ETA
EFFICIENT TECHNOLOGY ACCELERATOR

Window Market Insights Report: Residential Windows Contractors

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Primary author: Catherine J. Bruns

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Executive Summary

Background and methodology

High-efficiency window technologies use efficient components such as triple-pane glazing to attain a U-Factor at or below 0.22, which is typically equivalent to ENERGY STAR Northern Climate Zone Prescriptive windows. These components enable high-efficiency windows to improve a home's energy performance while simultaneously reducing noise, condensation, and thermal discomfort. The Wise Window Hub (WWH), an initiative under Minnesota's Efficient Technology Accelerator (ETA), was built to encourage market actors to incorporate high-efficiency windows into their projects, accelerating statewide adoption of the technology. To understand how one of these market actors, residential windows contractors, perceive these products, ETA conducted two primary data collection efforts in 2025:

- A contractor survey (N=39) of residential windows contractors in MN
- Semi-structured interviews (N=10) with survey respondents

While casting a large net, survey respondents and follow-up interviewees generally represented contractors at smaller companies in the metro area who primarily worked on retrofit or replacement projects, and findings should be interpreted with that lens.

Key findings

- **Most contractors (82%) had some experience with high-efficiency windows but primarily used them for niche projects.** Many contractors said they only install high-efficiency windows a few times a year and rarely recommend them to customers. Contractors also mentioned that when homeowners do request high-efficiency windows, they are often attracted to the technology's sound proofing, luxury features, or top-tier efficiency.
- **The majority of contractors had favorable opinions of some high-efficiency window technologies but thought double-pane windows were suitable for most situations.** Although contractors had favorable opinions of traditional triple-pane windows (62%) and vacuum insulated glass (54%), 90% believed double-pane windows fulfilled most customers' needs. Cost was a large deterrent, with 54% of contractors reporting the upfront cost of high-efficiency windows to be too high and not worth the benefit.
- **Contractors reported that high-efficiency windows represent a small portion of the window market but that sales are increasing somewhat.** Contractors agreed that high-efficiency window sales are lower than standard window sales, although the average sales figures they provided were higher than expected. Additionally, 44% said they have seen high-efficiency window sales increase over the past five years, and 51% expect sales to increase over the next five years.
- **Contractors estimated similar lead times for high-efficiency and standard windows**, with more than 50% reporting that both products are available within 4–7 weeks.

- While previous ENERGY STAR reports indicate a $50–100 incremental cost for high efficiency windows, **contractors perceived high-efficiency windows to be on average $170 more expensive than standard windows,** even before considering factors such as additional markups, upgraded features, or cost differences between manufacturers.
- **Over half of contractors said they educate customers about high-efficiency windows,** often by talking with them during visits. **Over 60% said they include high-efficiency windows in bids at least sometimes**, but a few reported that customers rarely select the high-efficiency product after seeing the cost.
- Contractors identified **heating and cooling savings as one of customers' top benefits of new windows, and cost as one of customers' top concerns of high-efficiency windows.** Some contractors also mentioned that the immediate benefit of improving window functionality can sometimes outweigh the long-term benefit of cost savings.
- **86% of contractors were very confident in their ability to install a high-efficiency window,** with many saying that the installation process is no different from standard window installation but crucial to avoiding later performance issues. At the same time, **66% of contractors said trainings and resources on installation techniques were worth their time.**
- **100% of contractors said they prefer winter trainings, and 97% said they look to manufacturers for window information.** Additionally, while most contractors were happy with the support manufacturers provide them, some said that manufacturer communication about high-efficiency windows is lacking and they would appreciate educational resources from neutral third parties.

Conclusions

1. **Contractors are skeptical of the need for high-efficiency windows.** The majority of contractors had some experience with high-efficiency windows, but 90% of them said that double-pane windows were sufficient for most customers and projects.
2. **Contractors are concerned about the cost and longevity of high-efficiency windows.** Contractors shared reservations about the cost effectiveness of high-efficiency windows, as well as the impact weight has on long-term durability.
3. **Contractors report higher than expected average sales estimates and product costs.** Contractors estimated average high-efficiency window sales figures and material price differences that were higher than suggested by previous sources.
4. **Contractors are hesitant to recommend or bid high-efficiency windows unless requested by the customer.** Outside of a few niche cases, most contractors prefer to guide customers toward standard window products.
5. **All contractors prefer winter trainings, and nearly all contractors look to manufacturers for residential window training and information,** although manufacturer communication about high-efficiency windows specifically is limited.

Future considerations

1. **Support existing and new efforts to expand contractor knowledge of high-efficiency window technologies.** Promote and develop educational trainings to expand contractor awareness of high-efficiency window performance benefits and cost savings.
2. **Provide contractors with a robust communication toolkit for discussing high-efficiency windows with homeowners.** Prepare contractors to communicate the value proposition of high-efficiency windows to a broad client base by ensuring they have up-to-date talking points and marketing resources.
3. **Explore contractor concerns with high-efficiency windows.** Investigate contractor skepticism about the weight, longevity, and payback of high-efficiency windows by conducting additional research activities with more market actors.

INTRODUCTION

Background

WWH Initiative

Windows represent only 8% of a typical home's building envelope area, yet account for 45% of envelope heat transfer.[1] However, high-efficiency window technologies such as ENERGY STAR triple-pane windows can advance a home's energy performance by improving the envelope's thermal insulation, air leakage, and solar heat gain components to optimize HVAC performance. High-efficiency window products also offer homeowners extensive non-energy advantages such as improved comfort, sound dampening, and health benefits from reduced condensation.

In 2023, the state of Minnesota initiated its Efficient Technology Accelerator (ETA) market transformation program, which aims to accelerate market adoption of efficient technologies. ETA is a partnership funded by the state's investor-owned utilities, administered by the Minnesota Department of Commerce, Division of Energy Resources, and implemented by Center for Energy and Environment (CEE). As part of this program, the Wise Window Hub (WWH) initiative was built to influence and encourage market adoption of high-efficiency window technologies.

The goal of the WWH is to empower builders, contractors, and homeowners with the tools and knowledge they need to take advantage of the benefits and opportunities offered by high-efficiency windows, especially ENERGY STAR triple-pane windows. The initiative aims to provide industry professionals and homeowners with real-time updates, expert guidance, and practical resources that raise consumer awareness and interest in high-efficiency window products. By streamlining the high-efficiency window decision-making and implementation process, the WWH makes it easier for projects to meet energy efficiency and building code requirements, encouraging market actors to incorporate these windows into their projects before they become code mandated. More information about the WWH initiative and high-efficiency window technologies can be found at https://www.wisewindowhub.org/.

The data-driven insights provided in this report serve to benchmark current perceptions of high-efficiency window technologies, identify barriers and opportunities to expanding their market presence, and track the WWH's effectiveness in closing this gap.

High-efficiency window technologies

High-efficiency windows are available in the same custom shapes and sizes as baseline code windows, making them well suited for use in single-family, multifamily, and some commercial buildings. Importantly, these windows leverage efficient components such as triple-pane glazing, low-emissivity (Low-e) coating, and thermally improved foam-filled frames to attain a U-

[1] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. April 2022. "Pathway to Zero Energy Windows." Available here.

Factor at or below 0.22. **For the purposes of this report and WWH initiative efforts, we define high-efficiency windows as those with a U-Factor at or below 0.22, which is typically equivalent to ENERGY STAR Northern Climate Zone Prescriptive windows and usually achieved using triple-pane glazing.**

High-efficiency window market

Despite the adaptability and technological capabilities of high-efficiency windows, double-pane windows remain the standard across much of the market. Windows themselves are complex technologies that can last up to 45 years on average,[2] reducing the frequency with which homeowners need to think about window replacement. Additionally, the triple-pane glazing used in many high-efficiency window products is perceived to make already pricey windows even more expensive, dissuading cost-conscious homeowners and frugal builders.

Challenges such as these have slowed the adoption of high-efficiency window technologies, which remain a primarily niche market estimated to represent only 2–3% of nationwide window sales.[3] Additionally, window sales are affected by nuanced market dynamics across retrofit and replacement markets. Each have different key players, and retrofit and replacement projects are often driven by homeowner comfort and aesthetic preferences, while new construction projects are largely price driven.[4] Windows contractors are especially critical for retrofit installation decisions and work directly with customers as well as with product and supply chain actors. Thus, windows contractors can provide unique and comprehensive market insight.

Research goals and scope

This report details windows contractor views on residential windows and emerging windows technologies, including high-efficiency products like ENERGY STAR triple-pane windows. Although this research focuses solely on residential windows contractor perspectives, respondents were sometimes asked to speculate on homeowner preferences and values.

The key goals of this research include:

- Track/update market progress indicators
- Understand window market share
- Assess contractor training or learning needs
- Identify gaps where contractors want to learn more and where they have a lot of resources available
- Understand changes with perceptions, sales patterns, incentive structures, barriers, and demand

[2] Center for Energy and Environment. Fall 2023. "High-Performance Windows Market Transformation Plan." Available here.

[3] NEEA. January 2023. "Study of High-Performance Windows Incremental Manufacturing Cost." Available here.

[4] Center for Energy and Environment, "High-Performance Windows Market Transformation Plan" (Fall 2023). Available here.

Methods overview

Two primary data collection efforts were conducted to solicit residential windows contractor perspectives:

- A survey (N=39) of residential windows contractors in MN
- Semi-structured interviews (N=10) with previous survey respondents

A summary of methods is provided within this section and a more detailed overview of each data collection process can be found in Appendix A. Detailed methodology.

To assess contractor views on residential windows and emerging windows technologies, we surveyed residential windows contractors across the state of MN. A contractor contact list was created from manufacturer preferred contractor/dealer networks and Better Business Bureau search results. Out of 399 potential contacts, 39 contractors partially or fully completed our survey. Respondents answered questions about their experience with residential windows and emerging windows technologies, barriers and opportunities they see with them, sales insights, and training preferences. Later, 10 follow-up interviews were conducted to collect further details about contractors' sales estimates and experience with high-efficiency window products. Survey and interview findings are interwoven yet distinguished throughout this report, with interview conversations primarily providing deeper commentary or context for survey responses.

High-efficiency windows were defined for all contractors as "only windows with a U-Factor at or below 0.22, which is typically equivalent to ENERGY STAR Northern Climate Zone Prescriptive windows and usually achieved using triple-pane glazing." Because contractors often also use ENERGY STAR ratings when speaking with customers, survey respondents were shown a chart of U-Factor ranges next to their respective ENERGY STAR Northern Climate Zone performance designations (Table 1). For simplicity, this report refers to high-efficiency windows by U-Factor (at or below 0.22) unless otherwise specified.

Table 1. ENERGY STAR Northern Climate Zone performance designations

<table>
<tr><th>Climate Zone</th><th>U-Factor[1]</th><th>SHGC[2]</th><th></th></tr>
<tr><td rowspan="5">Northern</td><td>≤ 0.22</td><td>≥ 0.17</td><td>Prescriptive</td></tr>
<tr><td>0.23</td><td rowspan="2">≥ 0.35</td><td rowspan="4">Equivalent Energy Performance</td></tr>
<tr><td>0.24</td></tr>
<tr><td>0.25</td><td rowspan="2">≥ 0.40</td></tr>
<tr><td>0.26</td></tr>
</table>

Business characteristics

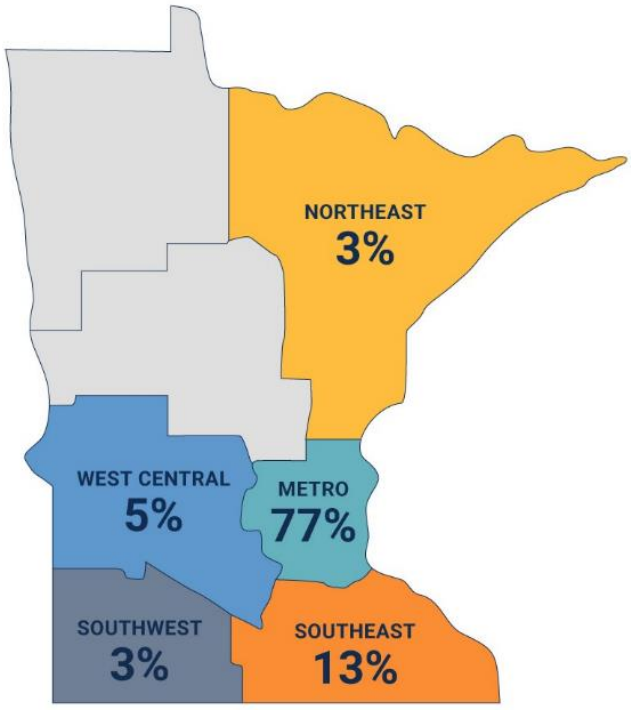
To gauge sample diversity, we asked contractors for further details about their business and approach to residential window installation.

Survey insights: Most contractors worked at small companies in the metro focused on the retrofit and replacement market

Company size leaned smaller, with nearly two-thirds of contractors (64%) working at businesses with 1–5 employees and the remaining third (36%) working at businesses with 6–20 employees. Medium- or large-scale residential window companies were not represented in this data set.

To determine location, survey respondents provided their business' zip code, which was then mapped to the seven regions used by the Clean Energy Resource Teams (CERTs) to evaluate energy efficiency across the state. About three-quarters (77%) of contractors came from the 11-county metro region, while the remaining 23% came from Greater Minnesota (Figure 1). Two regions, Central and Northwest, were not represented in this data set.

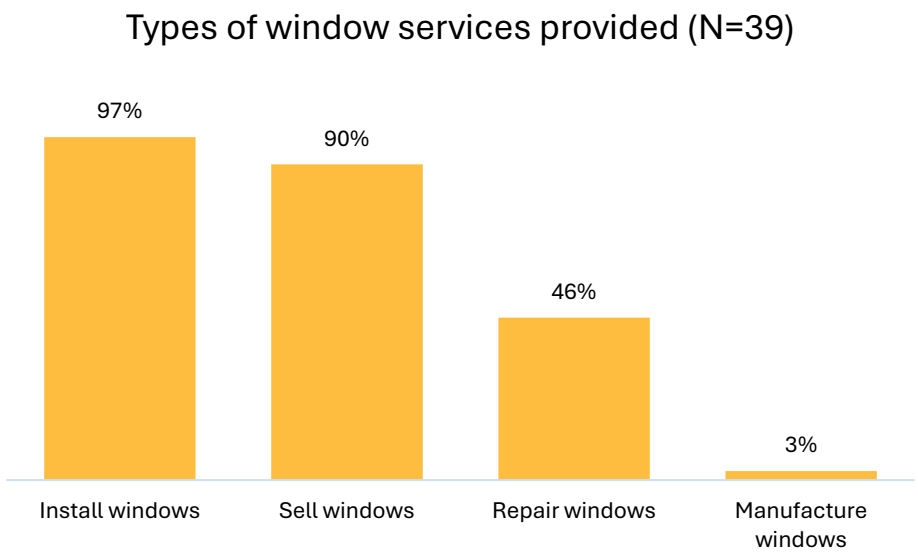
Figure 1. Respondents by CERTs region



Respondents were also asked what window services their company offered. All but one contractor said that their company installs windows, and 90% said that their company sells

windows (Figure 2). Nearly half of respondents (46%) said that their company performs window repair. A single respondent (3%) said that their company manufactures windows.

Figure 2. Types of window services provided (N=39)



Note: Respondents could select multiple options, so percentages do not sum to 100%

When asked what proportion of window-related business was performed at their company, the majority (79%) of contractors said their business was primarily oriented to the retrofit or replacement market, indicating that window replacements comprised at least 75% of their business (Table 2). On average, contractors said that their business was 9% new construction (ranging from 0–60%), 84% retrofit/replacement (ranging from 25–100%), and 7% reconditioning/window repair (ranging from 0–75%).

Table 2. Proportion of window-related business (N=39)

Business category	Proportion new construction (N=39)	Proportion retrofit/replacement (N=39)	Proportion reconditioning/window repair (N=39)
Minimum	0%	25%	0%
Maximum	60%	100%	75%
Average	9%	84%	7%

Interview insights: Many contractors relied on referral business and prioritized customer satisfaction

Multiple contractors said that their companies have reduced their involvement in new construction in recent years. Explained one interviewee:

New construction, I would say those we actually are trying to do less of. We've had some builders that just wanna do the cheapest cost to get the house built. And that's not really our jam. So, we've been politely declining.

This decreasing interest in new construction aligns with survey respondent data as well as previous supply chain research, which indicates that window installation in new construction is typically managed by builders.

When asked to share more about the projects they do take on, the following categories were mentioned by at least one contractor:

- **Storm-chasing** companies
- **Lead abatement** and **weatherization**
- **Custom design** builds
- **Grant-funded projects** through community action partnerships
- **"Problems others don't want to touch,"** such as foreclosures, remediation, and dilapidated structures
- **Old or historic** homes

Some interviewees also shared information about the brands they work with. Of the manufacturers cited, four contractors mentioned Andersen and Marvin and three contractors mentioned Pella and ProVia (Table 3). Most contractors identified 2–3 preferred brands but said they occasionally use others for specific projects. Factors influencing brand loyalty included affordability, product availability, and sales rep accessibility. One contractor mentioned being more dedicated to a manufacturer they previously worked for.

Table 3. Window brands mentioned by interviewees

Most frequently used window brands
Most mentions (4): Andersen, Marvin
Some mentions (3): Pella, ProVia
Single mentions: Kensington Windows, Kolbe, Lindsey Windows, Mon-Ray, Ply Gem, Weather Shield, Windsor
Unnamed miscellaneous

When asked about their clientele, at least four interviewees said they worked with homeowners, often in the middle- to upper-income bracket. One contractor described their customers as "high-end homeowners" who pay a premium for good work:

We're not selling to be cheap. You're going to spend more money if you deal with [our company], but we guarantee you're going to get what you paid for and you're going to be happy, or we'll fix it.

Other contractors indicated that they "try to work with the customer regardless of the budget" by spreading out project costs over multiple stages (e.g., room by room) or showing homeowners "in dollars and cents" reasons why they should upgrade their windows.

Interviewees mentioned a variety of marketing strategies to attract these customers, including running TV and radio ads; appearing in print newspapers, magazines, and mailers; and attending home shows. Online sites such as Better Business Bureau, Houzz, Google, and Nextdoor were also mentioned. Five interviewees spoke about the importance of customer referrals:

> *Referrals are the best kind of business, you can have nothing better, other than your existing users coming back to buy more. We have clients that are on their fifth house. A lot of our clients today have children who are now buying homes and they're referring them to us.*

Considering this reliance on referrals, it is unsurprising that many contractors expressed a desire to help customers find the right window for their needs:

> *Homeowners, it might be their first house. And they don't understand all that goes into this [windows]. So, it's my responsibility to help them make the best call.*

To do this, interviewees said they ask homeowners what they like about their current windows, how much they are willing to spend for certain features, and how long they're planning to stay in their home. From there, it's about providing "all the pros and cons between different brands" and "narrowing it down to several possible products," explained one contractor. In doing so, contractors across the board, some of whom have been in the industry for 25+ years, displayed a customer-first business approach:

> *We try to keep the customer in mind. That's the goal, [and] I think that's why we're still in business.*
>
> *We don't want to sell someone something they don't need, right? I think our reputation is interesting because some of the Google reviews that are coming through I'm very proud of. There's a home we were gonna work with someday, but I just said, "Nope, you need to call me next year. You've got these things to take care of, and when you're ready, we're here to serve you." That's kind of our approach and our style of things.*
>
> *I'm nowhere near the biggest company in the industry, I'm just a little guy, and that's all I ever want to be. I just want to be the best at what I do and I want to be profitable.*

It is important to reiterate that none of the contractors interviewed worked at companies with more than 20 employees, which may have skewed the perspectives shared. Expanding conversations to include contractors at medium- or large-scale residential window replacement

companies could help determine if these customer-first attitudes are isolated to small businesses or indicative of wider industry values.

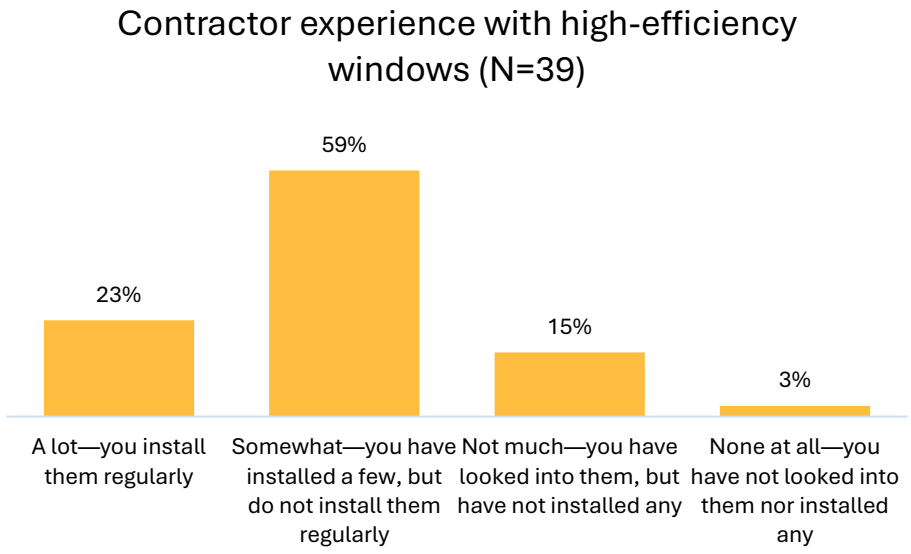
Contractor awareness and perceptions of high-efficiency windows

To determine baseline perspectives of emerging windows technologies, we asked contractors about their experience with high-efficiency windows and opinion of the technology compared to other window products. As mentioned previously, high-efficiency windows were defined for all contractors as only windows with a U-Factor at or below 0.22**,** which is typically equivalent to ENERGY STAR Northern Climate Zone Prescriptive windows and usually achieved using triple-pane glazing.

Survey insights: Most contractors had some experience with high-efficiency windows, but installation frequency remains low

When asked about their experience with high-efficiency windows (at or below 0.22), 82% of survey respondents said that they had at least some installation experience, with nearly a quarter (23%) saying they install them a lot (Figure 3). Only one respondent (3%) reported having no experience with high-efficiency windows at all.

Figure 3. Contractor experience with high-efficiency windows (N=39)



Interview insights: High-efficiency windows are mostly requested by niche clientele

Follow-up conversations affirmed that contractors have somewhat limited installation experience with high-efficiency windows. Most interviewees said that they rarely install triple-

pane windows ("once a year," "hardly at all," a couple," "we don't do a lot of it"), and one contractor said that they install high-performance double-pane windows almost exclusively.

When asked what drives customer interest in high-efficiency windows, some contractors mentioned the appeal of sound proofing. One contractor said that customers like to get them for the premium feature of between-the-glass blinds, but that in most cases, the homeowners are simply efficiency enthusiasts:

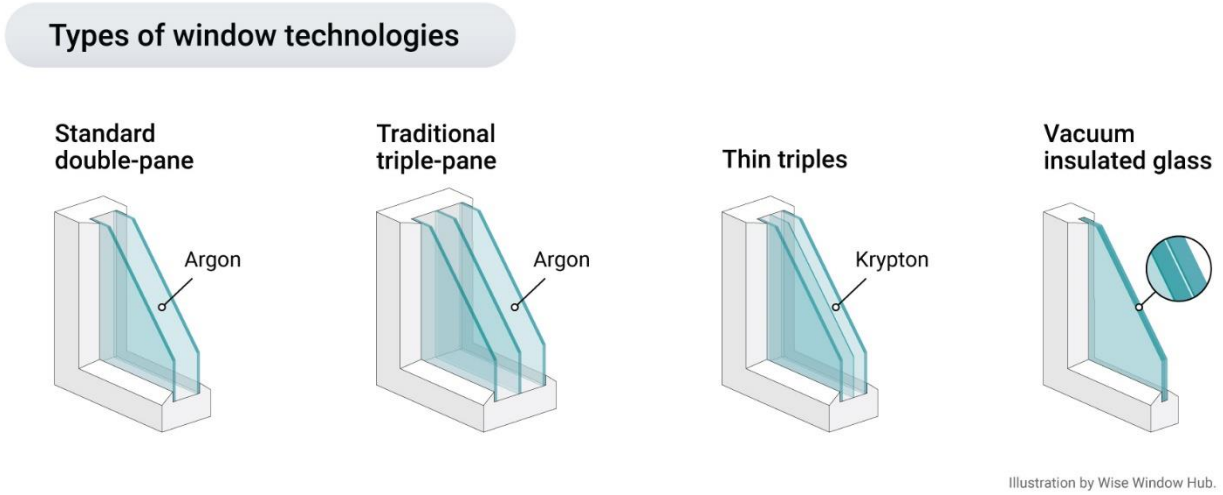
> *The people that I get asking for triple-pane are typically engineers and they just want to have the lowest number, the highest energy efficiency just from a "nerdy" standpoint.*

These comments, particularly homeowner interest in between-the-glass blinds, reflect previous indicators that high-efficiency windows are primarily seen as a niche product for clients with luxury or special interests. Generalizing the benefits of high-efficiency windows to appeal to a broader client base thus remains a potential opportunity for market growth.

Survey insights: Contractors preferred traditional triple-pane and vacuum insulated glass windows over thin triples

Survey respondents were asked about their opinions of three types of high-efficiency window technologies: traditional triple-pane windows, thin triples, and vacuum insulated glass (an emerging technology). Differences between these technologies and standard double-pane windows can be seen in Figure 4.

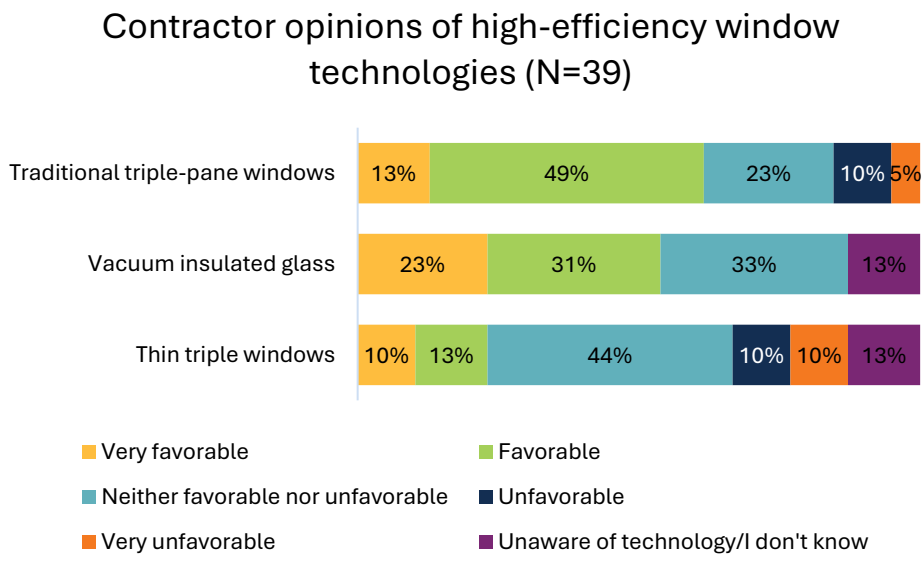
Figure 4. Types of window technologies



Over half of respondents had a favorable or very favorable opinion of traditional triple-pane windows (62%) or vacuum insulated glass (54%, Figure 5). Slightly more contractors had a very favorable opinion of vacuum insulated glass compared to traditional triple-pane windows (23% vs. 13%). Thirteen percent of contractors indicated they were unsure or unaware of vacuum

insulated glass or thin triple windows, while no contractor reported being unfamiliar with traditional triple-pane windows. Thin triple windows had the highest unfavourability among survey respondents (20%), followed by traditional triple-pane windows (15%). No one had an unfavorable opinion of vacuum insulated glass.

Figure 5. Contractor opinions of high-efficiency window technologies (N=39)



Eight survey respondents provided additional open-ended feedback about their unfavorable opinions. Comments mentioned by two or more contractors included:

- **Low return on investment** overall
- **Inferior performance** compared to double-pane or storm windows
- **Weight issues** in traditional triple-pane windows
- Too **thin airspace** in thin triples, resulting in poor insulation
- **Seal failures**, especially in vacuum insulated glass

Interview insights: Contractors were concerned about the weight of triple-pane windows

Although interviewees were not asked to specify their opinions of high-efficiency windows by technology type, similar concerns emerged about triple-pane windows in general. Five contractors said that the weight of triple-panes reduces the window's longevity:

> *I generally don't recommend them [triple-pane] because of the durability and long-term the weight. If you have a double hung, it's not going to be able to carry the weight of the window... Casement hardware wears out faster.*
>
> *It's so much glass and it's so heavy on a frame, that longevity wise, we've noticed and seen that they don't last nearly as long as the double-pane glass.*

Triple-pane glass is going to put more wear on the window. It's just like your car. If you constantly loaded the trunk with 5,000 pounds of lead and drove around the Cities, your tires would wear out quicker than if you just used your trunk occasionally. It's just a matter of fact.

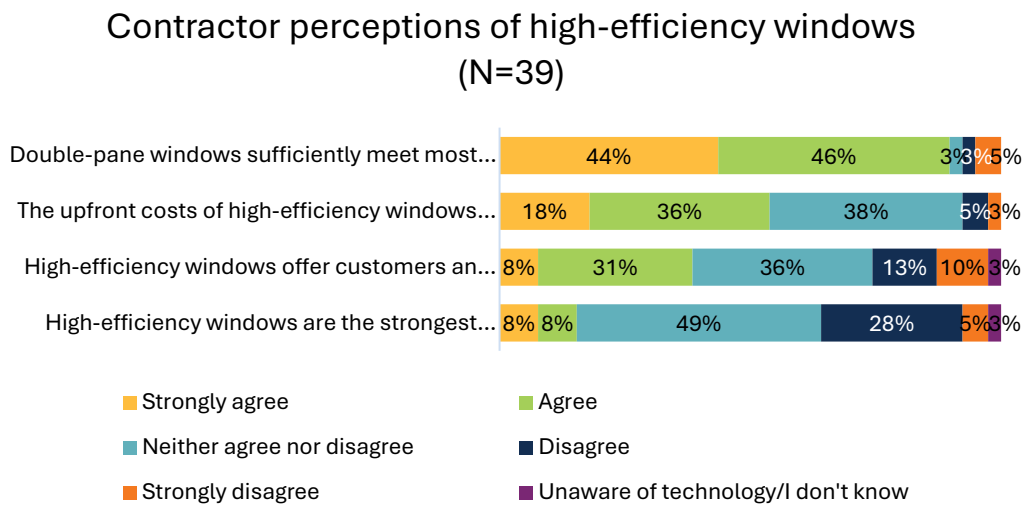
One contractor also said that while they don't personally have any qualms with the heaviness of triple-panes, their crews "definitely complain about window weight when we're installing triple-pane" and sometimes must install the window in pieces. Weight aside, two contractors mentioned that product availability could sometimes be an issue, with one saying that "it usually increases the lead times by 3–4 weeks when we go triple."

On the flip side, two interviewees said that triple-pane windows are especially effective at reducing interior condensation, with one going as far as to call them "really the only product that you can use to really prevent that." Contractors also said that triple-pane windows reduce outdoor noise, but opinions were mixed as to whether the difference is greater than what would be offered by a double-pane or storm window, with one admitting, "We've had just as many homeowners say *any* window was an improvement."

Survey insights: The majority of contractors thought double-pane windows were good enough for most situations

Survey respondents were asked to indicate their agreement with a series of statements about high-efficiency windows. Most notably, 90% of contractors agreed or strongly agreed that double-pane windows sufficiently meet most customers' needs, while only 16% agreed or strongly agreed that high-efficiency windows are the strongest tool to improve whole-home performance (Figure 6).

Figure 6. Contractor perceptions of high-efficiency windows (N=39)



Note: Due to rounding, some percentages do not sum to 100%

When asked about the cost of high-efficiency windows, just over half of respondents (54%) agreed or strongly agreed that the upfront costs of these products are too high and do not justify the benefits. Less than 40% of contractors agreed or strongly agreed that high-efficiency windows offer customers an attractive payback over time.

Interview insights: Contractors were skeptical about high-efficiency windows' return on investment

Follow-up conversations reinforced survey respondents' cost concerns. Many interviewees felt that the return on investment for high-efficiency windows was too long, especially considering that homeowners may move or sell:

> *There's no way you're going to justify the increased investment for that additional glass pack unless you're going to live there the next 25 or 30 years.*
>
> *They all say it's an investment, but I've seen some quotes lately that are $4,000 for a window. ONE window. Well, how long do you have to live? Vampires won't live that long for that to pay off, I mean, literally you'd have to live 200 years.*

One contractor added that repairing a high-efficiency window is more expensive than a standard window, which customers often don't realize until it's too late. They recounted a client's price shock on a recent Habitat for Humanity project:

> *It was some green project where they wanted maximum performance and so we did a triple-pane. They were very expensive and someone broke a window. And they [the clients] weren't too happy about the cost of switching the glass out. It was, I don't know, $400 or $500. That's the other issue, there are diminishing returns if you have a problem like that, baseball going through a window or a tree branch... it's got to be serviceable and it's usually kind of expensive.*

Other interviewees questioned if the efficiency improvement between triple-pane and double-pane windows was worth the expense. Two contractors described the difference as "relatively minor, statistically speaking" and merely "tiny incremental improvements." Another said that while they believed triple-pane to be more efficient than double-pane, "We don't live in Anchorage, Alaska, or Thunder Bay, Ontario, we live in Minneapolis, Minnesota" and thus don't experience enough cold weather to justify the cost. In fact, one contractor expressed doubt that customers would ever make up their investment:

> *When you're spending $2–3,000 on a project to go triple-pane, it's hard for me to honestly tell somebody, "You're gonna save an additional $2–3,000 in savings over the course of 20 years," because I honestly don't think that's true.*

A few contractors commented on the difficulties of estimating a homeowner's potential cost savings. One interviewee explained that while they've asked customers to report the savings they see, the price of therms changes year to year, and they haven't yet figured out how to account for the difference. Overall, most contractors suggested that they weren't opposed to triple-pane windows in the right circumstances, but wanted to be transparent with their customers about the uncertain payback:

> *I feel like it's fair to them [the customer] to understand the whole ladder aspect on what you're spending and what you're saving because if we can truly save them the money, we will find a way to sell it for 'em.*

Survey insights: Contractors were more likely to recommend high-efficiency windows when energy efficiency is a focus

Survey respondents provided open-ended feedback about situations in which they were likely to recommend high-efficiency windows. Almost 30% said they were likely to recommend high-efficiency windows if a customer expressed a desire for energy efficiency or energy savings. In fact, multiple contractors agreed that high-efficiency windows only make sense when coupled with other efficiency improvements like additional insulation and new doors, because "if the walls are not high efficiency, the efficiency of the actual window matters less."

In addition to efficiency, other situations when two or more contractors said they would recommend high-efficiency windows included:

- In **certain property situations**, such as when a house faced south, had an above average number of exterior windows, was from the 90s or later, or was "Up North on the lakes"
- When **financial incentives** were involved, such as when customers were looking to make a long-term investment or could benefit from the federal tax rebate
- When **customers explicitly requested** high-efficiency windows, although some contractors said they warned customers of the price difference and asked them to review all the glass options before considering the high-efficiency quote
- In **noisy areas**, such as near train tracks or airports
- When **condensation or moisture issues** were involved

Importantly, three survey respondents suggested they were unlikely to recommend high-efficiency windows over other windows or simply don't offer them. "Most people are looking for the cheapest window they can find generally," one explained, while a second added, "They don't like the price [of triple-pane windows] so we hardly ever offer it."

Interview insights: Contractors were generally unlikely to recommend high-efficiency windows

Like survey respondents, most interviewees indicated that they rarely recommend high-efficiency windows and would only install them on homeowner request. The few instances when interviewees said they might recommend high-efficiency windows were:

- In **noisy areas** near airports
- In bathrooms to **reduce condensation**
- For **net zero or green** projects

Additionally, one contractor said that they would sometimes recommend triple-pane windows based on the results of a detailed project assessment:

> *We'll take the time to measure each window, look at the condition of the window and then what direction it faces and so on. Ask the customer what they want to get out of the window. And then we'll put a proposal together with a scope of work and we'll invite them into our showroom, and we'll show them the windows we're proposing and explain why we proposed them. [To] them we sell triple-pane windows.*

Sales insights

To better understand the current high-efficiency window market, we asked contractors to estimate sales data, product availability, and cost of various window technologies.

Interview insights: Contractor use of U-Factor and ENERGY STAR ratings varied

Contractors need to be well-versed in both U-Factor and ENERGY STAR ratings for effective homeowner communication. To better understand contractor opinions of these performance measures, we asked interviewees how often they used U-Factor and ENERGY STAR ratings.

Interviewee use of U-Factor ratings varied widely. Four contractors said they consider U-Factor at least sometimes. However, five said they do not consider U-Factor; of these, two said that they don't need to pay attention to it if the window meets code requirements, with one explaining, "If it's a 0.3 or less we're good." Another said that they prefer to focus on what window best fits the project, saying, "I probably haven't paid attention to it [U-Factor] for 15 years." Yet another contractor said that they were specifically attentive to U-Factor because "U-Factor is what determines your ENERGY STAR rating."

Interviewee use of ENERGY STAR ratings was similarly varied, though many discussed the program in customer-facing contexts. Two contractors mentioned that the portal they use to order windows provides an ENERGY STAR rating, which they then share with the homeowner. Additionally, multiple contractors mentioned that most customers want to know if a window is ENERGY STAR-rated:

> *[I use ENERGY STAR] a fair amount, because I think that we have customers that ask about that.*
>
> *ENERGY STAR rating is probably the number one thing people will judge [windows] off of.*

> *I know the consumer wants to know "Is it ENERGY STAR-rated?" If it is, they're happy with it.*

On the other hand, one contractor said that customers rarely care about the ENERGY STAR or U-Factor rating but are instead more interested in the product warranty.

Interviewees also described ENERGY STAR's usefulness as a marketing tool, for better or for worse. One interviewee referred to the program as a "buzz word," saying, "It's faster and easier to explain to a homeowner about ENERGY STAR than it is to explain U-Factor." Another interviewee cast doubt on the savings promoted by ENERGY STAR:

> *I feel like it [ENERGY STAR] was coaxing some of that stuff that happened in the marketplace... You're forcing people to spend a pile of money to save a little, and if they don't get told that... I mean, you're coming across as "We're going to get you a $600 discount" when that's not truly what you're getting. I mean yes, you're getting that $600 tax rebate discount, but... I think it's only fair to explain to the customer the cost incentive behind that, because otherwise I feel like it's falling more into a sales platform that you get with a lot of national companies. So, I think that's the biggest hiccup in the whole thing, is how it's presented.*

Additionally, one contractor said that since ENERGY STAR lowered their recommended U-Factor rating to 0.22, they only discuss it if a customer brings it up.

Interviewees were also asked if they have ever seen ENERGY STAR-rated windows being sold in MN that did not meet required ENERGY STAR Northern climate zone specifications. Three contractors said that while they have never encountered that, they believed it could happen. However, two contractors said that they have encountered that before, with one explaining:

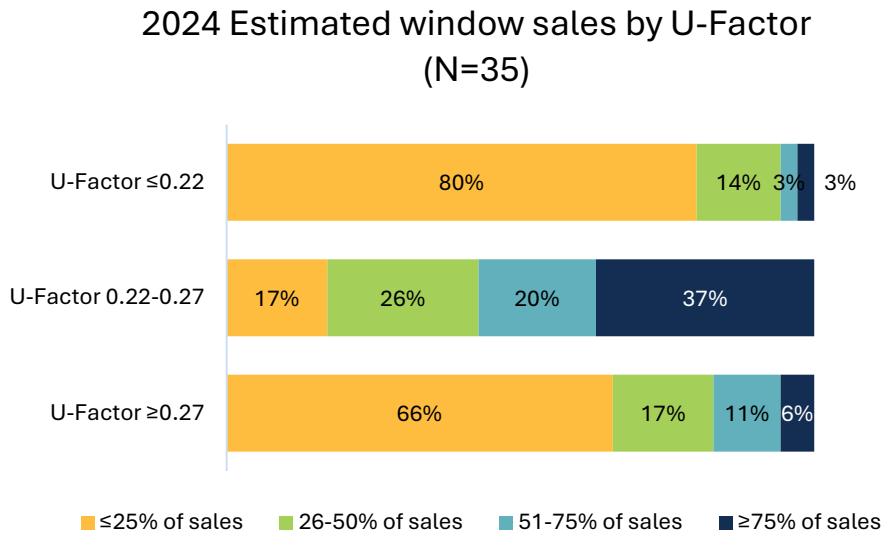
> *Yes, yes. Not a lot, but sometimes enough where I think it's good to be aware that it can happen. This is where it gets kind of interesting. When we do work with insurance, sometimes, if there's a big storm, then they get insurance adjusters from other parts of the country that come in. And [if an adjuster comes from] Austin [for example], if they are more familiar with, let's say Texas weather, climate, whatever, then they have to consider that they're in a different area they're not experienced with. So that comes into play a fair amount because [the out of state adjusters are] not familiar with things like ice and water and installation specs needed to protect against the climate. With windows, I just wonder a little bit if something similar happens.*

Survey insights: Most contractors estimated high-efficiency windows to be a small portion of their business' overall sales

Survey respondents were asked to estimate the proportion of windows their company sold in 2024 that had a U-Factor at or below 0.22 (ENERGY STAR Prescriptive), between 0.22 and 0.27 (ENERGY STAR Equivalent Energy Performance), and at or above 0.27 (non-ENERGY STAR windows).

More than three-quarters (80%) of contractors estimated that windows with a U-Factor at or below 0.22 (ENERGY STAR Prescriptive) were 25% or less of their total 2024 window sales (Figure 7), with the average estimate being 17% of total sales. This 17% average was considerably higher than expected and thus investigated further in interviews, described in the section below. Overall, most contractors indicated that windows with U-Factor between 0.22 and 0.27 made up the majority of their sales (57% of contractors indicated these windows were >50% of their sales, compared to only 6% who said windows with a U-Factor ≤0.22 were >50% of their sales, and 17% who said windows with a U-Factor of ≥0.27 were >50% of their sales).

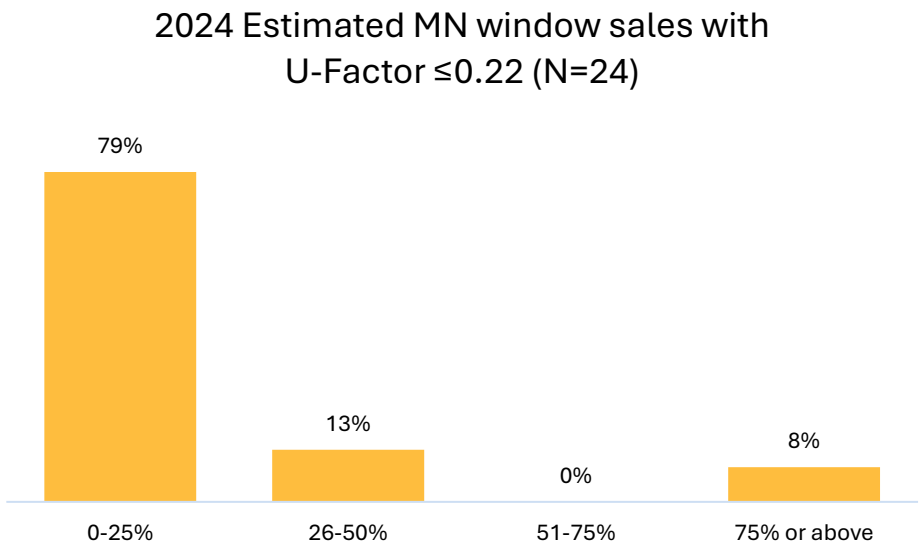
Figure 7. 2024 Estimated window sales by U-Factor (N=35)



Survey insights: Contractors estimated statewide high-efficiency windows sales to be similar to their own business' sales

In addition to estimating their own business' sales, survey respondents were asked to estimate the proportion of windows sold across the state of MN in 2024 with a U-Factor at or below 0.22. Seventy-nine percent of contractors estimated these windows to be a maximum of 25% of statewide sales, with the average estimate being 21% (Figure 8). Interestingly, these statewide estimates closely mirrored the estimates contractors provided about their own business' high-efficiency window sales (79% statewide vs. 80% individual companies, 21% average statewide vs. 17% average individual companies).

Figure 8. 2024 Estimated MN window sales with U-Factor at or below 0.22 (N=24)



Considering that previous literature has estimated windows with a U-Factor at or below 0.22 to be only 2–3% of the nationwide market,[5] these sales figures, both for individual companies and the MN market overall, are much higher than expected. These estimates also appear high given contractors' minimal experience with and somewhat unfavorable perceptions of high-efficiency windows, as described throughout this report.

Although sales data responses were cleaned to some extent, some irregularities emerged that cannot be easily accounted for. First, some data estimates appeared implausible based on other responses, though they were kept in the dataset to accurately reflect what was reported. Additionally, survey respondents were more hesitant to estimate statewide sales compared to their own company's sales, with 12 contractors saying they didn't know enough to make a guess. Finally, the fact that respondents primarily worked at smaller businesses focused on the

[5] NEEA. January 2023. "Study of High-Performance Windows Incremental Manufacturing Cost." Available here.

retrofit market may have introduced bias into these estimates, as their position in the market may be different from larger organizations, and a smaller number of windows may comprise a larger percentage of their sales. Given these challenges, these sales approximations should be cautiously considered.

These irregularities were a major motivation behind conducting follow-up interviews with survey respondents. However, when probed to carefully consider their responses, respondents largely stuck by their previous answers and offered additional explanations as context. More research should be done to determine or corroborate statewide sales estimates and high-efficiency windows market share.

Interview insights: Contractors suggested that some companies push triple-pane windows for higher commission

Follow-up conversations were used to better understand how contractors came up with the estimates provided in their survey. A few interviewees said they developed estimates through a combination of report pulling and rough mental calculation. Contractors were most confident in their estimates of windows with a U-Factor at or below 0.22, with one explaining, "I'm just basically looking off the fact that it's going to be one job a year, so trying to take a percentage." Given that participating contractors were all smaller operations, that could also inflate the sales percentage where a handful of projects could equal a bigger percentage of total jobs.

To gauge further context about the MN window market, interviewees were asked if their perceptions of statewide sales differed between small installers and big box retailers, where one segment may be selling more or fewer high-efficiency windows than the other. While interviewees were unsure whether larger retailers or small businesses sell more high-efficiency windows, four contractors were adamant that some companies push triple-pane windows more heavily, often due to the higher commission they receive:

> *I'll tell you that there are some companies out there, salesmen in particular, that push triple-pane on everything they do. And I think part of that is that the margins are higher for a salesman. If a window is more expensive, they're going to make more money on the sale. And I hate to say that, but I've seen it many times over as being the case.*
>
> *Yeah, it's probably a commission versus non-commission thing. Windows salespeople usually operate on commission, so they want to get the highest dollar volume, I guess.*
>
> *I don't know the industry, but I do know that there are a lot of guys and companies out there that, I might come in on a retail sale and hear about the last guy that was in the house selling triple-panes, "Gotta have triple-pane, gotta have triple-pane," so I know they're out there, quite a few of them.*

However, two contractors said that they're not concerned by these companies' tactics, and in some cases, that they improve their own business' sales, which focus less on triple-pane windows:

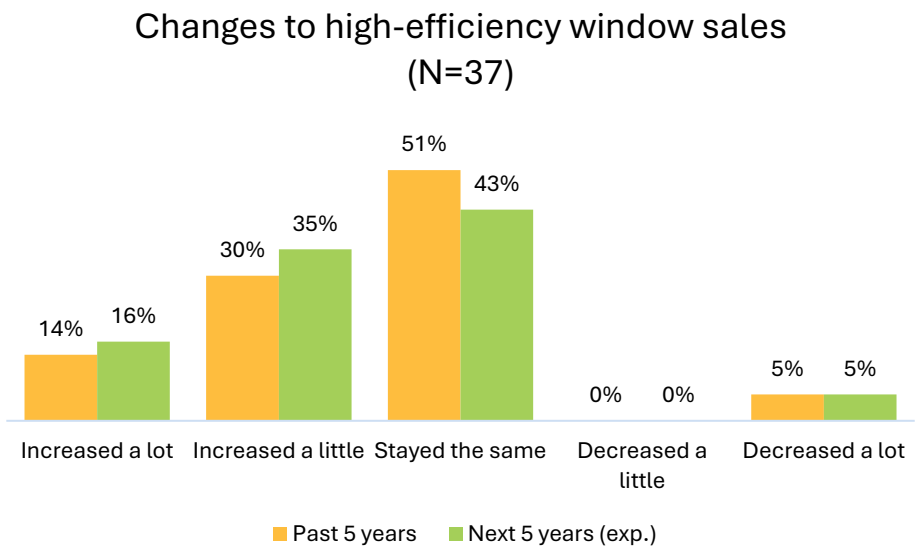
> *I can cite specific instances of competition that does it that way [pushes triple-pane because of the price margin], but they're easy to beat. If you're selling against me and you come in and try and bid that big, expensive triple-pane window with extremely high efficiency and you're selling it to a client who doesn't need it, you're gonna lose to us because we're gonna prove to them they don't need it.*
>
> *There are some companies I've come across just talking to different customers… that are telling customers that they will only offer triple-pane or they won't do the install. I feel like that's a foolish move on their end, but I'm perfectly fine with them doing it because I think they're leaving a lot of market share on the table.*

The certainty with which interviewees identified this practice happening is striking. If true, the relative consensus of contractors around which businesses engage in this activity—often calling out companies by name—suggests that pushing triple-pane windows for commission reasons may be isolated to a handful of specific companies rather than a particular segment (e.g., big box stores).

Survey insights: Contractors reported that high-efficiency window sales have stayed somewhat stagnant but are expected to increase slightly

About half of survey respondents (51%) said that high-efficiency window sales have stayed the same over the past five years, while 44% said they have seen sales increase, though most indicated sales have only increased a little (Figure 9). These proportions swapped for future projections, with just over half of contractors (51%) expecting sales to increase in the next five years compared to 43% who think they will stay the same. Only two contractors (5%) indicated a decrease in high-efficiency window sales over the past few years or in the near future.

Figure 9. Changes to high-efficiency window sales in the past 5 years vs. expected changes in the next 5 years (N=37)



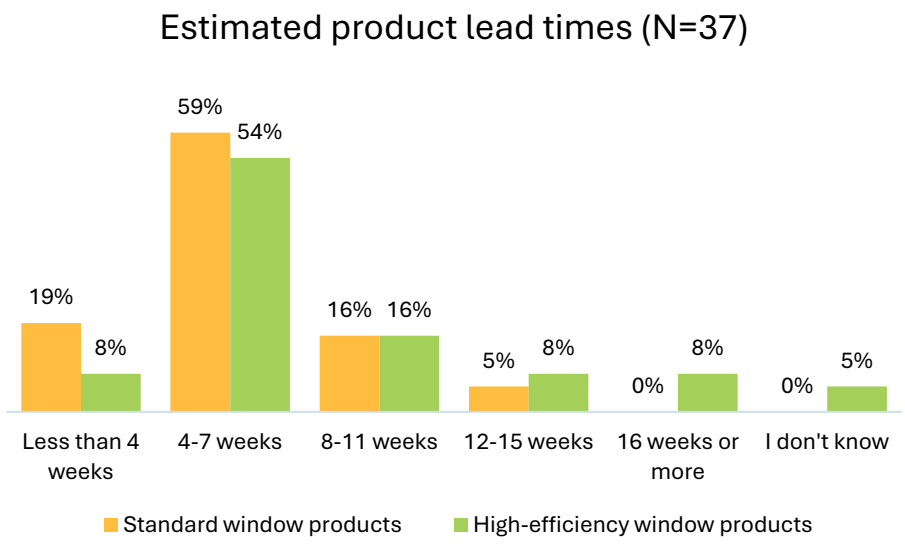
Note: Due to rounding, some percentages do not sum to 100%

Survey insights: Contractors perceived high-efficiency windows to have a slightly longer lead time and be slightly more expensive than standard windows

To get a better sense of the availability and price difference between high-efficiency and standard windows, we asked contractors to estimate the current lead time and cost for both products.

Over half of survey respondents estimated that both standard window products and high-efficiency window products are currently available within 4–7 weeks (59% vs. 54%, Figure 10). Slightly more contractors (19% vs. 8%) estimated a less than 4-week lead time for standard window products compared to high-efficiency window products. No contractor estimated the current lead time of standard window products to be more than 15 weeks, while 8% of contractors estimated the lead time of high-efficiency window products to be 16 weeks or more.

Figure 10. Estimated product lead times (N=37)



Note: Due to rounding, percentages do not sum to 100%

Survey respondents were also asked to estimate the typical product cost, excluding labor, of a standard 3' x 5' fixed/picture window compared to a high-efficiency 3' x 5' fixed/picture window. Prices for both standard and high efficiency windows varied widely, with minimum window estimates coming in at $250 and $300 respectively, while maximums were $3,000 and $3,500 respectively (Table 4).

Table 4. Estimated product cost (excluding labor) (N=25–22)

Estimated product cost (excluding labor)	Standard 3' x 5' fixed/picture window (N=25)	High-efficiency 3' x 5' fixed/picture window (N=22)
Minimum	$250	$300
Maximum	$3,000	$3,500
Average	$805	$975

While survey respondents estimated high-efficiency windows to be about $170 more expensive on average than their standard counterparts, the wide cost estimate spectrum for both products supports previous research that indicates performance is not the main driver of window cost. In fact, ENERGY STAR analysis has estimated a $50-$100 price increase for triple-pane windows, which is lower than the average price difference estimated in our study.[6] This suggests that contractors perceive high-efficiency window products to be more expensive even before factoring in additional costs such as markups or upgraded features. Another possible reason could be that added costs vary across manufacturers.

[6] ENERGY STAR. April 2024. Public presentation of "ENERGY STAR Windows, Doors, and Skylights Considerations for Minnesota."

Interview insights: Window cost variations lack transparency

Follow-up conversations were once again used to assess contractor confidence in and determination of their previous estimates. Most interviewees expressed high confidence in their cost estimates, with some saying they looked up the prices in their ordering system while others relied on experience or gut feeling.

At the same time, multiple contractors said that window costs vary depending on the material, manufacturer, and profit margin, and another added that window prices have increased across the board due to pandemic inflation. One interviewee expressed frustration at the lack of transparency behind these differences:

> *Someone just told me they got bids on getting their windows replaced and one bid was for $4,000 and one was for $24,000. It's for more than one window, but you can see where there's a spread of $20,000 and they want to know, "Why is that?" And it's just, I don't know.*

The same contractor stated that their company maintains the same price margin for standard and high-efficiency windows to incentivize customers to select the more efficient product, an approach they also use when bidding shingles:

> *That's the same thing that we do with shingles, a lot of times we won't necessarily mark up the higher-end shingles. We have a higher price point for the actual materials, but the installation [cost] is the same for us. That way we're incentivizing them to install a higher-end product from the perspective of energy efficiency and environment… [because] an upgraded shingle means they aren't gonna have to replace their roof as frequently, and those types of things are better for the environment and better for their home, and probably better for their insurance. I don't necessarily think that we need to make an extra profit off that.*

Price transparency has been a noted issue for many residential technologies, including windows. However, contractor uncertainty of the underlying drivers behind these cost variations suggests that further work is needed to separate material costs from individual markups.

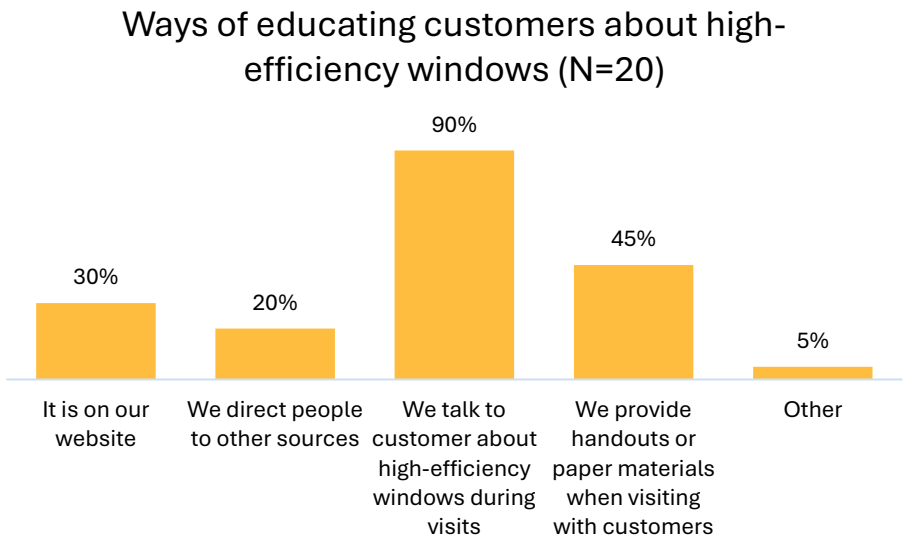
Contractor observations of customer window knowledge and benefits

To understand how high-efficiency windows are perceived by customers, we asked contractors about their bidding process, what drives homeowner window purchases, and what they see as their role in the buying process.

Survey insights: Most contractors said they educate customers about high-efficiency windows and include them in bids

Over half of survey respondents (54%) said that they currently advertise or provide education to consumers about high-efficiency windows. Of these, the majority (90%) do so by talking directly with customers during visits (Figure 11). Just under half (45%) said that they provide handouts or paper materials about high-efficiency windows when visiting with customers, and 30% said that they have information on their website. A single respondent provided a write-in response: "We tell them [customers] not to get them, they're not worth the price."

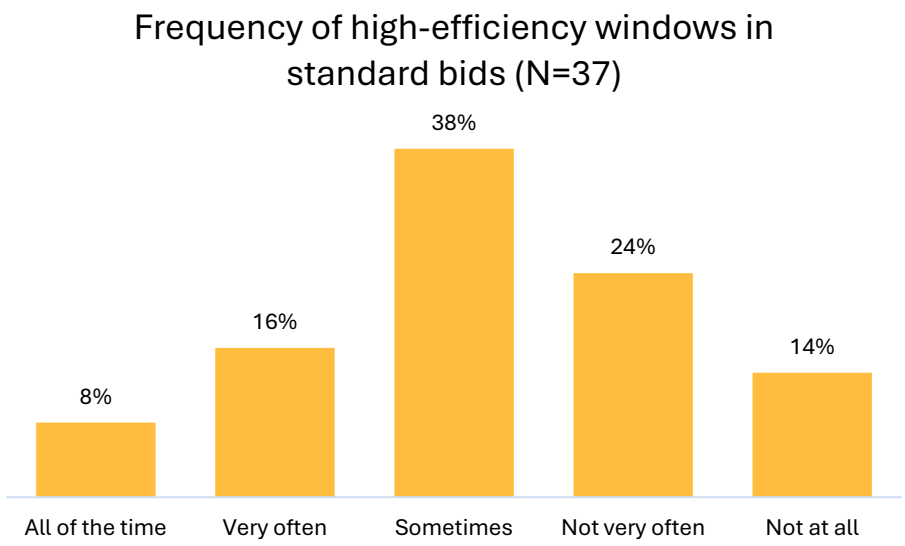
Figure 11. Ways of educating customers about high-efficiency windows (N=20)



Note: Respondents could select multiple options, so percentages do not sum to 100%

When asked how frequently they included high-efficiency windows in their standard bidding process, 38% of respondents said they sometimes include them, while the same amount said that they do not include them very often if at all (Figure 12). About a quarter of contractors (24%) said that they include high-efficiency windows in bids very often or all the time.

Figure 12. How often high-efficiency windows are included in standard bids (N=37)



Interview insights: Contractors reported that customers rarely choose high-efficiency windows after seeing the cost

A few contractors provided additional context about high-efficiency window bids during follow-up conversations. One interviewee explained that even clients who think they want high-efficiency windows often can't stomach the price:

> *[There's maybe] 1 in 1000 that's really concerned with super-duper energy efficiency, [but] once you give them the price, they run away pretty fast.*

Another interviewee added that so few customers select high-efficiency windows after receiving the estimate that it's barely worth their time to bid it:

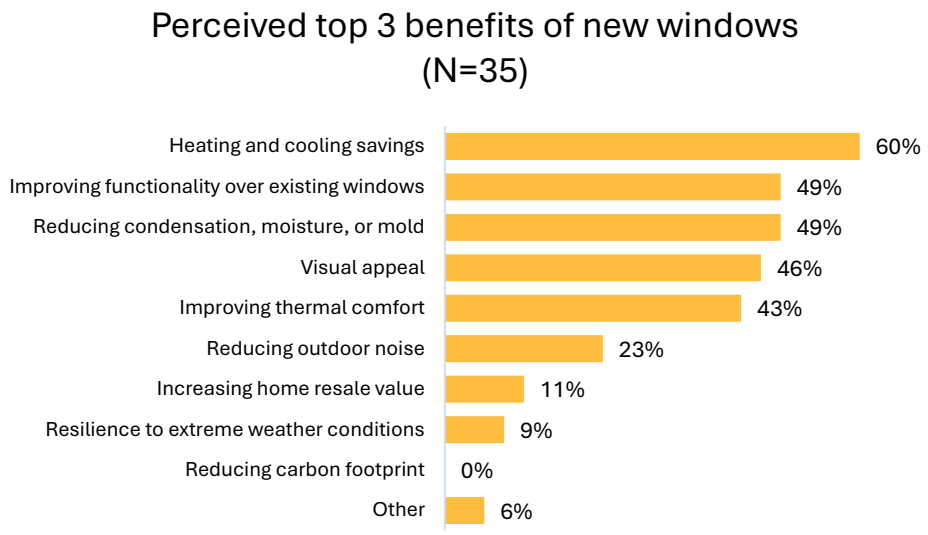
> *We price triple-pane for people, but we almost don't anymore because you price it up twenty times, maybe one person does it, [and it's] a lot of additional effort for our vendors to price it up, for our estimating staff [to] put estimates together for pretty little ROI as a business.*

Survey insights: Contractors perceived heating and cooling savings and improved functionality to be among customers' top benefits of new windows

Considering contractors' familiarity with customer decision-making, we asked survey respondents which benefits they think matter most when clients consider new windows. Notably, these benefits may not necessarily drive purchases, as other factors like cost likely play a large role in purchasing decisions.

Out of ten options, survey respondents identified heating and cooling savings (60%); improving functionality over existing windows (49%); and reducing condensation, moisture, or mold (49%) as customers' top three benefits, closely followed by visual appeal and improving thermal comfort (46% and 43%, Figure 13). Two contractors provided other write-in responses, in which one said simply "Cost" and the other said, "Ask the customer — I'm not here to sell you, I want to know what you want."

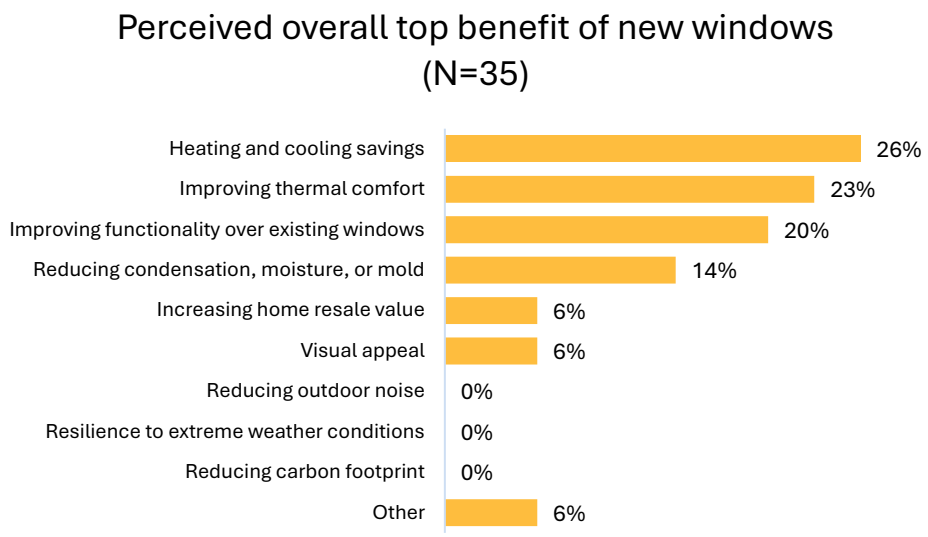
Figure 13. Perceived top 3 benefits of new windows to homeowners (N=35)



Note: Respondents could select multiple options, so percentages do not sum to 100%

Respondents were then asked to identify which of the three options they selected was most important to customers overall. Once again, heating and cooling savings emerged as the top perceived benefit, with 26% of contractors identifying it as most important (Figure 14). Improving thermal comfort, which failed to break most contractors' top three benefits, was deemed most important by 23% of contractors, ranking it second-most important.

Figure 14. Perceived overall top benefit of new windows to homeowners (N=35)



Note: Due to rounding, percentages do not sum to 100%

Interview insights: Contractors suggested that some customers care more about the immediate benefit of improved functionality compared to the long-term benefit of cost savings

Follow-up conversations with contractors presented a slightly different prioritization of window benefits. Whereas survey respondents named heating and cooling savings to be customers' top concern, interviewees suggested that functionality and operation issues are sometimes a larger influence on decision-making:

> *How they [windows] operate, where the pain points [are]… people are not always like, "Oh, my energy bill," a lot of times it's like, "I can't open my patio door or half my windows don't open and close" cause of rot, or whatever.*

In fact, nearly every contractor interviewed said that customers are most concerned about improving the functionality of their existing windows, such as addressing air leaks or drafts, fixing insulation or seal failures, and ensuring that windows open and close properly. Relatedly, three contractors said that customers are concerned with condensation or rot, with one interviewee naming panes fogging up as "the #1 complaint from customers."

Additional new window benefits mentioned by interviewees and ranked in surveys were:

- Reduced **outdoor noise**
- **Comfort**
- **Visual appeal**
- Reduced **carbon footprint**

Although follow-up conversations identified improved functionality as the largest benefit, it is important to note that this concern was still highly ranked by survey respondents. Whether a customer prioritizes functionality over savings is thus likely influenced by their individual financial situation and the severity of problems impacting their current windows.

Survey insights: Excluding cost, contractors believe customers are most concerned about the long-term durability of high-efficiency windows

Twenty-nine survey respondents provided open-ended feedback about what concerns they think customers have about high-efficiency windows specifically, excluding cost, which we know to be a main concern. Of these, 21% said that customers are concerned about the longevity or durability of high-efficiency windows, with two specifically calling out seal failures. Despite asking contractors to exclude cost from their consideration, over one-quarter of survey respondents (28%) mentioned cost anyway, with one stating matter-of-factly, "My experience is it comes down to cost and cost alone."

Other customer concerns with high-efficiency windows identified by at least two contractors included:

- The **heavier weight** in general
- **Uncertainty about the necessity or value**, especially when compared to double-pane windows
- **Aesthetic**, due to the darker tint of three glass panes
- **Supply chain issues** affecting krypton gas and lead times

Interview insights: Some contractors believe providing evidence of performance difference can ease customers' cost concerns

Like survey respondents, most interviewees believed that customers were concerned about the cost of high-efficiency windows more than anything else:

> *[I ask customers] "What are your top two priorities?" no matter what I'm selling. I say that because one of them is always money, every time. The other answer, durability, lead time, etc., that answer will change.*
>
> *They [customers] want some sort of assurance that at some point it's [the high-efficiency window] going to pay itself off because otherwise why do it? If it doesn't solve a systemic problem in the house system, they are less interested.*

However, two interviewees suggested that it was their responsibility as contractors to demonstrate that high-efficiency windows solve these problems, and by extension, that they are worth the price:

Most people are in the middle where they don't have an unlimited budget for every type of upgrade, but if you can really break it down for them to understand... you can't make guarantees, but then you're like, you know, "This is the actual savings that we think you'll have or where you'll notice a quality of life difference." That's where we can get into it.

I think in the end it just becomes a price point and how deeply are they getting into the performance improvement you get from it. For us, it's kind of like showing what the benefit could be and trying to do a better job of calculating that.

Yet, just like calculating energy savings, contractors said that providing clear proof of performance improvement remains a challenge. As one interviewee remarked, "I don't know how you'd measure that without building two houses side by side and actually doing a test sample."

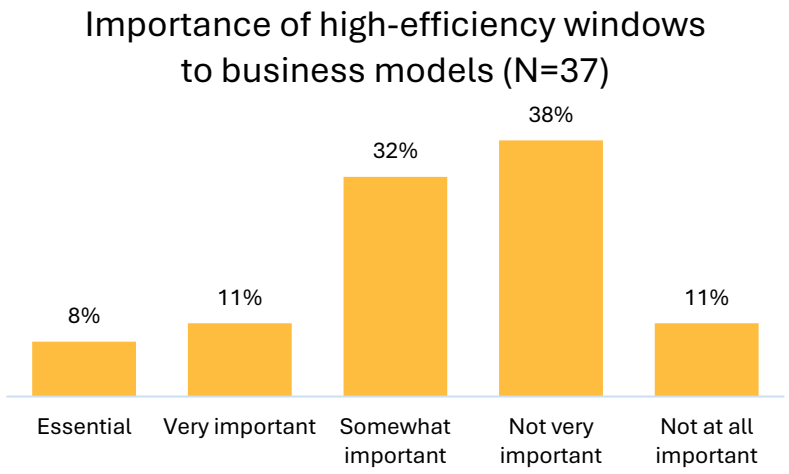
Business challenges

We also asked contractors what barriers they face in expanding their high-efficiency window business and what factors would encourage them to recommend high-efficiency products more often.

Survey insights: Contractors were mixed on the importance of high-efficiency windows to their business

When asked how important high-efficiency windows were to their business model, almost 20% of contractors said that high-efficiency windows were essential or very important (Figure 15). By comparison, more than twice as many contractors (49%) said that these windows were not very or not at all important to their business.

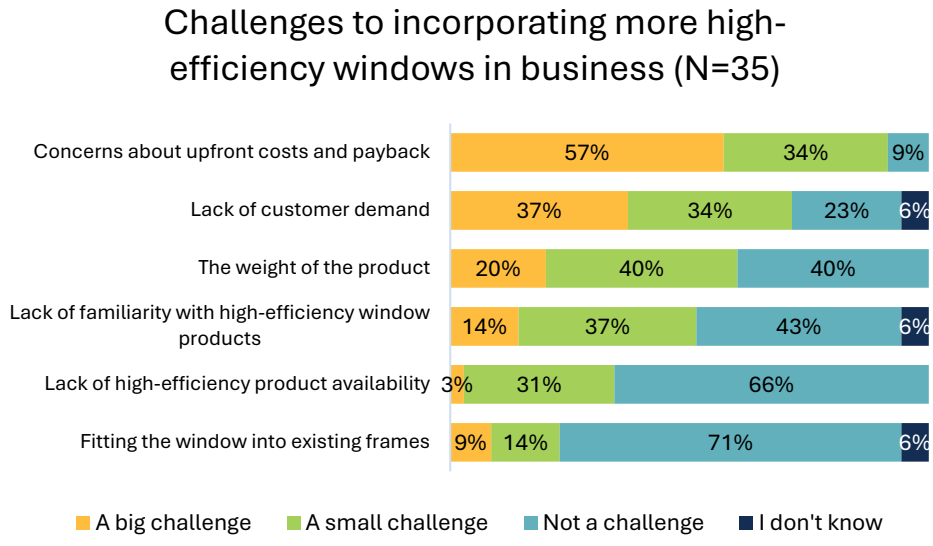
Figure 15. Importance of high-efficiency windows to business models (N=37)



Survey insights: Most contractors identified upfront cost and payback as key challenges to expanding their high-efficiency window business

We asked survey respondents what challenges they encounter when trying to incorporate more high-efficiency windows into their business. Out of six options, over 90% of contractors said concerns about upfront costs and payback were a big (57%) or small (34%) challenge (Figure 16). A little over one-third of contractors (37%) said that lack of customer demand was a big challenge, while another third (34%) said it was a small challenge.

Figure 16. Challenges to incorporating more high-efficiency windows in business (N=35)



Contractors were mixed about the difficulties weight and lack of familiarity with high-efficiency window products posed to their business, with 60% and 51% respectively considering these issues to be at least somewhat of a challenge. Lack of product availability and fitting high-efficiency windows into existing frames were considered the smallest obstacles, with 66% and 71% of contractors respectively saying these issues were not a challenge for them.

Survey insights: Contractors would install or recommend more high-efficiency windows if the financial incentives were better

Twenty-eight survey respondents provided open-ended feedback about what would make them more likely to install or recommend more high-efficiency windows.

Most contractors (68%) said that better financial incentives would make them more likely to recommend high-efficiency products. Of these, six contractors specified the need for a lower price or cost, and six others said they needed better or simpler tax credits or rebates. Another five indicated that high-efficiency windows needed to be priced more competitively or in line with double-pane windows, with one contractor explaining, "The cost of windows has increased significantly since COVID and most customers stretch their budgets to even afford basic windows."

Additional factors mentioned by two to three contractors included:

- Better **education**, such as improved sales training or marketing materials
- **Reduced weight or size**
- More **customer willingness to consider** high-efficiency products
- Stronger **manufacturer support**

Interview insights: Contractors believe that customers trust their recommendations

Given the perception of contractors as trusted home experts, interviewees were asked how much they think their recommendations influence homeowner window purchases. Many interviewees agreed that customers follow their advice, with occasional exceptions:

> *I'd say 95% of people will just kind of go with whatever you suggest as the contractor, and they defer to us as experts. The other 5%... somebody will say, "Oh, well my company does accounting work for [that manufacturer]"… so it's like a relationship that steers people into a brand. But for the most part, people are pretty deferential to what the best product is.*

However, two interviewees expressed concern at the level of trust customers place in their contractors:

I see so many homeowners that have no idea why something is being recommended to them, they're [the contractor] just like, "Trust me, I'm a contractor and I do this every day." And, you know what? There may be a great reason to trust them, but there also might be a reason not to. You don't know how much homework someone does and how much education... you may meet someone that's great at their job and you might meet someone that's full of it, you know?

Some guys probably don't know [the difference in gases], they haven't been in the business of exteriors long enough to truly understand what they're selling, they're just selling windows.

Both interviewees agreed that contractors may not be intentionally misleading or misinforming customers in these instances, but that it may be a case of "you don't know what you don't know." These responses provide support for the need to expand contractor knowledge through training and education.

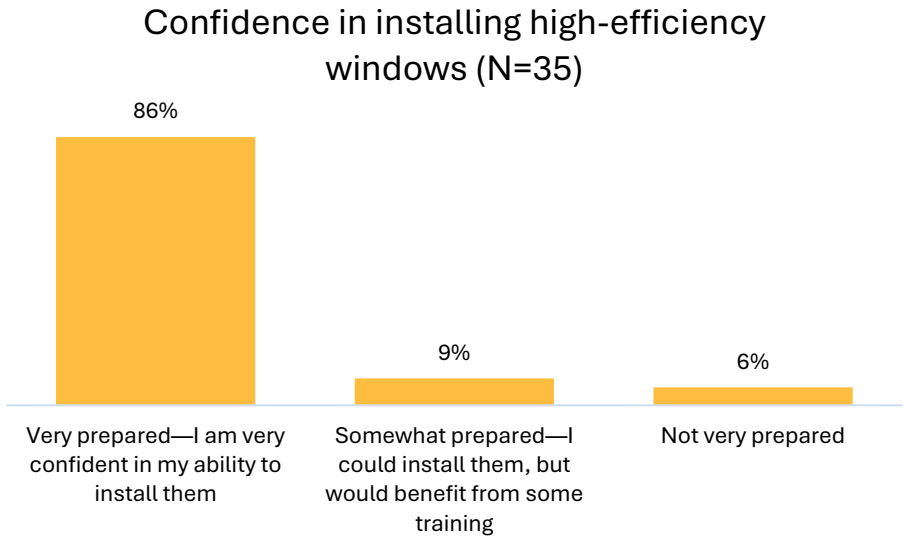
Information and training

To identify gaps in training or knowledge needs, we asked contractors what window topics or areas they were confident in, what they wanted to learn more about, and what resources would benefit them and their work.

Survey insights: Contractors were confident in their ability to install high-efficiency windows

Initially, we sought to assess current contractor confidence in installing high-efficiency windows. Eighty-six percent of survey respondents reported that they felt very prepared to install high-efficiency windows compared to only 6% who did not feel very prepared (Figure 17).

Figure 17. Contractor confidence in installing high-efficiency windows (N=35)



Note: Due to rounding, percentages do not sum to 100%

Interview insights: Contractors perceived no difference between high-efficiency window installation and standard window installation, but agreed that good installation is paramount

Window installation was a major discussion point in follow-up interviews. Six contractors maintained that installing a high-efficiency window is no different from installing a standard window:

> *Installing a triple-pane window versus a double-pane window is the same set of rules: square, straight, all that kind of stuff.*
>
> *They're [installers] gonna put a high-efficiency window in the same as they're gonna put a regular window in. There's really nothing else we can do differently unless a building manufacturer is building some crazy depth walls or something like that, but otherwise installation-wise, flashing techniques, things of that nature, they're all gonna be put in the same way.*
>
> *Whether it's [ENERGY STAR] 7.0, 6.0, 5.0… it's not different if you know what you're doing. If you know what you're doing, you're going to be fine.*

At the same time, multiple contractors expressed skepticism in other installers' capabilities, or even legitimacy. Noted two interviewees:

Let's say I have a pickup truck and a tool belt and I want to be a window installer. I can get my contractor license and I can go to any supplier, lumberyard, whatever, and I can buy windows. [But that] doesn't make me a window installer.

The problem is there's a lot of installers out there that have not a clue and they've never been to school. They may be watching YouTube videos and they became an "expert."

Contractors stressed that this questionable expertise is a growing problem across the industry, with one interviewee explaining that some builders pay installers by the piece or square foot, thus incentivizing crews to prioritize speed over accuracy. When installers don't know or don't care enough to install a window properly, attributes like efficiency ratings have less of an effect on performance. Consequently, multiple contractors suggested that the quality of an installation often matters more than the quality of the window:

You can buy the most expensive window in the business, doesn't matter who makes it, if your install is bad, you have a bad window. You can buy a good window — not necessarily the absolute best — if the install is great, you still have a really good window. So, installation is extremely important.

I mean, [if] you have an $80,000 car and the wheels aren't straight on it, it's not gonna drive, right? And it's gonna have problems. Same thing with a window in your house, [if] it's not installed right, it's not gonna operate correctly.

While building or home inspections are designed to catch install errors, it often falls on the homeowner to identify something is amiss. However, multiple contractors said that customers rarely understand what's happening or what they should be looking for during installation. One contractor recounted the aftermath of one such situation:

I had a call from a homeowner earlier this year who had all new windows on their home by someone else. And they said, "They're leaking air, they're terrible." And so we went out to look at it. They were all triple-pane ENERGY STAR 7.0-rated windows, [but] none of them were installed properly. They [the homeowner] spent large amounts of money on these windows and doors, and they had a terrible install. So, buying ENERGY STAR 7.0 means nothing unless you get an install that goes along with it to certify that window.

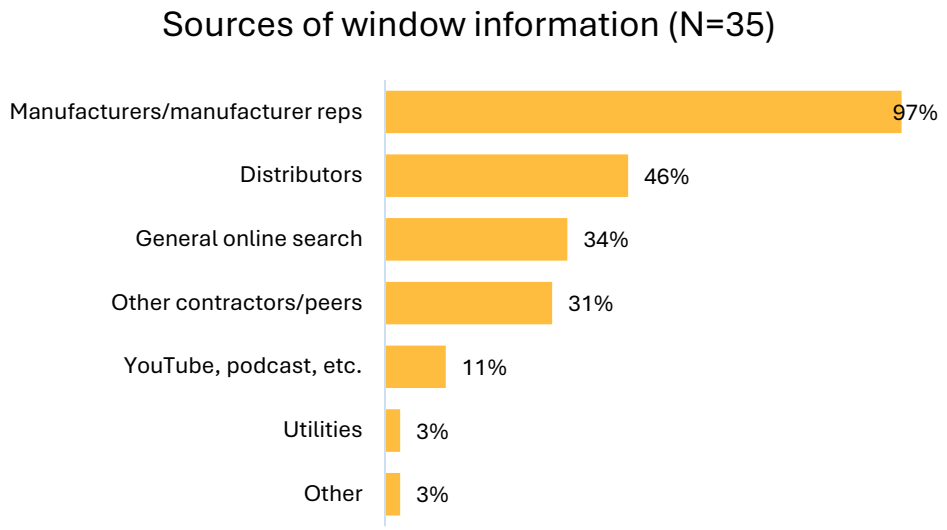
Despite these cautionary tales, all interviewees expressed confidence that the installation work being done at their own companies was top-notch, with multiple contractors noting that their installers undergo extensive training and are well-compensated for their skills. "It takes a little extra time, a little extra money," admitted one contractor, but as another explained, the investment is worth it:

Salesmen are one thing; they can sell you and close you on [an ENERGY STAR] 7.0 or whatever. But if you don't have a good installation team or crew, you got problems.

Survey insights: Nearly all contractors look to manufacturers for window information

When asked where they look for information about windows, all but one survey respondent (97%) said manufacturers or manufacturer reps (Figure 18).

Figure 18. Where contractors look for information about windows (N=35)



Note: Respondents could select multiple options, so percentages do not sum to 100%

Almost half of survey respondents (46%) said they look to distributors, and about a third each said they perform a general online search (34%) or turn to other contractors or peers (31%). Eleven percent of contractors said they use YouTube or podcast channels such as The Build Show, and one contractor said they use utilities. One contractor wrote in that they rely on "trade publications and energy efficiency/sustainable building organizations and certification authorities."

Interview insights: Contractors said that manufacturer information about high-efficiency window products is lacking

As indicated in survey responses, contractors reported strong support from manufacturers. A few contractors said they have gone on factory tours or attended manufacturer-led trainings. Two interviewees also praised their sales reps, with one specifying, "When you call him, he answers." However, another said that they have seen manufacturer support decline since the pandemic:

> *I used to have a rep that would stop in and they'd bring me a calendar, bring me a sandwich, and now it's, nope, nobody has reps anymore. When you call, you get who you get and you may email one person a concern and you'll get a reply from someone else, it's just whoever's there and they don't stop in. So, it's kind of odd but that's a window industry trend that I've followed, and it was right around the time of COVID or pre-COVID that changed.*

Additionally, about half of interviewees indicated that while manufacturers provide sufficient information about windows overall, their information on high-efficiency window products specifically is often lacking:

> *None of them [manufacturers] are pushing it [high-efficiency windows]. When we've done training with [Brand A], we don't feel like they're "pumping it up," that's not their focus at all. They offer it, if you want it you can go find it for yourself, like any other feature or thing going on they've got a sell sheet…*
>
> *They don't really push it [high-efficiency windows] with us, interestingly. We've sent guys to the [Brand A] factory and I've been to [Brand B] factory a bunch of times and they talk about it, but they don't really make a compelling case of why someone needs it in their home.*
>
> *I will tell you that [Brand A] isn't sitting there screaming, "High efficiency!" It's just a smaller part of the market. They just want the tonnage, they want the sale, and yeah, it's great to get what is probably extra profit margin going to a high-efficiency, but I don't think they're necessarily pushing it too hard.*

Other training or informational sources mentioned by interviewees included:

- **Certification programs**, such as AAMA (American Architectural Manufacturers Association)
- **Continuing education classes**, often mandated for license renewal
- **In-person or online trainings**
- **Conferences and seminars**, such as the Home Building & Remodeling Expo
- **Independent reading or online research**

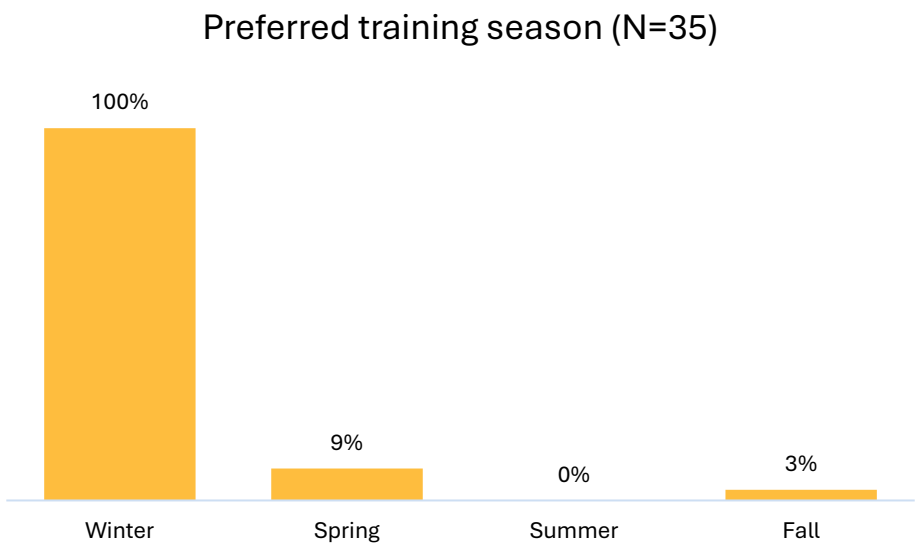
Finally, a few contractors said that they pick up general window information through experience, with one explaining, "We've been around long enough to see the good and the bad and [to] understand what's going on and how things are working."

Survey insights: All contractors preferred winter trainings, and most preferred trainings in the morning and in-person

To plan trainings effectively, we asked survey respondents about their preferred training timing and format. Out of 35 contractors, 100% said they would prefer winter training (Figure 19). Nine

percent of contractors said they would prefer spring. No contractors wanted training in summer.

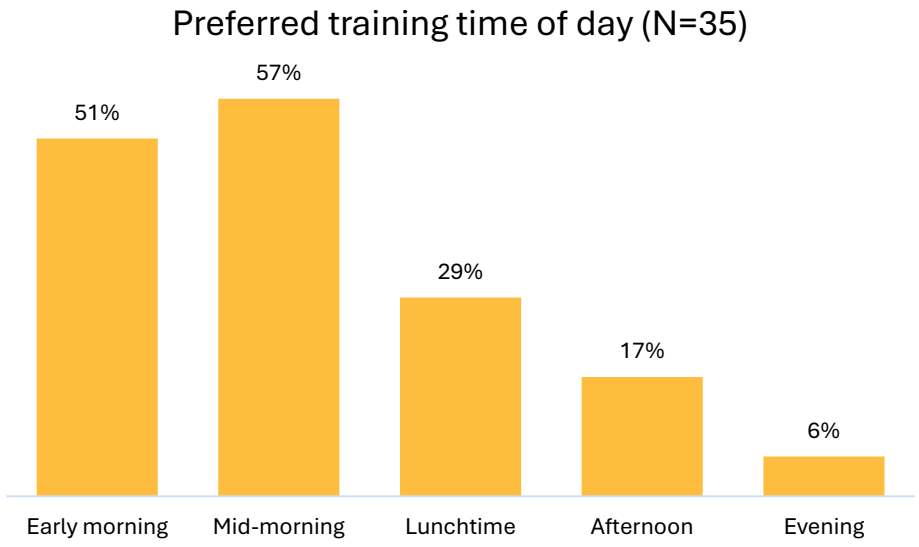
Figure 19. Preferred training season (N=35)



Note: Respondents could select multiple options, so percentages do not sum to 100%

About half of contractors preferred training in either early (51%) or mid-morning (57%), and 29% preferred lunchtime trainings (Figure 20).

Figure 20. Preferred training time of day (N=35)

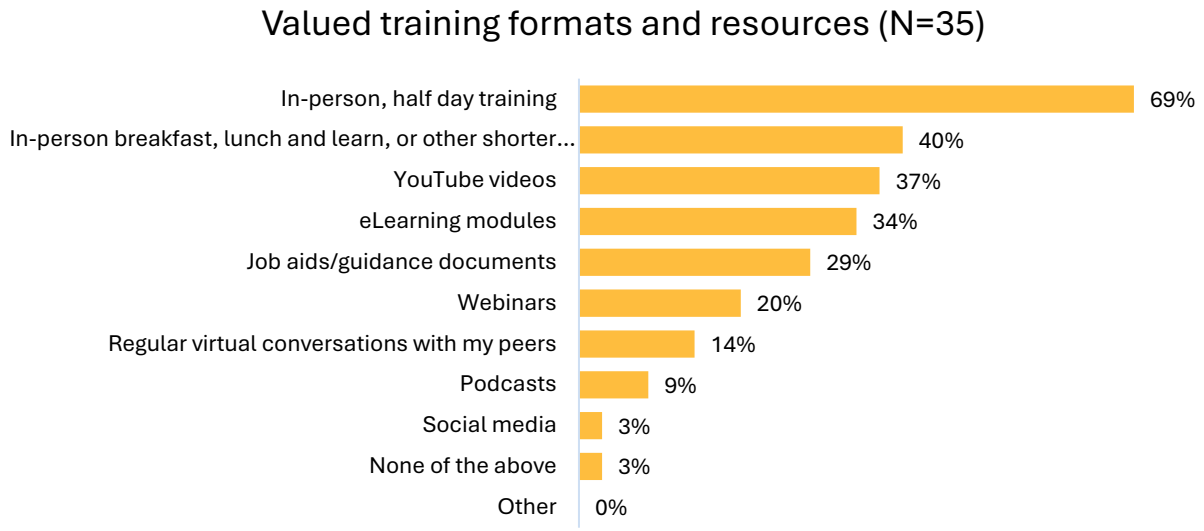


Note: Respondents could select multiple options, so percentages do not sum to 100%

Most contractors (69%) said they value in-person, half-day trainings and 40% said they value in-person breakfasts, lunch and learns, or other shorter trainings (Figure 23). About a third of contractors said they value online resources like YouTube videos (37%) or eLearning modules

(34%), and 29% said they value job aids/guidance documents. Podcasts (9%) and social media (3%) were the least popular training formats.

Figure 21. Valued training formats and resources (N=35)

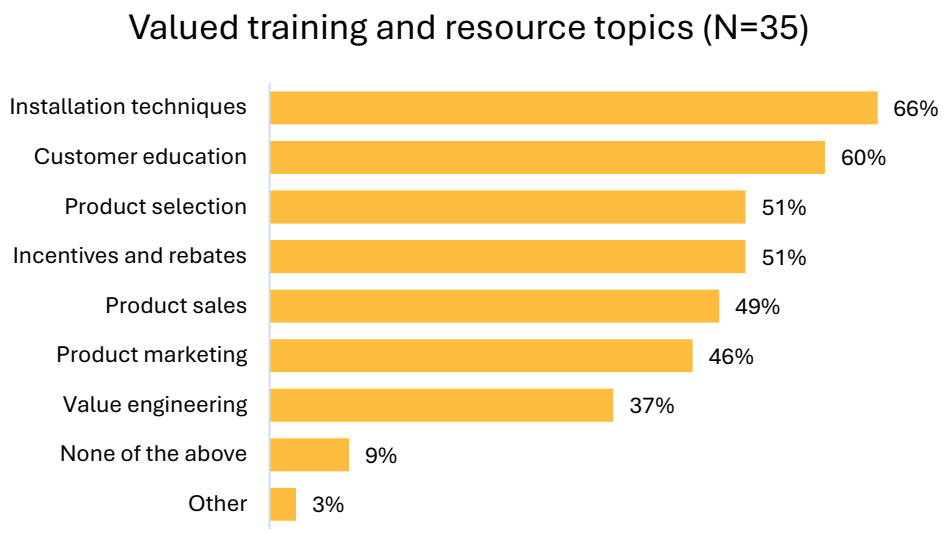


Note: Respondents could select multiple options, so percentages do not sum to 100%

Survey insights: Most contractors valued trainings and resources on installation techniques and customer education

Sixty-six percent of survey respondents said that trainings and resources on installation techniques were worth their time and energy, followed by customer education topics (60%, Figure 22). About half of contractors valued trainings on product selection (51%), incentives and rebates (51%), and product sales (49%). One contractor provided a write-in response requesting training or resources on “Unique product features that stand apart from big brands.”

Figure 22. Valued training and resource topics (N=35)



Note: Respondents could select multiple options, so percentages do not sum to 100%

Interview insights: Contractor trust in manufacturer-led trainings varied

Interviewee interest in future training and resources was somewhat mixed. Whereas survey respondents expressed a strong desire for resources on installation techniques, only two interviewees mentioned installation techniques at all, and both were hesitant to attend trainings on the topic that weren't led by manufacturers:

> *The only useful thing would be installation techniques, but we already have our code, we already have our manufacturer-related techniques and that's what we go off of.*
>
> *I just believe the people who made the window made it for a reason. They know how to install it properly to meet the requirements. They're the ones that should show my guys how to do it.*

Interestingly, while these two contractors trusted manufacturer-led trainings more, three other contractors appeared to trust them *less*, explaining that manufacturer support often comes with "strings attached":

> *Window manufacturers, their goal is to train you to sell more windows. So of course they're going to be the largest provider of training, and of course they'll be biased to their own products when they do that.*

Two contractors made knowledge-related requests. Of these, one requested deep or technical information on topics like solar heat gain, adding, "It's been a long time since I've worked on windows at that level where I used to know it, and I think I've forgotten some of that stuff a little bit." Another contractor hinted at similar uncertainty with where or how to find information:

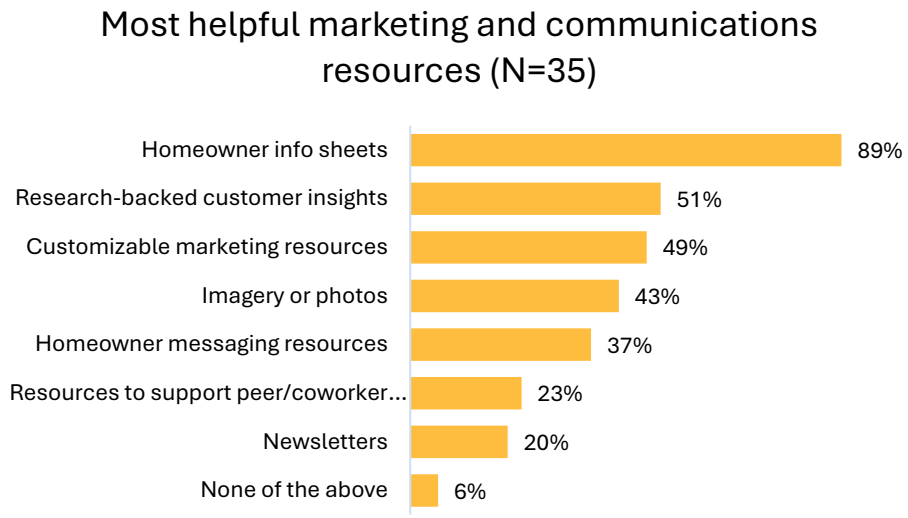
> *I struggle with education and knowing who to ask the question to. When weird things come up, I never know who to ask, I don't even know how I get this answer.*

Finally, one contractor requested more public awareness for high-efficiency windows, saying, "If there were more marketing campaigns around triple-pane glass in houses, I think people might pay a little bit more attention to it."

Survey insights: The vast majority of contractors said homeowner info sheets on high-efficiency windows would be useful

Contractors were also asked what types of marketing or communications resources would be most helpful to them. Eighty-nine percent of survey respondents said they would like homeowner info sheets that showcased high-efficiency windows (Figure 23). About half of contractors said they would value research-backed customer insights that were passed off to them (51%) and marketing resources that they could customize and publish (49%).

Figure 23. Most helpful marketing and communications resources (N=35)



Note: Respondents could select multiple options, so percentages do not sum to 100%

Interview insights: Some contractors would appreciate homeowner resources from neutral third parties

Similar marketing and communications needs emerged in interviews. Three contractors expressed a desire for materials that could be shared with customers:

> *I think handouts for anything would be nice, because we have to basically print all of our own. Any sort of brochure, fliers, anything like that… we can get resources or information from all our vendors, but we very rarely ever get customer handouts.*

When asked to provide more specifics, one contractor noted a need for section details and a preference for one-pagers over multi-page brochures, as the latter "makes you look dumb [when you can't find] where your information is." Another contractor wished that customer materials would balance technical details and broad overviews more effectively:

> *Sometimes they [manufacturers] have these sales flyers that are really dumbed down. They're just like, "Buy a higher efficiency window!" but they don't give enough [detail]. Then you have installation specs that are more like something someone selling the product would get, that has a ton of detail and that's maybe a bit overwhelming. I would rather see something in the middle, [for] a client that's curious and maybe wants to learn a little more bit more… and understand how this fits with a whole home approach.*

Finally, three contractors said they would appreciate resources from third parties like CEE or the National Fenestration Rating Council (NFRC), who they trust to be impartial:

> *I would love stuff from a neutral third party because every manufacturer is going to say why they're the best. [I want something that says,] "Here's how you evaluate."*
>
> *If somebody like CEE did educational materials it would have more weight than the manufacturers of the window because there's an inherent bias or slight distrust [in manufacturer-produced materials] because it's like, "How much of this is sales?" Versus like a third party such as yourself that's maybe working to educate the public. Certainly you have a viewpoint, but I think it would be taken and received differently by the homeowners.*

Despite being skeptical of third party-produced contractor information like install techniques, interviewees appeared to have no qualms trusting third parties for homeowner information. Given this finding, it may be worthwhile prioritizing homeowner resources.

Conclusions and Future Considerations

In its entirety, this research highlights several challenges and opportunities facing the high-efficiency window market. Five overarching conclusions and three future considerations are provided.

Conclusions

1. **Contractors are skeptical of the need for high-efficiency windows.** The majority of contractors in this research had at least some experience with high-efficiency windows, and most had favorable opinions of traditional triple-pane and vacuum insulated glass technologies. However, data also showed that 90% of contractors believe double-pane windows sufficiently meet most customers' needs. Multiple interviewees explained this finding by saying that most window problems could be solved with better product installation.
2. **Contractors are concerned about the cost and longevity of high-efficiency windows.** This research revealed that contractors have strong reservations about high-efficiency windows' upfront cost and long payback. Relatedly, data suggested that some contractors do not believe that the energy savings offered by high-efficiency windows are worth the price point, or even that their initial investment can be recovered. Contractors also expressed concern about the weight of triple-pane windows, which they perceived to reduce long-term durability.
3. **Contractors report higher than expected average sales estimates and product costs.** Contractors in this study indicated that high-efficiency window sales are still much lower than standard window sales, however, their average high-efficiency window sales estimates were higher than expected, both for their own companies and the MN market overall. This could be in part due to respondents representing smaller entities. Additionally, while ENERGY STAR reports indicate high-efficiency windows are marginally more expensive than standard windows, respondents perceived an average price differential that was considerably higher than the rate found in ENERGY STAR.
4. **Contractors are hesitant to recommend or bid high-efficiency windows unless requested by the customer.** This research maintained that high-efficiency windows are most popular with niche clientele, such as those interested in sound proofing, luxury features, or top-tier efficiency. While most contractors said they include high-efficiency windows in standard bids at least sometimes, a few reported that customers rarely select these windows after seeing the price. Consequently, most contractors said they guide customers toward standard windows unless explicitly directed otherwise.
5. **All contractors prefer winter trainings, and nearly all contractors look to manufacturers for residential window training and information.** Almost all contractors in this research relied on manufacturers for training and information about residential windows. Although most contractors said they trust and are satisfied with the manufacturer support they receive, many identified a lack of information about high-efficiency window products.

Future considerations

Given the above findings, the following areas have been identified for future thought or exploration.

1. **Support existing and new efforts to expand contractor knowledge of high-efficiency window technologies.** This research indicated potential gaps in contractor knowledge of high-efficiency windows, particularly related to the technology's incremental costs and savings, durability, and moisture control capabilities. Promoting educational trainings led by information sources that contractors already trust, such as manufacturers, may help fill these knowledge gaps in the short-term, while identifying and suggesting new sources of information may introduce contractors to fresh perspectives about high-efficiency windows in the long-term.
2. **Provide contractors with a robust communication toolkit for discussing high-efficiency windows with homeowners.** This research suggested limited contractor willingness to discuss high-efficiency windows with homeowners. Ensuring contractors have the most up-to-date talking points may better prepare them to answer customer questions and encourage them to recommend the technology to a broader client base. Homeowner info sheets and third-party marketing materials could be one way to build contractor confidence in discussing the value proposition of high-efficiency windows with customers and increase customer awareness.
3. **Explore contractor concerns with high-efficiency windows.** This research revealed contractors are concerned about the weight and longevity of high-efficiency windows, as well as their reported payback over time. Additional investigation into these apprehensions via pilot studies, case studies, or modelling efforts could help identify the source of these concerns and point to means of address. Furthermore, because the contractors who participated in this research generally represented smaller companies in the metro area who primarily worked on retrofit or replacement projects, additional discussion with more market actors could help shed light on other important perspectives.

Appendix A. Detailed Methodology

Contractor survey

The contractor survey was conducted by CEE staff. An initial residential windows contractor contact list was created using publicly available manufacturer preferred contractor/dealer networks. All manufacturers were confirmed to operate in the state of MN, and the majority maintained an online presence that suggested they were qualified to either distribute and/or install their products. The preferred contractors identified by these manufacturers were investigated via search engine results and vetted based on criteria such as customer reviews, past projects, qualifications and/or awards earned, and availability of contact information.

This initial contractor contact list was then expanded by scraping Better Business Bureau search results for "window installers" in the cities of Bemidji, Duluth, Minneapolis, Saint Paul, Mankato, Marshall, Moorhead, Rochester, and St. Cloud. These cities were selected to balance sizing and geographic spread across the state. Initial web scraping resulted in 1,645 contacts. Removing duplicates between lists and verifying relevancy (e.g., located in MN, install windows, still in business) resulted in 483 contacts (481 with an available phone number, 330 with an available email).

The survey was first sent to all 330 contacts with a listed email; 34 of these emails were undeliverable. After two rounds of follow-up, phone calls were made to 78 contractors whose emails had either bounced back or who had no available email but did have a valid website; 9 of these phone numbers were disconnected or wrong numbers. All contractors who completed the survey were offered a $50 gift card through Tango, an online gift card provider that permitted respondents to select a $50 voucher to a store of their choosing.

In total, 399 windows contractors were contacted, and 39 surveys were partially or fully completed. This gave us an overall response rate of 10%.

Contractor interviews

Contractor interviews were conducted by CEE staff. In the previous survey, 18 contractors indicated a willingness to participate in a follow-up conversation about their responses. Emails were sent to all 18 contractors inviting them to participate in a 30-minute interview on Teams or via phone. After one round of follow-up, phone calls were made to 14 contractors who had not scheduled interviews but had phone numbers available. All contractors who participated in an interview were offered an additional $50 gift card through Tango.

Eight full interviews of 20–60+ minutes were conducted with nine contractors (two contractors from the same company participated in a single interview) via Teams or phone. An additional two partial interviews were conducted with contractors who expressed interest in talking but had time constraints that precluded them from participating in an in-depth interview. These conversations were less than 10 minutes.

In total, 18 windows contractors were contacted, and 10 interviews were partially or fully completed. This gave us an overall response rate of 56