of the following:

[SINGLE RESPONSE MATRIX]

	Never	Once or Twice	Several times
Visited the BetterBricks.com website			
Read the BetterBricks newsletter			
Attended BetterBricks education or training sessions			

[ASK ALL]

Q2. How do you define a high-efficiency gas RTU?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q3. How do you define *heating* efficiency for gas RTUs?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q4. [PHONE SCRIPT:] Now I'm going to list some different metrics and standards for RTU heating efficiency. For each one, please tell me if you are not at all familiar, not very familiar, moderately familiar, very familiar, or extremely familiar with that metric. It's OK if you are not familiar; we just need your honest answer. How familiar are you with...

[WEB SURVEY TEXT:] How familiar are you with each of the following metrics or standards for RTU heating efficiency? It's OK if you are not familiar; we just need your honest answer.

[SINGLE RESPONSE MATRIX]

	Not at all familiar	Not very familiar	Moderately familiar	Very familiar	Extremely familiar
The Canadian Standards Association's P.8 Standard for Commercial RTU Efficiency					
The Total Heating Season Coefficient of Performance (TCOPHS) metric of performance					
BetterBricks' Efficient Gas Rooftop Units for Commercial Building System Requirements					

[ASK ALL]

Q5. [PHONE SCRIPT] Next, I'm going to list some efficient gas RTU product lines from specific manufacturers. Please tell me what experience, if any, you have had with each one. As with the last question, it's OK if you don't have experience with any of the manufacturers or their specific product lines. We just need your honest answers. Starting with [*First item*], have you heard of...

[WEB SURVEY TEXT] Next, please indicate the option that best matches your experience with the following efficient gas RTU product lines from specific manufacturers. Again, it's OK if you're not familiar with any of the manufacturers or their specific product lines. We just need your honest answers.

[SINGLE RESPONSE MATRIX]

	Not heard of this product line	Heard of this product line but know little or nothing about it	Learned about this product line but do not have direct experience with it	Have direct experience with this product line
AAON's RQ, RN, RZ, or RZ-A product lines				
Daikin Applied's Rebel or Rebel Applied product lines				
Trane's Horizon product line				
Valent's DOAS Rooftop product line				
Greenheck's RVE DOAS product line				
Tempeff's RG DOAS product line				
<i>Any Product Line</i>				

[ASK ALL]

Q6. What other brands, if any, do you prefer for efficient *gas heating* from an RTU?

1. [OPEN-ENDED RESPONSE]

[IF ANY ITEM IN Q5 = 3 OR 4 (Respondent has learned about or has experience with ERTUs)]

Q7. How often do you recommend each product line of efficient RTUs when you are suggesting equipment for an RTU replacement?

[SINGLE RESPONSE MATRIX]

[Display only product lines respondent has learned about or has direct experience with]	Never	Rarely	Occasionally	Often	Always
AAON's RQ, RN, RZ, or RZ-A product lines					

Daikin Applied's Rebel or Rebel Applied product lines					
Trane's Horizon product line					
Valent's DOAS Rooftop product line					
Greenheck's RVE DOAS product line					
Tempeff's RG DOAS product line					

[IF ANY ITEM IN Q5 = 3 OR 4 (Respondent has learned about or has experience with ERTUs)]

Q8. In the past 12 months, about how many efficient RTUs did you sell from each product line? Your best estimate is fine; if you didn't sell any please enter a zero.

[NUMERIC RESPONSE MATRIX]

[Display only product lines respondent recommends or installs rarely or frequently]	Total # Sold
AAON's RQ, RN, RZ, or RZ-A product lines	
Daikin Applied's Rebel or Rebel Applied product lines	
Trane's Horizon product line	
Valent's DOAS Rooftop product line	
Greenheck's RVE DOAS product line	
Tempeff's RG DOAS product line	

[ASK ALL]

Q9. Does your company provide HVAC installation or maintenance services for companies or agencies that own or lease multiple commercial buildings?

[SELECT ONE]

1. Yes

ERTU MPER #1

2. No
3. Don't know

[IF Q9=1 (Company has clients that own or lease multiple commercial buildings)]

Q10. How often do your customers that own or lease multiple commercial buildings have policies or contracts that require any of these efficient RTUs?

[SELECT ONE]

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

Condensing RTUs

[ASK ALL]

Q11. In the past 12 months, did your company sell any condensing RTUs?

[SELECT ONE]

1. Yes
2. No
3. Don't know

[IF Q11=1 (Respondent sold condensing RTUs)]

Q12. About how many condensing RTUs did you sell? Your best estimate is fine.

1. Number sold: [NUMERIC RESPONSE]
2. Don't know

[If Q11=1 (Respondent sold condensing RTUs)]

Q13. Which brands of condensing RTUs did you sell?

1. [OPEN-ENDED RESPONSE]

Bolt-on E/HRVs

[ASK ALL]

Q14. We have some questions about external and/or “bolt on” energy or heat recovery ventilators. These ERVs are not included in the RTU cabinet. As add-ons, they are sometimes attached to the RTU cabinet or placed inside a duct near the RTU.

Are you familiar with these types of “bolt-on” energy or heat recovery ventilators for use with gas RTUs?

[SELECT ONE]

1. Yes
2. No
3. Not sure

[IF Q14=1 (Respondent is familiar with bolt on E/HRVs)]

Q15. In the past 12 months, about how many bolt-on energy or heat recovery ventilators did you install **specifically on gas RTUs**?

1. Number installed: [NUMERIC RESPONSE]

[IF Q15>0 (Respondent installed bolt on E/HRVs)]

Q16. Approximately how many of these bolt-on energy or heat recovery ventilators were added to new RTUs (as opposed to RTUs that were already on buildings)?

1. Enter percentage: [NUMERIC RESPONSE]
2. Not Sure

ERTU Value Proposition

[IF Q4 = 3, 4, OR 5 (Respondent is at least moderately familiar with Better Bricks requirements)]

Q17. You mentioned that you are familiar with BetterBricks’ Efficient Gas Rooftop Units System requirements. For the remainder of this survey, when we refer to “efficient RTUs,” we mean equipment that meets those requirements.

1. [TEXT ONLY – NO RESPONSE REQUIRED; DISPLAY NEXT ITEM ON SAME PAGE]

[IF Q17 IS NOT DISPLAYED AND ANY ITEM IN Q5 = 3 OR 4 (Respondent is not familiar with Better Bricks requirements but is at least moderately familiar with one or more ERTU product lines)]

Q18. You mentioned that you have some knowledge or experience with efficient RTUs, like those in **<First Q5 item rated 3, 4>**. For the remainder of this survey, when we refer to “efficient RTUs,” that is the type of equipment we mean.

1. [TEXT ONLY – NO RESPONSE REQUIRED; DISPLAY NEXT ITEM ON SAME PAGE]

[IF Q4 = 3, 4, OR 5 OR ANY ITEM IN Q5 = 3 OR 4 (Respondent is at least moderately familiar with Better Bricks requirements and/or ERTU product lines)]

Q19. To what extent do efficient RTUs provide value to end users beyond energy efficiency, compared with other RTUs? Would you say they provide...

[SELECT ONE]

1. No more value
2. Slightly more value
3. Moderately more value
4. Considerably more value
5. A great deal more value
6. Don't know

[IF Q19=3, 4, OR 5 OR Q21=3, 4, OR 5 (Respondent rates ERTUs as at least moderately more valuable)]

Q20. What makes efficient RTUs more valuable to end users, beyond energy efficiency?

1. [OPEN-ENDED RESPONSE]

[IF Q4 = 3, 4, OR 5 OR ANY ITEM IN Q5 = 3, 4, OR 5 (Respondent is at least moderately familiar with Better Bricks requirements and/or ERTU product lines)]

Q21. How similar is the process of installing an efficient RTU compared with a new, code compliant RTU?

[SELECT ONE]

1. Not at all similar
2. Not very similar

ERTU MPER #1

3. Moderately similar
4. Very similar
5. Extremely similar
6. Don't know

[IF Q21=1, 2 OR 3 (Respondent rates ERTU installation as moderately similar to standard RTU installation or less)]

Q22. How is installing an efficient RTU different from installing a new, code compliant RTU?

1. [OPEN-ENDED RESPONSE]

Firmographic items

Q23. Is your company classified by any US state as any of the following?

[SELECT MULTIPLE]

1. Emerging Small Business (ESB)
2. Minority-owned Business Enterprise (MBE)
3. Small Business
4. Women-owned Business Enterprise (WBE)
5. None of the above

Q24. Which languages do you and your co-workers use in the course of doing business, including with your customers or clients? *[In phone survey, do not read, probe to code]*

[SELECT MULTIPLE]

1. English
2. Spanish
3. Mandarin
4. Cantonese
5. Korean
6. Arabic

7. Russian
8. French
9. Vietnamese
10. Portuguese
11. Hindi
12. Other, please specify: [OPEN-ENDED RESPONSE]

Closing

Q25. This survey is part of a larger research project to support NEEA's HVAC program offerings. In the spring of 2024, we plan to hold more detailed conversations with HVAC contractors. Contractors who participate in these 30-minute conversations by phone or video conferencing software will receive an additional incentive of \$150.

Would you be interested in participating in one of these conversations?

Note: Indicating interest below does not obligate you to participate in a conversation, nor does it guarantee that you will be invited to participate in one.

[SELECT ONE]

1. No, I am not interested in participating in a more detailed conversation in the spring.
2. Yes, I would be interested in participating in a more detailed conversation in the spring.

Q26. Thank you very much for your time and information. As mentioned earlier, we are offering \$100 as a thank-you for completing this survey. The incentive will come to your email as an electronic gift card, and you can choose from a range of places to redeem it. Please let us know the best email address to send that gift card.

Distributor Survey

Web Introduction

Thank you for your interest in our research. Your feedback will help the Northwest Energy Efficiency Alliance understand the market for efficient RTUs.

As a thank you for your time and information, we are offering everyone who qualifies for and completes the survey a \$100 incentive. The survey should take about 15 minutes to complete.

If you have any technical difficulties with this survey, please contact Joe Van Clock at Apex Analytics: joevc@apexanalyticsllc.com.

Phone Introduction

Hello, my name is [NAME], and I'm calling from [COMPANY] on behalf of the Northwest Energy Efficiency Alliance, NEEA. I'm calling because NEEA is studying the market for efficient rooftop units, and information from distributors/manufacturers' representatives like you will help them work with the market more effectively.

[If contact is not known:]

Who can I speak with that is involved in selling or specifying light commercial RTUs? *[Record contact name; in subsequent attempts, ask to speak to contact directly.]*

[If speaking with an identified contact:]

Do you have time to answer a few questions about your work with light commercial RTUs? It should take about 15 minutes, and we're offering an incentive of \$100 to thank you for your time. *[If not available to answer questions at the moment, ask to schedule an appointment.]*

Screening

[ASK ALL]

S10. To start with, I'd like to gather a little bit of background information about you and your company. In which states do you do business?

[SELECT MULTIPLE]

1. Idaho
2. Montana
3. Oregon
4. Washington
5. Other, please specify: [OPEN-ENDED RESPONSE]

[If respondent does not work in Idaho, Montana, Oregon, or Washington, thank and terminate interview]

[IF S10.1 OR S10.2 OR S10.3 OR S10.4 IS SELECTED]

S11. Does your company sell light commercial rooftop units between 3 and 25 tons that include gas heating?

[SELECT ONE]

1. Yes

ERTU MPER #1

2. No

[IF S11=1]

S12. About how many gas RTU product lines do you offer?

1. [NUMERIC RESPONSE]

[IF S11=1]

S13. What is your role in your company? Please select all that apply:

[SELECT MULTIPLE]

1. Sales
2. Specifying equipment or technical advising
3. Stocking/supply
4. Management/oversight
5. Administrative, HR, back office, finance
6. Other, please specify: [OPEN-ENDED RESPONSE]

[If respondent only involved in stocking/supply and/or administrative work, ask to speak with someone involved in sales or specification.]

[IF S11=2 OR S8=3 OR 5 (Respondent's company does not sell gas RTUs for commercial buildings or respondent is not involved in equipment decision-making)]

S14. Thanks again for your interest in our research. Unfortunately, your experience does not quite fit with the types of information we are hoping to collect.

[TEXT ONLY – NO RESPONSE REQUIRED; TERMINATE SURVEY]

ERTU Awareness

[ASK ALL]

Q1. How often have you done each of the following:

[SINGLE RESPONSE MATRIX]

	Never	Once or twice	Several Times
Visited the BetterBricks.com website			
Read the BetterBricks newsletter			

	Never	Once or twice	Several Times
Attended BetterBricks education or training sessions			

[ASK ALL]

Q2. How do you define a high-efficiency gas RTU?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q3. How do you define **heating** efficiency for gas RTUs?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q4. [PHONE SCRIPT:] Now I'm going to list some different metrics and standards for RTU heating efficiency. For each one, please tell me if you are not at all familiar, not very familiar, moderately familiar, very familiar or extremely familiar. It's OK if you are not familiar; we just need your honest answer. How familiar are you with...

[WEB SURVEY TEXT:] How familiar are you with each of the following metrics or standards for RTU heating efficiency? It's OK if you are not familiar; we just need your honest answer.

[SINGLE RESPONSE MATRIX]

	Not at all familiar	Not very familiar	Moderately familiar	Very familiar	Extremely familiar
The Canadian Standards Association's P.8 Standard for Commercial RTU Efficiency					
The Total Heating Season Coefficient of Performance (TCOPHS) metric of performance					
BetterBricks' Efficient Gas Rooftop Units for Commercial Building System Requirements					

[ASK ALL]

Q5. [PHONE SCRIPT] Next, I'm going to list some efficient gas RTU product lines from specific manufacturers. Please tell me what experience, if any, you have had with each one. As with the last question, it's OK if you don't have experience with any of the manufacturers or their specific product lines. We just need your honest answers. Starting with *[First item]*, have you...*[Read response options]*

[WEB SURVEY TEXT] Next, please indicate the option that best matches your experience with the following efficient gas RTU product lines from specific manufacturers. Again, it's OK if you're not familiar with any of the manufacturers or their specific product lines. We just need your honest answers.

[SINGLE RESPONSE MATRIX]

[RANDOMIZE ITEMS]	Not heard of this product line	Heard of this product line but know little or nothing about it	Learned about this product line but do not have direct experience with it	Offer this product line
AAON's RQ, RN, RZ, or RZ-A product lines				
Daikin Applied's Rebel or Rebel Applied product lines				
Trane's Horizon product line				
Valent's DOAS Rooftop product line				
Greenheck's RVE DOAS product line				
Tempeff's RG DOAS product line				

[IF ANY ITEM IN Q5=4 (Offer this product line)]

Q6. In the past 12 months, about how many efficient RTUs did **you** sell from each product line? How many did **your company** sell? Your best estimate is fine. If your company has multiple branches, please provide your best estimate of sales for the branch where you work. *[If respondent didn't sell any please enter a zero.]*

[NUMERIC RESPONSE MATRIX]

[Display only product lines respondent offers]	Number you sold	Number your company sold
AAON's RQ, RN, RZ, or RZ-A product lines		
Daikin Applied's Rebel or Rebel Applied product lines		
Trane's Horizon product line		
Valent's DOAS Rooftop product line		
Greenheck's RVE DOAS product line		
Tempeff's RG DOAS product line		

ERTU MPER #1

[IF ANY ITEM IN Q5=4 (Offer this product line)]

Q7. Next, we'd like to know about how quickly the efficient RTUs you sell are available for installation.

About how many weeks does it typically take to supply efficient RTU orders for:

[NUMERIC RESPONSE, DISPLAY ONLY ITEMS FOR WHICH Q5=4]

1. AAON's RQ, RN, RZ, or RZ-A product lines
2. Daikin Applied's Rebel or Rebel Applied product lines
3. Trane's Horizon product line
4. Valent's DOAS Rooftop product line
5. Greenheck's RVE DOAS product line
6. Tempeff's RG DOAS product line
7. A code-level efficiency gas RTU

Condensing ERTUs

[ASK ALL]

Q8. About how many condensing RTUs did your company sell in the past 12 months?

1. Number sold: [NUMERIC RESPONSE]

[IF Q8>0]

Q9. Which brands of **condensing** RTUs do you sell?

1. [OPEN-ENDED RESPONSE]

Bolt On E/HRV

[ASK ALL]

Q10. We have some questions about external and/or "bolt on" energy or heat recovery ventilators. These E/HRVs are not included in the RTU cabinet. As add-ons, they are sometimes attached to the RTU cabinet or placed inside a duct near the RTU.

Are you familiar with these types of "bolt on" energy or heat recovery ventilators for use with gas RTUs?

[SELECT ONE]

1. Yes

ERTU MPER #1

2. No
3. Not sure

[IF Q10=1 (Aware of bolt-on ERVs/HRVs)]

Q11. How many of the gas RTU product lines you offer include or have an option for a bolt-on energy or heat recovery ventilator?

[SELECT ONE]

1. Number of product lines *[If none, please enter a zero]*: [NUMERIC RESPONSE]

[IF Q10=1 (Respondent is familiar with bolt-on E/HRV options)]

Q12. In the past 12 months, about how many bolt-on energy or heat recovery ventilators did you sell specifically to be installed on **gas RTUs**?

1. Enter Number: [NUMERIC RESPONSE]

[IF Q12>0 (Respondent sold bolt-on E/HRVs with gas RTUs)]

Q13. Approximately how many of these bolt-on energy or heat recovery ventilators were added to **new RTUs** (as opposed to RTUs that were already on buildings)?

[SELECT ONE]

1. Enter Number: [NUMERIC RESPONSE]
2. *[In phone survey, do not read:]* Don't know

[IF Q12>0 (Respondent sold bolt-on E/HRVs with gas RTUs)]

Q14. When a customer orders a bolt-on energy or heat recovery ventilator, about how many weeks does it typically take to supply the equipment?

1. Enter Number: [NUMERIC RESPONSE]

ERTU Value Proposition

[IF Q4.3 = 3, 4, OR 5 (Respondent is at least moderately familiar with Better Bricks requirements)]

Q15. You mentioned earlier that you are familiar with BetterBricks.com's Efficient Gas Rooftop Units system requirements. For the remainder of this survey, when we refer to "efficient RTUs," we mean equipment that meets those requirements.

1. [TEXT ONLY – NO RESPONSE REQUIRED; DISPLAY NEXT ITEM ON SAME PAGE]

[IF ANY ITEM IN Q5 = 3 OR 4 (Respondent is at least moderately familiar with one or more ERTU product lines)]

ERTU MPER #1

Q16. You mentioned that you have some knowledge or experience with efficient RTUs, like those in **<First Q4 item rated 3, 4, or 5>**. For the remainder of this survey, when we refer to “efficient RTUs,” that is the type of equipment we mean.

1. [TEXT ONLY – NO RESPONSE REQUIRED; DISPLAY NEXT ITEM ON SAME PAGE]

[IF Q4.3= 3, 4, OR 5 OR ANY ITEM IN Q5 = 3 OR 4 (Respondent is at least moderately familiar with Better Bricks requirements and/or ERTU product lines)]

Q17. To what extent do efficient RTUs provide value to end users beyond energy efficiency, compared with other RTUs? Would you say they provide...

[SELECT ONE]

1. No more value
2. Slightly more value
3. Moderately more value
4. Considerably more value
5. A great deal more value

[IF Q17=3, 4, OR 5 (Respondent rates ERTUs as at least moderately more valuable)]

Q18. In your opinion, what makes efficient RTUs more valuable to end users, beyond energy efficiency?

1. [OPEN-ENDED RESPONSE]

Firmographics

Q19. Finally, we have just a few questions about your company that will help us interpret the results of this survey. Is your company classified by any US state as any of the following:

[SELECT MULTIPLE]

1. Emerging Small Business (ESB)
2. Minority-owned Business Enterprise (MBE)
3. Small Business
4. Women-owned Business Enterprise (WBE)
5. None of the above

Q20. Which languages do you and your co-workers use in the course of doing business, including with your customers or clients? *[Do not read options, probe to code]*

[SELECT MULTIPLE]

ERTU MPER #1

1. English
2. Spanish
3. Mandarin
4. Cantonese
5. Korean
6. Arabic
7. Russian
8. French
9. Vietnamese
10. Portuguese
11. Hindi
12. Other, please specify: [OPEN-ENDED RESPONSE]

Closing

[ASK ALL]

Q21. This survey is part of a larger research project to support NEEA's HVAC program offerings. We plan to hold more detailed conversations with HVAC suppliers in the spring of 2024. Suppliers who participate in these 30-minute conversations by phone or video conferencing software will receive an additional incentive of \$150.

Would you be interested in participating in one of these conversations?

Note: Indicating interest below does not obligate you to participate in a conversation, nor does it guarantee that you will be invited to participate in one.

1. No, I am not interested in participating in a more detailed conversation in the spring.
2. Yes, I would be interested in participating in a more detailed conversation in the spring.

[ASK ALL]

Q22. Thank you very much for your time and information. As mentioned earlier, we are offering \$100 as a thank-you for completing this survey. The incentive will come to your email as an electronic gift card, and you can choose from a range of places to redeem it. Please let us know the best email address to send that gift card.

Building Decision-Maker Survey

Web Introduction

Thank you for your interest in our research. Your feedback will help the Northwest Energy Efficiency Alliance understand the market for efficient RTUs.

As a thank you for your time and information, we are offering everyone who qualifies for and completes the survey a \$100 incentive. The survey should take about 10 minutes to complete.

If you have any technical difficulties with this survey, please contact Joe Van Clock at Apex Analytics: joevc@apexanalyticsllc.com.

Phone Introduction

Hello, my name is [NAME], and I'm calling from [COMPANY] on behalf of the Northwest Energy Efficiency Alliance, NEEA. I'm calling because NEEA is studying the market for efficient rooftop units, and information from people who manage HVAC systems in commercial buildings like you will help them work with the market more effectively.

[If contact is not known:]

Can I please speak with your facilities manager or someone else involved in making decisions about replacing HVAC equipment? *[Record contact name; in subsequent attempts, ask to speak to contact directly.]*

[If speaking with an identified contact:]

Do you have time to answer a few questions about your work with RTUs? It should take about 10 minutes, and we're offering an incentive of \$100 to thank you for your time. *[If not available to answer questions at the moment, ask to schedule an appointment.]*

Screening

Screening Criteria

We will screen potential respondents to ensure they meet the following criteria:

- Are responsible for buildings with gas RTUs.
- Are responsible for making decisions about HVAC equipment replacement.
- Have been involved in a gas RTU replacement within the past 5 years.

Screening Questionnaire

[ASK ALL]

S1. What is your title and role in your organization?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

S2. Are you responsible for buildings that use gas rooftop units (aka Gas Packs or Gas Packaged HVAC units) for heating?

[SELECT ONE]

1. Yes
2. No

[IF S2=YES]

S3. How many buildings that use gas rooftop units for heating are in your organization's portfolio, and for how many of those would you be involved in decisions about HVAC equipment replacement?

[SINGLE RESPONSE MATRIX]

Response	Number in Company Portfolio	Number for which you would be involved in HVAC equipment replacement decisions
1		
2-5		
6-10		
11-24		
25-49		
50 or more		
Don't know		

[IF S2=YES]

S4. What types of buildings with gas rooftop units are you responsible for?

[SELECT MULTIPLE]

1. Small/medium commercial buildings (including grocery stores and restaurants)
2. School/university buildings
3. Large commercial buildings

ERTU MPER #1

4. Warehouse
5. Residential care
6. Small/medium industrial/manufacturing
7. Hospital
8. Multifamily buildings
9. Large industrial/manufacturing
10. Other

[IF ANY ITEM IN S4 IS SELECTED OTHER THAN 5 OR 9]

S5. When a gas rooftop unit needs to be replaced, how are you involved in the process?
Do you...

[SELECT MULTIPLE]

1. Coordinate with the contractors or staff conducting the replacement work
2. Provide input on the type of equipment that will be installed
3. Oversee and/or inspect the replacement work to ensure it meets your needs
4. Manage the contractors or staff conducting the replacement work
5. Select the contractors or staff conducting the replacement work
6. Approve the proposal for rooftop unit replacement and/or authorize the spending
7. How else, if at all are you involved in a rooftop unit replacement? [OPEN-ENDED RESPONSE]
8. Not involved in rooftop unit replacement

[IF S5≠NOT INVOLVED IN RTU REPLACEMENT]

S6. In which states are the buildings where you are involved in decisions about HVAC equipment replacement located?

[SELECT MULTIPLE]

1. Oregon
2. Washington
3. Montana
4. Idaho
5. Other, please specify: [OPEN-ENDED RESPONSE]

BetterBricks Awareness (no MPIs)

[ASK ALL]

Q25. How often have you done each of the following:

[SINGLE RESPONSE MATRIX]

Response	Never	Once or twice	Several times
Visited the BetterBricks.com website			
Read the BetterBricks newsletter			
Attended BetterBricks education or training sessions			

Procurement Policies, Specifications & Agreements

[IF S3a=2, 3, 4, 5 OR 5 (Respondent's organization has multiple buildings with gas RTUs in its portfolio)]

Q26. HVAC equipment can be a major purchase, and some companies have policies that guide those purchase decisions. Which of the following areas, if any, do your company's policies address?

[SELECT MULTIPLE]

1. Allowable expenses and vendor selection processes
2. The specific suppliers or contractors who maintain the equipment (for example, through service agreements or long-term maintenance contracts)
3. The specifications of the HVAC equipment you can purchase
4. The specific suppliers or contractors who provide the equipment (for example, through purchase agreements or long-term contracts)
5. Other
6. Don't know
7. None of the above

[IF Q26.4 OR Q26.3 IS SELECTED]

Q27. To the best of your knowledge, when did your company's current HVAC equipment purchase agreements or system specifications take effect?

[MATRIX WITH DROP DOWN RESPONSE OPTIONS]

Response	System Specifications	Purchase Agreements
2024		
2023		
2022		
2021		
2020		
2019		
2018		
2017 or earlier		
Don't know		

[IF Q26.3 IS SELECTED (Policies define equipment specifications)]

Q28. Do your company's specifications for the HVAC equipment you can purchase include specific product lines from individual manufacturers?

[SELECT ONE]

1. Yes, the specifications list one or more product lines
2. No, the specifications describe certain requirements the equipment must meet but do not list product lines
3. Other, please specify: [OPEN-ENDED RESPONSE]

[IF Q28=1 (Equipment specifications list product lines)]

Q29. To the best of your knowledge, which of the following gas heated HVAC product lines, if any, are included in your system specifications?

[SELECT MULTIPLE, RANDOMIZE ITEMS 1-6]

1. AAON's RQ, RN, RZ, or RZ-A product lines
2. Daikin Applied's Rebel or Rebel Applied product lines
3. Trane's Horizon product line

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4. Valent's DOAS rooftop product line
5. Greenheck's RVE DOAS product line
6. Tempeff's RG DOAS product line
7. [Do not read:] Don't know
8. None of the above

[IF Q26.4 IS SELECTED AND Q26.3 IS NOT SELECTED (Respondent has purchase agreements or contracts, but not equipment specifications)]

Q30. Do your purchase agreements or contracts specify the individual HVAC equipment manufacturers and product lines you will receive?

[SELECT ONE]

1. Yes
2. No
3. Don't know

[IF Q30=1 (Purchase agreements specify product lines)]

Q31. To the best of your knowledge, which of the following gas heated HVAC product lines, if any, are included in your purchase agreements or contracts?

[SELECT MULTIPLE, RANDOMIZE ITEMS 1-6]

1. AAON's RQ, RN, RZ, or RZ-A product lines
2. Daikin Applied's Rebel or Rebel Applied product lines
3. Trane's Horizon product line
4. Valent's DOAS rooftop product line
5. Greenheck's RVE DOAS product line
6. Tempeff's RG DOAS product line
7. [Do not read:] Don't know
8. None of the above

ERTU Awareness

[ASK ALL]

Q32. How familiar are you with NEEA's Efficient Gas Units for Commercial Buildings System Requirements available at BetterBricks.com? Would you say you are...

[SELECT ONE]

1. Not at all familiar
2. Not very familiar
3. Moderately familiar
4. Very familiar
5. Extremely familiar

[IF Q26.3 OR Q26.4 IS SELECTED AND Q32=3, 4, OR 5 (Respondent has equipment specifications or purchase agreement and is familiar with BetterBricks requirements)]

Q33. To the best of your knowledge, do your company's current HVAC equipment purchase agreements or system specifications include BetterBricks' Efficient Gas Units for Commercial Buildings System Requirements?

[SELECT ONE]

1. Yes
2. No
3. Don't know

[IF (Q26.3 AND Q26.4 ARE NOT SELECTED) OR (Q28≠1 AND Q30≠1) OR (Q29=97 OR 98 OR Q31=97 OR 98) (Respondent does not have specifications or purchase agreements, or specifications or purchase agreements do not require eRTU product lines)]

Q34. Next, I'm going to list some gas heated HVAC product lines from specific manufacturers. All of these product lines include efficient gas rooftop unit models, also known as Efficient RTUs. Please tell me what experience, if any, you have had with each one.

It's OK if you don't have experience with any of the manufacturers or their specific product lines. We just need your honest answers. Starting with *[First item]*, have you...

[SINGLE RESPONSE MATRTIX]

Response	Not heard of this product line	Heard of this product line, but know little or nothing about it	Learned about this product line, but don't have experience with it.	Have some experience with this product line	Have a lot of experience with this product line
AAON's RQ, RN, RZ, and RZ-A product lines					
Daikin Applied's Rebel and Rebel Applied product lines					
Trane's Horizon product line					
Valent's DOAS rooftop product line					
Greenheck's RVE DOAS product line					
Tempeff's RG DOAS product line					

[IF ANY ITEM IN Q34=3, 4, OR 5 (Respondent is aware of at least one eRTU product line)]

Q35. You mentioned that you know about, or have experience with, efficient gas RTUs, like those in **<Q34 item with highest rating>**. For the remainder of this survey, when we refer to "efficient gas RTUs," that is the type of equipment we mean.

Compared with other gas RTUs, to what extent do **efficient** gas RTUs provide value to you and the occupants of your buildings beyond energy efficiency? Would you say they provide...

[SELECT ONE]

1. No more value
2. Slightly more value
3. Moderately more value
4. Considerably more value
5. A great deal more value
6. Don't know

[IF Q35=3, 4 OR 5 (eRTUs provide at least moderately more value)]

Q36. What makes efficient gas RTUs more valuable to you and the occupants of your buildings, beyond energy efficiency?

1. [OPEN-ENDED RESPONSE]

Firmographics

[ASK ALL]

Q37. Is your company classified by any US state as any of the following?

1. Disadvantaged Business Enterprise (DBE)
2. Minority-owned Business Enterprise (MBE)
3. Women-owned Business Enterprise (WBE)
4. Emerging Small Business (ESB)
5. Service-Disabled Veteran Business Enterprise (SDVBE)
6. Small Business
7. Don't know
8. None of the above
9. Prefer not to answer

[ASK ALL]

Q38. Which languages do you and your coworkers use in the course of doing business, including with your customers or clients?

1. [OPEN-ENDED RESPONSE]

Closing

[ASK ALL]

Q39. Thank you very much for your time and information. As mentioned earlier, we are offering \$100 as a thank-you for completing this survey. The incentive will come to your email as an electronic gift card, and you can choose from a range of places to redeem it. Please let us know the best email address to send that gift card.

Appendix 2: In-Depth Interview Guides

Contractor Interview Guide

Phone Introduction

Hello, my name is [NAME], and I'm calling from [COMPANY] on behalf of the Northwest Energy Efficiency Alliance, NEEA. I'm calling because NEEA is studying efficient rooftop units and information from contractors like you will help them work with the market more effectively.

[If contact is not known:]

Who can I speak with that is involved in selling or specifying RTUs? *[Record contact name; in subsequent attempts, ask to speak to contact directly.]*

[If speaking with an identified contact:]

Do you have time to answer a few questions about your work with RTUs? Please let me know what days and times would work well for you to have a 30 minute phone conversation. We are offering a \$150 electronic gift card as a thank you for your feedback if you participate in the interview. *[If not available to answer questions at the moment, ask to schedule an appointment.]*

Screening

Note that a portion of participants may be drawn from the contractor survey respondent pool and will have already completed this screening.

- S1. *[If not screened as survey respondent:]* To start with, I'd like to gather a little bit of background information about you and your company. In what states do you work? *[Thank and terminate interview if respondent does not work in ID, MT, OR, or WA]*
- S2. *[If not screened as survey respondent:]* Does your company regularly install light commercial rooftop units (3-25 tons) that include gas heating (for example, RTUs or gas packs)? *[If not, thank and terminate interview]*
- S3. *[All:]* Please tell me a little bit about the work your company does in non-residential buildings?
 1. *[If not addressed:]* What types of services do you provide? *[If needed:]* For example, do you have maintenance contracts with clients? Do you do new construction? Equipment replacement?
 2. *[If not addressed:]* What types of non-residential buildings do you work in? What types are most common?
- S4. *[All:]* How, if at all, are you typically involved in your company's gas RTU projects? *[If respondent is not involved with equipment selection/recommendation, ask to speak with someone else in the company.]*

[TERMINATION SCRIPT]

Thanks again for your interest in our research. Unfortunately, your experience does not quite fit with the types of information we are hoping to collect.

RTU Experience

Q1. *[If did not complete survey:]* I'm going to read through a list of product lines. I'd like you to briefly let me know how experienced you are with gas heated commercial RTUs from each line. Is it something you've never heard of? Something you've heard of but don't know much about? Something you know about but don't install regularly? Or something you have lots of experience with?

	Never heard of	Heard of, but don't know much about it	Know about but don't regularly install	Have lots of experience
AAON's RQ, RN, RZ, or RZ-A product lines				
Daikin Applied's Rebel or Rebel Applied Product lines				
Trane's Horizon product line				
Valent's DOAS Rooftop product line				
Greenheck's RVE DOAS product line				
Tempeff's RG DOAS product line				

Q2. *[If completed survey:]* I understand that you [are familiar/have experience] with [reference product lines from survey response]. Just to confirm, are you familiar with the gas heated commercial RTUs from that/those line(s)?

Q3. *[If familiar with any ERTU product line:]* OK, it sounds like you have experience with [reference product lines from Q1 or Q2]. From your perspective, what are the most important things that set those product lines apart from other RTUs that you might install?

Q4. *[If familiar with any ERTU product line:]* How frequently, if at all, do you recommend those product lines to your customers?

- a. *[If recommend:]* In what situations are you most likely to recommend one of those product lines? *[Probe on building types, needs/use of space, customer type]*
- b. *[If recommend:]* In what situations are you least likely to recommend one of those product lines?
- c. What, if anything, prevents you from recommending those product lines more frequently?

Q5. How frequently, if at all, do you install those product lines?

- a. Have you had any customers specifically requesting an RTU from one of those product lines? *[If so:]* How often does that occur?
- b. Why don't more customers take you up on your recommendation for those product lines?

Case Study *[If Respondent Has Installed ERTUs]*

Q6. To help us understand the market for efficient gas RTUs like the ones in *[product line]*, please walk me through a recent project where you installed one. If you've done multiple projects, please pick one that you think is representative of a typical installation.

- a. *[If not answered]* What type of building did you install it on?
- b. *[If not answered]* What motivated the RTU installation? Had existing equipment failed? Was it a new building?
- c. What was the process that led to you performing the installation? Did it come about through an ongoing maintenance contract? Was it a competitive bid?
- d. How closely did the customer specify the equipment they wanted? *[If needed:]* Did they ask for specific brands or models? Did they ask for certain features or capabilities? Did they specify efficiency levels?
- e. *[If customer did not specify:]* Did you present the customer with multiple options?
 - i. How did you decide which RTU option(s) to present to the customer?
 - ii. *[For those that considered multiple options:]* What were the main differences between the options you presented?
 - iii. *[For those that considered multiple options:]* What ultimately led you and the customer to choose the option you went with?
- f. Did you seek any outside information or advice to determine which equipment option(s) you would present to the customer?
 - i. *[If yes:]* Where did you go for that information (e.g., manufacturer, distributor)?
- g. *[If not answered]* What questions or concerns, if any, did the customer have about installing the *[product line]* RTU?

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- h. *[If not answered]* How did the installation go, overall? Were there any challenges with installing the *[product line]* RTU?
- g. How did the customer feel about their RTU overall? (e.g., were they satisfied with the product's performance?)
 - i. What elements of the RTU has the customer liked the most?
 - ii. What has the customer found most frustrating about the RTU?
- h. What ended up being the installed cost of the final ERTU for the project? How does this compare to the likely installed cost of a standard efficiency RTU in this installation scenario?
 - i. What drives that difference in cost? *[If needed:]* How much of the difference is a higher equipment cost and how much is a higher labor cost to install?

RTU Features and Barriers

- Q7. *[If not aware of ERTU product lines:]* Some manufacturers produce RTUs with increased insulation and reduced damper leakage, which makes them up to 15% more energy efficient than a standard RTU. There are also units that have additional energy efficiency improvements, like condensing gas furnaces and energy or heat recovery ventilators that can make them up to 40% more energy efficient than a standard RTU. Have you heard of this type of efficient RTUs?
- a. What product lines, if any, are you aware of that offer these efficiency features?
- Q8. *[All:]* Based on what you know about efficient RTUs *[if aware of product lines]* like the ones in *[product line(s)]*, what benefits do you think they would offer, beyond energy efficiency?
- a. Why do you say that?
 - b. Which of those benefits are the most important to your customers?
- Q9. *[All:]* What *[are/do you think would be]* customers' greatest concerns about installing an efficient RTU?
- Q10. *[All:]* In general, when would you be most likely to recommend an efficient RTU?
- a. What buildings or spaces do ERTUs work best in? Why?
 - b. What buildings or spaces do ERTUs not work well in? Why?
 - c. What other aspects of an installation would make you more or less likely to recommend an ERTU?
 - d. What types of customers, if any, strike you as particularly receptive to ERTUs?

Information and Education [A//]

Q11. I'd like to shift to talk about where you get your information on HVAC equipment. How closely do you track information about HVAC equipment and new types of HVAC equipment and technology entering the market?

a. How do you get information about HVAC equipment and technologies, generally?

Q12. Where do you go for information or advice about equipment options for specific projects?

a. How often (on what share of projects) do you look for advice about equipment options?

b. On what types of projects are you more likely to seek advice?

Closing

Q15. [All:] Those are all the questions I have prepared. Is there anything we haven't discussed that you think it would be important for NEEA to know about your perspective, or customer perspectives on RTUs?

Q16. [If provided case study information:] Thank you for all the information you shared with us, and especially the details about your recent efficient RTU installation. Would you mind sharing the name of the company where that installation happened so we can follow up with them to get more information?

a. Is there anyone in particular who was involved in the project that we should ask for?

[If learned about equipment from distributor or mfr. Rep.] You also mentioned that one of your suppliers recommended the efficient RTU to you in that case. Would you mind telling us who that was, so we can follow up with them?

Distributor Interview Guide

Phone Introduction

Hello, my name is [NAME], and I'm calling from [COMPANY] on behalf of the Northwest Energy Efficiency Alliance, NEEA. I'm calling because NEEA is studying efficient gas rooftop units and information from distributors like you will help them work with the market more effectively.

[If contact is not known:]

Who can I speak with that is involved in selling or specifying gas RTUs? [Record contact name; in subsequent attempts, ask to speak to contact directly.]

[If speaking with an identified contact:]

Do you have time to answer a few questions about your work with RTUs? Please let me know what days and times would work well for you to have a 30 minute phone conversation. We are offering a \$150 electronic gift card as a thank you for your feedback if you participate in the interview. [If not available to answer questions at the moment, ask to schedule an appointment.]

Screening

S15. *[If not screened as survey respondent:]* To start with, I'd like to gather a little bit of background information about you and your company. In what states do you do business? *[Thank and terminate interview if respondent does not work in ID, MT, OR, or WA]*

S16. *[If not screened as survey respondent:]* Does your company sell light commercial rooftop units between 3 and 25 tons that include gas heating (for example, RTUs or gas packs)? *[If not, thank and terminate interview]*

S17. *[If not screened as survey respondent:]* About how many gas RTU product lines do you offer?

S18. Please tell me about your role in your company. How, if at all, are you involved with gas RTU sales?

1. How frequently do you advise customers on which gas RTU options would work for a specific installation?

[If respondent does not specify gas RTUs or recommend gas RTU options for customers, ask to speak with someone more closely involved in selling and recommended gas RTUs.]

RTU Experience

Q1. *[If did not complete survey]* I'm going to read through a list of product lines. I'd like you to briefly let me know what experience you have with gas heated commercial RTUs from each line. Is it something you've never heard of? Something you've heard of but don't know much about? Something you know about but don't sell? Or something you sell?

[RANDOMIZE ITEMS]	Not heard of	Heard of but don't know much about it	Know about but don't sell	Sell product line
AAON's RQ, RN, RZ, and RZ-A product lines				
Daikin Applied's Rebel and Rebel Applied product lines				
Trane's Horizon product line				
Valent's DOAS rooftop product line				
Greenheck's RVE DOAS product line				
Tempeff's RG DOAS product line				

Q2. *[If completed survey:]* I understand that you are familiar with/sell *[reference product lines from survey response]*. Just to confirm, are you familiar with the gas heated commercial RTUs from that/those line(s)?

Q3. *[If familiar with any ERTU product line:]* OK, it sounds like you have experience with *[reference product lines from Q1 or Q2]*. From your perspective, what are the most important things that set those product lines apart from other RTUs that you sell?

Q4. *[If familiar with any ERTU product line:]* How frequently, if at all, do you recommend those product lines to your customers?

- a. *[If recommend:]* In what situations are you most likely to recommend one of those product lines? *[Probe on building types, needs/use of space, customer type]*
- b. *[If recommend:]* In what situations are you least likely to recommend one of those product lines?
- c. What, if anything, prevents you from recommending those product lines more frequently?

Q5. How frequently do your customers choose those product lines?

- a. *[If recommend:]* Why don't more customers take you up on your recommendation for those product lines?

Q6. Have you had any customers specifically request an RTU from one of those product lines? *[If so:]* How often does that occur?

- a. *[If customers request:]* Are there certain types of customers that are more likely to request RTUs from one of those product lines?
- b. *[If customers request:]* Are there certain types of projects for which customers are more likely to request an RTU from one of those product lines?
- c. *[If customers request:]* When customers request an RTU from one of those product lines, how often is that request based on the contractor's own judgement as opposed to a specification from an end user or an engineer?

Case Study *[If Respondent Has Recommended ERTUs]*

Q7. To help us understand the market for efficient gas RTUs like the ones in *[product line]*, please walk me through a recent case where you recommended one. If you have recommended them in multiple cases, please pick one that you think is representative of a typical installation.

- a. *[If not answered:]* What type of space did you recommend it for? Why did you think it would be a good fit for that space?
 - a. Beyond the type of space, what else, if anything, made you think a *[product line]* RTU would be a good option for that installation?
- b. What other equipment options, if any, did you recommend for that installation?
 - a. What were the main benefits of the *[product line]* RTU over those alternatives?

- b. What were the main drawbacks of the *[product line]* RTU relative to those alternatives?
 - c. Roughly what was the difference in costs between the *[product line]* RTU and the alternatives you recommended in that case?
- c. Did the customer end up purchasing the *[product line]* RTU?
 - a. *[If so:]* What was the most important selling point for the customer that motivated them to purchase the *[product line]* RTU?
 - b. *[If so:]* What were the customer's main concerns about the *[product line]* RTU?
 - c. *[If not:]* Why not?
 - d. *[If not:]* What did they choose instead?

RTU Features and Barriers

Q8. *[If not aware of ERTU product lines:]* Some manufacturers produce RTUs with increased insulation and reduced damper leakage, which makes them up to 15% more energy efficient than a standard RTU. There are also units that have additional energy efficiency improvements, like condensing gas furnaces and energy or heat recovery ventilators that can make them up to 40% more energy efficient than a standard RTU. Have you heard of this type of efficient RTUs?

- a. What product lines, if any, are you aware of that offer these efficiency features?

Q9. *[All:]* Based on what you know about efficient gas RTUs *[if aware of product lines]* like the ones in *[product line(s)]*, what benefits do you think they would offer, beyond energy efficiency?

- a. Why do you say that?
- b. *[if additional benefits are identified]* Which of those benefits are most important to your customers?

Q10. *[All:]* What are/do you think would be customers' greatest concerns about installing one of these efficient RTUs?

Q11. *[If not addressed in Q4:]* In general, when would you be most likely to recommend one of these efficient RTUs?

- a. What types of buildings or spaces would be best for one of these efficient RTUs?
- b. What types of buildings or spaces would not work well with one of these efficient RTUs?
- c. What other aspects of an installation would make you more or less likely to recommend one of these efficient RTUs?
- d. What types of customers, if any, strike you as particularly receptive to these types of efficient RTUs?

- e. What types of customers, if any, are particularly unreceptive to these types of efficient RTUs?

Information and Education

Q12. I'd like to shift to talk about where you get your information on HVAC equipment.

Do you keep up with new types of HVAC equipment and technology entering the market?

- b. If so, how?
 - i. Do you seek out information or advice about equipment options for specific projects? If so, where do you go for that?

Closing

Q13. [All:] Those are all the questions I have prepared. Is there anything we haven't discussed that you think it would be important for NEEA to know about your perspective, or customer perspectives on RTUs?

Q14. [If provided case study information:] Thank you for all the information you shared with us, and especially the details about the recent case when you recommended an efficient RTU. Would you mind sharing the name of the customer you made that recommendation to so we can follow up with them to get more information?

Is there anyone in particular who was involved in the project that we should ask for?

Building Decision-Maker Focus Group Guide

Outreach

We anticipate that focus group participant outreach will primarily occur by phone. Our contact lists do not provide email addresses. We will consider a mailing for survey outreach, but mailing is likely too broad of a tool for a more limited, focus group recruitment.

Phone Outreach Script

Hello, my name is [NAME], and I'm calling from [COMPANY] on behalf of the Northwest Energy Efficiency Alliance, NEEA. NEEA is a non-profit organization that helps to bring new energy efficient technologies to the market, and we are helping them with some research into commercial rooftop units. As part of our research, we're going to hold online discussions with people who make decisions about commercial HVAC systems, and I wanted to invite you, or someone else from your organization, to participate. We're offering \$500 as a thank you to anyone who qualifies and participates in a discussion.

Does that sound like something you would be interested in?

Great, I just have a few questions to make sure you will be a good fit for the discussions.

Screening Criteria

We will screen potential respondents to ensure they meet the following criteria:

- Work in buildings with gas RTUs.
- Are responsible for making decisions about HVAC equipment replacement.
- Have been involved in a gas RTU replacement within the past 5 years.

Screening Questionnaire

[ASK ALL]

S7. What is your title and role in your organization?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

S8. Are you responsible for buildings with gas rooftop units (aka Gas Packs or Gas Packaged HVAC units)?

1. Yes
2. No

[IF S2=YES]

S9. What types of buildings with gas rooftop units are you responsible for?

[SELECT MULTIPLE]

1. Small/medium commercial buildings (including grocery stores and restaurants)
2. Large commercial buildings
3. Warehouse
4. Small/medium industrial/manufacturing
5. Large industrial/manufacturing
6. School/university buildings
7. Hospital
8. Residential care
9. Multifamily buildings
10. Other, please specify: [OPEN-ENDED RESPONSE]

[IF ANY ITEM IN S4 IS SELECTED OTHER THAN 5 OR 9]

S10. When a rooftop unit needs to be replaced, how are you involved in the process? Do you...

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[SELECT MULTIPLE]

1. Select the contractors or staff conducting the replacement work?
2. Manage the contractors or staff conducting the replacement work?
3. Provide input on the type of equipment that will be installed?
4. Coordinate with the contractors or staff conducting the replacement work?
5. Oversee and/or inspect the replacement work to ensure it meets your needs?
6. Approve the proposal for a rooftop unit replacement and/or authorize the spending?
7. How else, if at all, are you involved in a rooftop unit replacement? [OPEN-ENDED RESPONSE]
8. Not involved in rooftop unit replacement

[IF S5≠NOT INVOLVED IN RTU REPLACEMENT]

S11. When was the last time you were involved in replacing a gas RTU on one of your buildings?

[SELECT ONE]

1. Within the last six months
2. Between 6 months and a year ago
3. Between 1 and 2 years ago
4. Between 2 and 3 years ago
5. Between 3 and 5 years ago
6. More than 5 years ago
7. Have not been involved in an RTU replacement

[IF S2=YES AND S4=ANY ITEM OTHER THAN LARGE INDUSTRIAL/MANUFACTURING OR MULTIFAMILY, AND S5≠NOT INVOLVED IN RTU REPLACEMENT AND S6≠MORE THAN 5 YEARS AGO OR HAVE NOT BEEN INVOLVED]

S12. It sounds like you would be a great fit for our research. We are planning on holding discussions with groups of six to eight people, using video conferencing software. Do you have access to reliable internet and a web camera, and are you comfortable participating in that type of discussion?

1. Yes
2. No

[IF S12=No]

S13. What type of support, if any, could we provide that would enable you to participate?

1. [OPEN-ENDED RESPONSE]

Thank you for the information you have given us so far. We will consider whether we can provide the support you need and reach out to you if we can.

[IF S12=Yes]

S14. We are planning to hold discussions on the following dates and times. Please let me know which ones would work for you. As a reminder, you will receive \$500 in appreciation for your time and input.

[SELECT MULTIPLE]

1. Tuesday, February 6, 7:00 AM – 8:30 AM
2. Tuesday, February 6, 12:00 PM – 1:30 PM
3. Tuesday, February 6, 5:30 PM – 7:00 PM
4. Thursday, February 8, 7:00 AM – 8:30 AM
5. Thursday, February 8, 12:00 PM – 1:30 PM
6. Thursday, February 8, 5:30 PM – 7:00 PM
7. None of these times work

[IF S14=NONE OF THESE TIMES WORK]

S15. I'm sorry none of those options would work for you. What days and times would work for you the week of February 5?

1. [OPEN-ENDED RESPONSE]

Thank you. We will keep that in mind and reach out to you if we can shift a discussion to one of those times.

[IF ANY S14 DATE/TIME OPTION IS SELECTED]

S16. Thank you very much, we look forward to having you in the discussion. [NAME] from our research team will be in touch soon to give you additional details about how to participate. What is the best email address for them to send you the information?

1. Email: [RECORD EMAIL ADDRESS]

[IF ANY S14 DATE/TIME OPTION IS SELECTED]

S17. And is the phone number I reached you on today the best one to call on the day of the discussion, in case we need to resolve any technical issues?

1. Yes – phone number on record is best.
2. No: [RECORD ALTERNATE PHONE NUMBER]

ERTU MPER #1

[IF S2=NO OR S4=LARGE INDUSTRIAL/MANUFACTURING AND/OR MULTIFAMILY ONLY OR S5=NOT INVOLVED IN RTU REPLACEMENT OR S6=MORE THAN 5 YEARS AGO OR HAVE NOT BEEN INVOLVED]

S18. Thank you for your interest in our research. Unfortunately, it doesn't sound like you are a good match for the discussions we are planning to hold. These discussions are part of a larger research project. Would you be interested in being contacted for other parts of the research that would be a better fit?

1. Yes
2. No

Introduction

Hello everyone, and thanks for joining us today. My name is [NAME]. As we mentioned when we reached out to you about joining this conversation, we're conducting research on behalf of the Northwest Energy Efficiency Alliance, NEEA, to better understand how people make decisions around rooftop unit replacements. That is why we wanted to hear from you – I understand you have all been involved in replacing RTUs (aka Gas Packs or Gas Packaged HVAC units) on commercial buildings.

Before we get started, I am going to go over a few housekeeping items:

- Our discussion will take 90 minutes. We will take a break partway through in case you need to step away. If you need to step away at other times, we just ask that you come back as soon as you can.
- There may be distractions and it is tempting to multitask, but I want everyone to stay focused on the discussion, just like you would if we were in a room together.
- If there is background noise where you are, please mute yourself when you are not speaking.
- Please assume positive intent during our discussion. Conversations online can be a bit awkward, and we don't all know each other, so we might need to give each other a little extra slack and patience.
- That said, it's OK to respectfully disagree with someone. Our goal is not to arrive at a consensus. We want to learn how your views and experiences are different as well as what is similar for each of you. We welcome different opinions.
- It is my job to make sure we hear from everyone, so if you haven't spoken up in a while, I might call on you. Or, if you have been talking a lot, I might ask you to give someone else a turn. I appreciate your understanding and cooperation in making sure everyone gets to speak.

We are also audio and video recording the conversation today. The purpose of the recording is to make sure we capture everything accurately. The recordings will not be available publicly, and we will not report our findings in ways that identify individual respondents. We may also have some observers from NEEA on the line. They wanted to hear your perspective firsthand.

Our goal is to learn from your experience, and we appreciate your honesty. Nothing you say here will have any impact on any relationships you have with NEEA or any other organizations.

Any questions before we begin?

Q7. Let's begin by going around with introductions, please share ONLY your first name, what types of buildings you work in, and your favorite thing about heating season. Would you start, [PARTICIPANT NAME]?

RTU Experience and Decision-Making

Q8. How familiar are you with RTUs, generally? Do you have a sense for the different features and product lines available?

a. [For any that are familiar:] How do you learn about RTUs?

Q9. Tell me a little bit about the last time you replaced an RTU in one of your facilities?

a. What motivated you to replace it? Had it failed?

b. How did you decide what contractor to use to replace it? Did you get multiple bids?

c. How involved were you in selecting the specific model of RTU that would be installed? Did you consider multiple options?

i. [For those that considered multiple options:] What were the main differences between the options you considered?

ii. [For those that considered multiple options:] What ultimately led you to choose the option you went with?

d. How did the installation go? Were there any unexpected obstacles?

e. Overall, what was most challenging about the RTU replacement? Why was it challenging?

Q10. Stepping back from that specific installation, in general, what are the most important features of an RTU from your perspective?

a. Which of those features, if any, would you be willing to pay more for?

RTU Energy Efficiency

Q11. How do you define a high-efficiency gas RTU?

Q12. How do you define *heating* efficiency for gas RTUs?

Q13. Some manufacturers produce RTUs with increased insulation and reduced damper leakage, which makes them up to 15% more energy efficient than a standard RTU. There are also units that have additional energy efficiency improvements, like condensing gas furnaces and energy or heat recovery ventilators that can make them up to 40% more energy efficient than a standard RTU. Has anyone heard of these types of efficient RTUs?

a. How did you hear about them?

Q14. These are product lines that offer this type of efficient gas RTU. *[Show slide listing product lines.]* Which of these product lines, if any, have you heard of?

- a. How did you hear about them?

Q15. Have any of you considered installing this type of efficient gas RTU in any of the buildings you are responsible for?

- a. *[For any respondents aware, but not considering:]* Why not?
- b. *[For any respondents considering:]* Did you end up installing them? Why or why not?
- c. *[If not addressed:]* How much did one of these efficient RTUs cost, compared to a standard RTU for the same application?

Q16. For those of you who were not aware of these efficient RTUs, how appealing do they sound as an option if you were replacing an RTU?

- a. What are the most important factors that would determine whether you would choose to go with an efficient RTU or a standard RTU?
- b. What concerns, if any, would you have about installing this type of efficient RTU?

Q17. In addition to energy savings, efficient rooftop units can be highly configurable, and units that include an energy or heat recovery ventilator can improve comfort and indoor air quality through better air mixing. They also provide environmental benefits due to reduced energy use. How appealing would those benefits be if you were replacing an RTU? Why do you say that?

- a. How would you rank those benefits relative to each other and to the energy savings benefits?
- b. Based on what you know about efficient rooftop units, what other benefits, if any, would you anticipate that they might provide?

Q18. How much more, if anything, would you be willing to pay for an efficient RTU that delivers the benefits we just discussed, relative to a standard RTU? Is this something you would pay a lot more for? A little bit more for? That you would only choose if there was no cost difference?

- a. When you say you would pay “a lot more,” what does that mean – 50% more? 25% more?
- b. When you say you would pay “a little more” what does that mean – 15% more? 10% more?

Q19. Thanks everyone. I have one last question, and I’d like to go around and have everyone answer. Based on what we have discussed today, what do you think are the most important things that would need to change for there to be greater adoption of efficient gas rooftop units?

Thank you very much for your time. As we mentioned, we are offering \$200 as a thank you for participating in this discussion. We use a service called Tango to provide that. Look for an email in the next few days with a link that will allow you to select from a range of different gift cards and other options.

Manufacturers Rep Interview Guide

Introduction

Thank you for taking the time to talk with me today. As I mentioned in my email, we are working with the NEEA on some research to support their work to increase the energy efficiency of gas rooftop units. Manufacturers reps play an important role in advising people about HVAC equipment, and we thought your perspective could be very helpful for our research.

Do you have any questions about our research before we get started?

I'll be taking notes as we talk, but would you mind if I also record the conversation? The recording is just to help with my notetaking. We won't share the notes or recordings with anyone, or report anything in a way that would identify individual respondents.

Background

- Q1. First, I'd like to know a little bit more about your role in the market, specifically around light commercial rooftop units between 3 and 25 tons with gas heating. How would you typically be involved in a project involving those types of rooftop units?
- On what types of projects would you be most likely to be involved? *[If needed:]* New construction? Equipment replacement?
 - Who would you primarily work with on that type of project? *[If needed:]* The installer? The distributor? The building owner? *[If appropriate:]* How, if at all, does it vary between new construction and equipment replacement projects?
 - [If not addressed:]* Are you typically involved in all projects of that/those type(s), or are there certain project characteristics that would make it more likely you would be called in? What characteristics?
- Q2. I'd also like to know about how you work with manufacturers of light commercial rooftop units: How do you determine which manufacturers to represent?
- How often do you add or drop manufacturers?
 - Do you give the manufacturers you work with suggestions or feedback about their products? *[If so:]* How?
- Q3. Are you familiar with the Northwest Energy Efficiency Alliance, NEEA?
- [If so:]* How, if at all, have you worked with NEEA?
 - Have you used any messaging or materials from NEEA or the BetterBricks.com website that they administer, either for your own learning or to help inform your customers? *[If so:]* What have you used? What did you think about the content?
 - What impact has that had, if any, on the way you approach the efficiency of your RTU products? *[If needed:]* Has it motivated you to recommend more efficient RTU options?

Tier 1 ERTUs

Q4. NEEA is interested in increasing adoption of gas RTUs with energy efficient features like low-leakage dampers and cabinets with increased insulation, up to R-12, [*If represent ERTU product lines: like the ones in the <Product line 1> product line and <Product line 2> product line*]. Are you familiar with gas heated RTUs in those product lines/with those features?

- a. From your perspective, what are the most important things that set gas heated RTUs in those product lines/with those features apart from other gas heated RTUs?
- b. How frequently, if at all, do you recommend gas RTUs with low-leakage dampers and increased cabinet insulation to your customers?
- c. [*If recommend:*] In what situations are you most or least likely to recommend one of those product lines? Why? [*Probe on building types, needs/use of space, customer type*]
- d. What, if anything, prevents you from recommending those product lines more frequently?

Q5. How receptive have customers been to those gas heated RTUs with low-leakage dampers and increased cabinet insulation?

- a. What, if anything, do customers find most appealing about them?
- b. What concerns, if any, do customers have about them?

Q6. Have you had any customers specifically request an RTU from one of those product lines/with those features? [*If so:*] How often does that occur?

- a. [*If customers request:*] Are there certain types of customers or project types that are more likely to result in requests for RTUs with low leakage dampers and increased cabinet insulation?
- b. [*If customers request:*] When customers request an RTU from one of those product lines, how often is that request based on a specification from an engineer? From an end user?

Q7. What do you think would need to happen for customers to adopt gas RTUs from those product lines/with low-leakage dampers and increased insulation more broadly?

Case Study

Q8. [*If mentioned recommending ERTUs in Q4.b*] To help us understand the market for efficient gas RTUs [like the ones in <Product line 1>/with low leakage dampers and increased cabinet insulation], please walk me through a recent case where you recommended one. If you have recommended them in multiple cases, please pick one that you think is representative of a typical installation.

- a. [*If not answered:*] What type of space did you recommend it for? Why did you think it would be a good fit for that space?

- b. Beyond the type of space, what else, if anything, made you think a **<Product line 1 or 2>** RTU would be a good option for that installation?

Q9. What other equipment options, if any, did you consider for that installation?

- a. What were the main benefits of the **<Product line 1 or 2>** RTU over those alternatives?
- b. What were the main drawbacks, if any, of the **<Product line 1 or 2>** RTU relative to those alternatives?
- c. Roughly what was the difference in costs between the **<Product line 1 or 2>** RTU and the alternatives you recommended in that case?

Q10. Did the customer end up purchasing the **<Product line 1 or 2>** RTU?

- a. *[If so:]* What was the most important selling point that motivated them to purchase it?
- b. *[If so:]* What were the customer's main concerns, if any, about the **<Product line 1 or 2>** RTU?
- c. *[If not:]* Why not?
- d. *[If not:]* What did they choose instead?

ERVs/HRVs

Q11. NEEA is also interested in increasing adoption of gas heated RTUs with heat or energy recovery ventilators. About how many gas heated RTUs with integrated ERVs or HRVs did you sell in the past year?

Q12. Do you see RTUs with those features as a growing part of the market? Why or why not? How receptive have your customers been to RTUs with heat or energy recovery ventilators?

- a. What types of customers, if any, have been most or least receptive? What is appealing or unappealing to them about gas heated RTUs with ERVs or HRVs?
- b. What types of projects are the best or worst fits for gas heated RTUs with ERVs or HRVs?

Q13. *[If not addressed:]* How does the cost of an RTU with an ERV or HRV compare to a similar gas heated RTU without an ERV or HRV?

Q14. I understand that heat and energy recovery ventilators can be either integrated into the RTU or sold separately as a "bolt-on" device. How common are bolt-on ERV/HRVs relative to ones that are integrated into the RTU for gas heated RTUs?

- a. What manufacturers offer bolt-on ERVs or HRVs?
- b. How many bolt-on ERVs or HRVs did you sell in the past year?
- c. *[If not addressed:]* There seems like a clear retrofit opportunity to install a bolt-on ERV or HRV on an existing RTU. Are there cases where your clients would also use a bolt-on ERV or HRV when they are installing a new RTU? Why would they choose a bolt-on model instead of an integrated one in that case?

- d. How much do bolt-on ERVs or HRVs typically cost? *[If needed:]* Is it more or less expensive to purchase an RTU and add a bolt-on ERV or HRV, or to purchase an RTU with an integrated ERV or HRV?

Q15. So far, we have been talking about ERVs and HRVs connected to RTUs. NEEA is also interested in systems that use highly efficient ERVs and HRVs, with at least 82% Sensible Recovery Efficiency (SRE). How many ERVs and HRVs with at least 82% SRE did you sell in the past year?

- a. What share of your total ERV and HRV sales had at least 82% SRE?
- b. Is that fewer, about the same, or more than the previous year?

Condensing RTUs

Q16. Do you offer RTUs with condensing heat exchangers?

- a. How receptive have your customers been to those RTUs?
- b. What types of customers, if any, have been most or least receptive? What is appealing or unappealing to them about RTUs with condensing heat exchangers?
- c. What types of projects are the best and worst fits for gas RTUs with condensing heat exchangers?
- d. How does the cost of an RTU with a condensing heat exchanger compare to a similar gas heated RTU without a condensing heat exchanger?

Information Flows

Q17. We have been talking about your role in recommending equipment for specific projects. What are the main sources of information that you use to learn about new RTU features and technologies?

- a. Do you primarily get information from the manufacturers you work with? Or from other sources?
- b. What other sources do you use to get information about RTU features and technologies?

Q18. What information, if any, do the manufacturers you work with give you about RTUs with low leakage dampers and increased cabinet insulation?

- a. Are those features that manufacturers promote on their RTU products? Why or why not?
- b. Are there particular use cases that manufacturers focus on for their RTUs with those features?

Q19. Do you also do anything to inform your customers about new product offerings or advances in HVAC equipment more generally?

- a. *[If so:]* What kinds of things do you do?

ERTU MPER #1

- b. *[If so:]* What, if anything, have you done to inform people about gas heated RTUs in the **<Product line 1 or 2>** product line?
 - c. *[If inform about ERTUs:]* What do you emphasize about gas heated **<Product line 1 or 2>** RTUs when you are telling people about them, generally?
- Q20. What are the main messages you focus on when you are informing customers about gas RTUs with reduced damper leakage and cabinets with increased insulation?
- a. You mentioned that customers are concerned about *[Reference Q5 response]*. What, if anything, do you do to address those concerns?
 - b. What, if anything, do customers need to know when they are specifying or installing gas RTUs with reduced damper leakage and cabinets with increased insulation? *[If not addressed:]* How do you give them that information?
- Q21. What are the main messages you focus on when you are informing customers about gas RTUs with energy or heat recovery ventilators?
- a. You mentioned that customers are concerned about *[Reference Q11 response]*. What, if anything, do you do to address those concerns?
 - b. What, if anything, do customers need to know when they are specifying or installing gas RTUs with reduced damper leakage and cabinets with increased insulation? *[If not addressed:]* How do you give them that information?

Closing

Thanks for all of that information. Those are all the questions I have prepared. Is there anything we haven't discussed that you think would like us to know as we think about how NEEA can best work with the market to promote energy efficient gas heated RTUs?