Describing the Elephant: Comparing Market Actor Perspectives on Energy Efficient Technology to Support Market Transformation

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ABSTRACT

Determining where in the supply chain to intervene is a key consideration in any market transformation program. Different market actors approach technologies from different perspectives and with different priorities. This paper examines how commercial building decision-makers, installation contractors, distributors, and manufacturers' representatives perceive an emerging technology: Advanced Performance Rooftop Units (AP RTUs). It will also consider how market actors may misperceive other market actors' approach to or perception of the market, potentially creating barriers to adoption of efficient technologies. For example, contractors may overestimate the price sensitivity of commercial building equipment decision-makers and opt not to present efficient options.

The authors share insights gathered from surveys and in-depth qualitative research with building decision-makers, contractors, distributors, and manufacturers' representatives. Drawing on this research, this paper reviews how each population's perception of the technology differed and what implications those perceptions had for a market transformation program seeking to increase adoption of AP RTUs.

The paper explores the implications of varying market actor perspectives on the likely effectiveness of different market transformation interventions in increasing AP RTU adoption. Balancing the perspectives of multiple market actor groups is a challenge that market transformation programs face across sectors and technologies. These findings provide relevant insights for a variety of market transformation programs that seek to influence multiple market actor groups to motivate change in complex systems.

Introduction

There is a parable from India in which a group of blind men encounter an elephant for the first time. Each goes to a different part of the elephant, and they argue over whether the animal is most like a snake (as the man at the trunk claims), a wall (as the man at the side claims), or a rope (as the man at the tail claims). While few market transformation (MT) programs focus on increasing uptake of elephants as an efficiency measure, the parable can be apt as a metaphor for the differences in how market actors perceive an efficient technology. Actors in different parts of the market may experience an efficient technology in very different ways, leading to differences in how they view that technology and differences in the barriers to uptake that they face.

MT programs seek to address barriers to uptake of efficient technologies in such a way that, eventually, permanent changes have been made to the market and program support is no longer needed to sustain continued adoption of the efficient technology. However, markets are

intertwined systems, and addressing barriers to uptake often involves interaction with actors at various levels of the supply chain. Manufacturers inform their representatives and distributors about new technologies they have incorporated into their products, and those representatives and distributors promote those products to their contractor and end-use customers. At the same time, contractors and end-users demonstrate demand for particular features or technologies, sending signals back up the supply chain to distributors, manufacturers' representatives, and manufacturers.

Each market actor's unique position in the supply chain influences their perspective on an efficient technology. When those perspectives do not fully align, it can create unique challenges for MT programs. This paper explores varying market actor perspectives on one efficient technology, Efficient Rooftop Units (RTUs), and discusses the implications of those varying perspectives for the program's strategy.

Background

Differences in perspective have been a common challenge for programs across a range of social disciplines, including energy efficiency. In the broader evaluation literature, authors have noted that views of phenomena, including program impacts, can vary across different stakeholder groups. These authors argue that this variation in perspectives among stakeholders is natural, and that investigating it can lead to a more nuanced understanding of programs and the context in which they operate (Campbell et al. 2020; Cohen-Mansfield 2021; Hammersley 2008).

One of the best known areas in which key stakeholder perspectives diverge in the arena of energy efficiency programs is the split incentive barrier impacting efficiency improvements in rented space. Tenants receive the direct benefits of efficiency improvements in the form of improved comfort and lower energy bills (assuming units are individually metered), leaving little incentive for building owners, who are responsible for the upfront cost of building retrofits and equipment replacement, little incentive to invest in energy efficiency (Eto et al. 1996).

Focusing on HVAC measures specifically, researchers have also noted disconnects between the perceptions of contractors and those of customers. For example, one study found that contractors' estimates of how long customers were willing to wait for equipment in an emergency replacement scenario was considerably shorter than the time customers themselves reported they would be willing to wait (Lawrence and Jenkins 2000). The research presented in this paper provides additional examples of differences in perception of efficient HVAC technologies among commercial HVAC market actors.

Efficient Rooftop Units

A packaged RTU is a single unit that contains all of the components needed to provide conditioned air and ventilation, located on the roof of a building. RTUs are a common equipment solution for many commercial buildings. They typically can be replaced relatively quickly and easily by swapping one unit for another in a "like-for-like" replacement.

The Northwest Energy Efficiency Alliance's (NEEA) Advanced Performance Rooftop Unit (AP RTU) Program seeks to increase the energy efficiency of rooftop units (RTUs) installed

on commercial buildings. The program has defined two tiers of compliant RTUs (NEEA 2026):[1]

- Tier 1 RTUs gain efficiency from improvements to the enclosure, including two-inches of insulation on the RTU shell and low-leakage dampers.
- Tier 2 RTUs must meet the Tier 1 requirements and include: 1) an energy or heat recovery ventilator (ERV/HRV), which can be either integrated into the device or added separately as a "bolt-on" unit, or 2) 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 AP RTUs by increasing awareness of RTU heating efficiency among market actors, increasing availability of AP RTUs, and encouraging energy efficiency program administrators to include AP RTUs in their commercial incentive programs. The program initially focused on building relationships with manufacturers, encouraging them to certify compliant models and increase their outreach to their manufacturers' representatives about AP RTUs. The program has also reached out to manufacturers' representatives directly, both to build their awareness of AP RTUs and to gather data on AP RTU sales. Finally, NEEA has worked to engage commercial building staff responsible for HVAC equipment decisions through attendance at industry events and connections with professional organizations. Ultimately, the program hopes to support the adoption of a federal standard leading to increased RTU efficiency.

Research Approach

This paper draws on research conducted as part of NEEA's first Market Progress Evaluation Report for the AP RTU program (Van Clock 2025). That study included primary data collection with four market actor populations, listed in Figure 1.

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

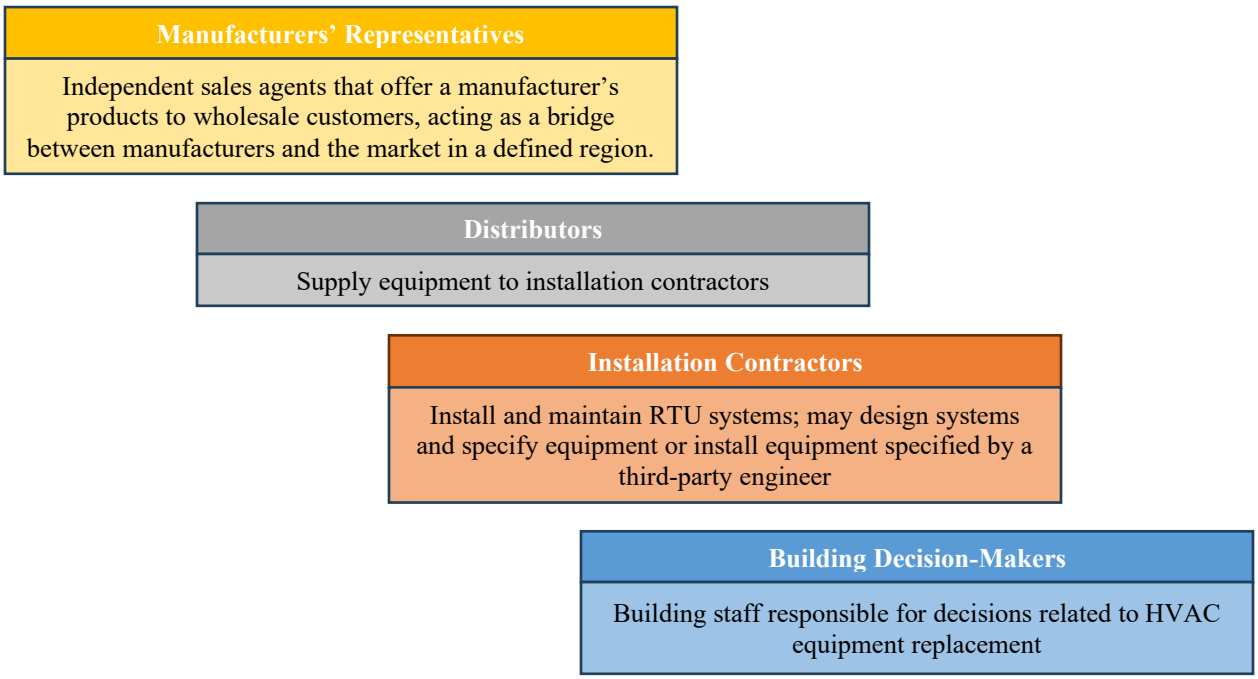

Figure 1: Market Actors Included in Primary Research

Data collection efforts sought understand each population's awareness of and considerations around AP RTUs. Table 1 summarizes the data collection modes, timeframes, and sample sizes for each population. The authors 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 Group	Feb. 2024	9 (2 groups)
	Survey	Mar. – Apr. 2024	52
Manufacturers' Reps	In-depth interview	Dec. 2024 – Jan. 2025	9

For the contractor and distributor surveys, the research team sought a sample that was representative of the geographic distribution of potential respondents across five Pacific Northwest sub-regions (Western Washington, Western Oregon, Eastern Oregon and Washington, Idaho, and Montana). The contractor sample ultimately overrepresented Western Washington, Idaho, and Montana, while underrepresenting Western Oregon and Eastern Oregon and

Washington.[2] The distributor survey overrepresented businesses in Montana while underrepresenting businesses in Idaho.[3] The building decision-maker survey included respondents working in all four Northwest states (Oregon, Washington, Idaho, and Montana) and across a range of buildings including government, private business, community/nonprofit, including schools and universities, and healthcare, including residential care.

The study included in-depth interviews with contractors and distributors following the survey efforts with those groups in order to add context to survey findings and gather deeper insights. The study included focus groups with building decision-makers prior to the survey effort in order to gain a better understanding of their roles and considerations that could inform survey development.

Key Differences in Market Actor Perspectives

A combination of program strategies is necessary to address the barriers described above. Market transformation programs targeting the RTU market need to build market actor awareness not just of AP RTUs as a technology but of their potential as a more efficient option in standard RTU replacement scenarios. These programs may also need to take steps to address challenges related to the cost and weight of AP RTUs. This research found two key areas in which perspectives of AP RTUs differed between market actor groups in ways with potential to impact these program efforts.

Awareness of Efficient Technologies

Within a market, information about new technologies typically flows downstream, from manufacturers to their representatives and distributors, to installers, and ultimately to end-users. Thus, market actors further upstream (that is, closer to manufacturers) are expected to be more knowledgeable about new technologies than those further downstream. In-depth interviews confirmed that information about new HVAC technologies typically follows this expected pattern, flowing from manufacturers to distributors and manufacturers' representatives, who have direct lines of communication with manufacturers, and then on to contractors who advise building decision-makers on what equipment to install.

Manufacturers' representatives demonstrated the greatest awareness of AP RTUs and described 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' representatives suggested that they would be unlikely to be involved in a typical

[2] Contractors in Montana represented 11% of the population and 17% of survey respondents; contractors in Western Washington represented 35% of the population and 39% of survey respondents; and contractors in Idaho represented 14% of the population and 17% of survey respondents. Contractors in Western Oregon represented 24% of the population and 17% of survey respondents, and contractors in Eastern Oregon and Washington represented 15% of the population and 9% of survey respondents.

[3] Distributors in Montana represented 10% of the population and 19% of survey respondents; distributors in Eastern Oregon and Washington represented 11% of the population and 13% of survey respondents; and distributors in Western Washington represented 38% of the population and 39% of survey respondents. Distributors in Idaho represented 14% of the population and 4% of survey respondents; and distributors in Western Oregon represented 26% of the population and 22% of survey respondents.

replacement of a standard RTU. According to one respondent, "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' representatives may have limited opportunity to recommend AP RTUs as a standard replacement option.

However, awareness among market actors downstream of manufacturers' representatives did not follow the expected pattern of greater awareness among actors further upstream. As Figure 2 shows, contractors were considerably more likely to report direct experience with one or more of the listed AP RTU product lines than were distributors, with decision-makers in buildings using RTUs even demonstrating greater experience with the technology than distributors.

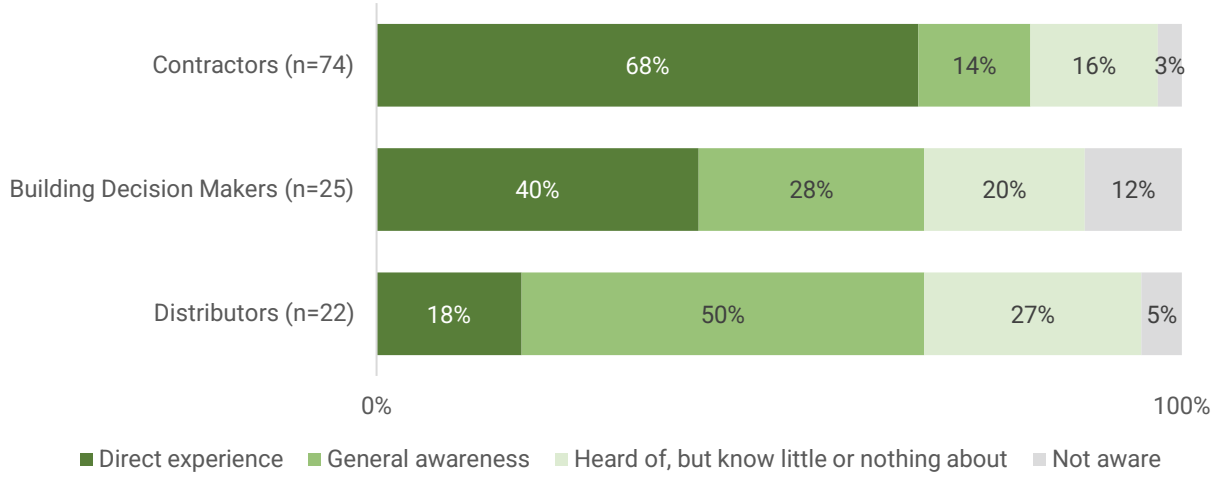

Figure 2: Reported Awareness of One or More Listed AP RTU Product Line by Market Actor Type. *Source:* Van Clock 2025.

Distributors' limited awareness of AP RTUs stemmed from their focus on the product lines they provide more regularly. Distributors were highly knowledgeable about their core product lines but had limited awareness of products outside those lines, including AP RTUs. Some distributors that had experience providing AP RTU units noted that those units were outside of their typical product offerings. As one distributor explained, "We're primarily a Carrier dealer. We have used AAON [an AP RTU manufacturer] – we use them when we need some specific points they hit."

Rather than distributor outreach, interviewed contractors primarily reported learning about AP RTU 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 AP RTU]: it's the engineer, because of [the unique needs of healthcare facilities]." In these cases, the installation contractor gains experience installing an AP RTU, but may not develop a broader understanding of the benefits of the technology or how it might be applied in other situations. Contractors also reported encountering AP RTUs already installed on buildings as part of their maintenance work. This exposure to AP RTUs through Plan and Specify projects and maintenance work led to contractors' greater awareness of AP RTUs.

Building decision-makers reported relying on contractors and distributors for information on HVAC equipment. Even those with backgrounds in HVAC reported seeking input from vendors, with one explaining, "I'm not out in the field with an HVAC company working on everything, so when we get new stuff, it's contractors and distributors." This response demonstrates that contractors and distributors play an important role in informing building decision-makers about HVAC technologies, even when those building decision-makers have a technical understanding of HVAC equipment. Similar to contractors, building decision-makers' awareness of AP RTUs appears to come from practical experience with them. Forty percent of building decision-makers reported having AP RTUs installed on their buildings.

Perceptions of AP RTUs

The scenarios in which AP RTUs were applicable was a key difference in perceptions of the technology between the program and the market actors it sought to influence, ultimately emerging as a key barrier to uptake. Market actors, particularly HVAC contractors and distributors who are often in a position to recommend HVAC equipment to building decision-makers, saw AP RTUs as a specialized technology, while NEEA's program seeks to drive uptake of AP RTUs as a more efficient replacement option for standard RTUs.

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

Few contractors and distributors discussed energy efficiency as a motivation for AP RTU 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 AP RTU 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]." Several manufacturers' representatives also reported that sales of AP RTUs were typically driven by non-energy benefits (e.g., airflow needs, improved filtration) rather than efficiency. As one manufacturer's representative 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."

This limited recognition of AP RTUs 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 AP RTU installation. Interviewed contractors with recent experience installing AP RTUs reported that their costs were 15% to 30% higher than a comparable standard RTU. Two manufacturers' representatives reported a similar range for AP RTU cost premiums, estimating they were 20% to 30% more expensive than a standard alternative. Two other representatives reported larger cost premiums, indicating that AP RTUs could be twice as expensive or more than standard RTUs.

AP RTUs can be notably heavier than standard RTUs due to the addition of cabinet insulation and potentially an ERV/HRV, and this added weight can also increase the cost of an AP RTU as a replacement option. If the equipment being installed is significantly heavier than the equipment it replaces, the project may require engineering and permitting work to ensure the roof will support the additional weight. As a result, one manufacturer's representative noted that, "accommodating structural requirements for larger [AP RTU] units is easier done on a new project than an existing one."

Perceived barriers to AP RTU installation focus on reliability. Reliability was a key consideration for both building decision-makers and contractors in their decision-making around RTUs. Both groups 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."

Building Decision-Maker Willingness to Pay

Interviewed contractors and distributors indicated that the cost premium of AP RTU equipment would make them reluctant to propose an AP RTU 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 AP RTU, saying "it looks pretty much the same…you basically have to understand HVAC to see the benefits of it."

Manufacturers' representatives also reported pressure to offer lower prices in typical replacement scenarios. According to one, "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 representative 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 further perceived that split incentives between tenants and owners in commercial buildings can exacerbate upfront cost barriers to AP RTU installation. As one contractor explained, "Typically, the guy 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 representative 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.

In contrast to these perceptions, interviewed building decision-makers indicated that there were situations in which they would be willing to pay more for a higher-quality or more efficient piece of equipment. As one building decision-maker explained, "If there is a [return on investment due to energy cost savings] on it, and it does work reliably, then it would make good sense to spend a little bit more on something like that." Another building decision-maker noted

that, for certain facility types, there were reputational benefits to energy efficiency that went beyond direct cost savings. According to this respondent, “Energy efficiency would be very appealing, not just for the economic benefits, but for marketing purposes…the fact that we might be able to say that our utilities are ‘energy efficient and environmentally safe’ will go a long way into swaying a parent’s opinions about our school.”

Program Implications

Differences in awareness of AP RTUs between market actors suggest that a typical MT outreach approach, which focuses on providing manufacturers’ representatives and distributors with information and resources to disseminate to their customers further downstream, may need adjustment. While distributors may need education about AP RTUs in general, including the technology’s features and its value propositions, a majority of contractors were aware of the technology but did not typically consider it in a replacement scenario. As a result, contractor education may need to be more focused on the opportunities to install AP RTUs as a replacement technology and the value proposition of doing so, as well as providing information to address concerns around reliability.

In general, market actors’ failure to perceive AP RTUs as a viable like-for-like replacement presents a variety of barriers for programs promoting AP RTUs to address. Some of these are awareness barriers, with the contractors and distributors involved in the retrofit market needing a greater understanding of the opportunities and benefits of installing AP RTUs as replacements for standard RTUs. While manufacturers’ representatives demonstrated the greatest awareness of these benefits, they often are not involved in standard RTU replacements. However, there are also important technical barriers to address, especially regarding AP RTU weight. Programs promoting AP RTUs may need to explore situations in which added weight is less likely to complicate installation or work with manufacturers to seek opportunities to reduce the weight of AP RTU equipment without compromising efficiency.

Building decision-makers’ willingness to pay more for equipment that is more efficient as long as it is also reliable demonstrates a crucial opportunity to communicate the value proposition of AP RTUs as a standard RTU replacement both to the building decision-makers themselves and, potentially more importantly, to the contractors and vendors on whom they rely for equipment advice.

NEEA is currently conducting two additional AP RTU market research projects that aim to provide a deeper and more nuanced understanding of some of the findings described in this paper. The first is a study on owner and operator experiences with ERV/HRVs (a component of Tier 2 AP RTUs) especially focused on cleaning and maintenance practices (Haldane and Artis 2026). The qualitative analysis shows that while some market actors align with reliability concerns reported above, others report ERV/HRVs as being relatively simple technology where not much can go wrong as long as filters are changed.

The second study is slated to begin in mid-2026 to explore processes, timelines, and roles involved in RTU replacements in emergency, near-emergency, and planned scenarios. This study includes research objectives to better understand weight differences of RTUs and the process of triggering and completing a structural review. In addition, the next Market Progress Evaluation Report for NEEA’s AP RTU program will include data collection from current AP RTU owners to better understand their reasons for adopting this efficient equipment for their buildings and

insights from this research may be used to update program marketing and educational materials. NEEA's program team is also monitoring for potential case study opportunities that can highlight value proposition in ways that address all market actors' perspectives and in a wider set of applications and is working with manufacturers to develop lower-cost AP RTUs.

Conclusion

As in the parable of the blind men and the elephant, an efficient technology can appear very different from the perspectives of different market actors. From the perspective of a contractor, an AP RTU is an expensive technology that a cost-sensitive building decision-maker would not be willing to accept. From the building decision-makers' perspective, however, the costs can be justified if there is a sufficient value proposition. Instead, the challenge with AP RTUs for building decision-makers is that, as an efficient technology, they are seen as more complex, and thus less reliable. Distributors, meanwhile, face limited awareness of AP RTUs since they are rarely part of the distributors' core product lines.

Perhaps the most important difference in perspectives on AP RTUs, however, is that between NEEA's AP RTU program and the market actors it seeks to influence. While the program sees AP RTUs as an energy efficient replacement option for standard RTUs, contractors and distributors see AP RTUs as a niche product for specialized applications. Changing these market actors' perspectives on AP RTUs is a key challenge that the program is working to address through its outreach efforts.

In order to effectively increase adoption of those technologies through MT efforts, it is important for program administrators to understand the specific perspectives of actors at various points in the supply chain and tailor their intervention strategies to those actors' perspectives. This may represent a shift from common MT approaches that focus interventions as far upstream as possible, seeking to influence manufacturers or their representatives, in anticipation that information about, and support for, new technologies will flow downstream to distributors, installers, and ultimately end-users.

When information flows do not follow the expected pattern, as was the case with AP RTUs, targeted outreach efforts may be needed to build awareness at specific points in the supply chain. This can help to address awareness gaps by demonstrating that there is demand for the targeted efficient technology. For example, installers demonstrated greater awareness of AP RTUs than distributors. If the program can shift installers' perceptions of AP RTUs as a specialized technology and overcome other barriers, increased installer demand could send a signal to distributors, motivating them to learn more about AP RTUs.

Similar targeted interventions may be necessary to address market actors' perceptions of other actors' barriers and priorities. Convincing end-users of the reliability and energy savings benefits of AP RTUs could lead them to increasingly ask installers about the technology and demonstrate to installers that they are willing to pay a premium if they are convinced of the value proposition.

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