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Manufactured Homes Market Diffusion Evaluation Report

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Executive Summary

This report presents findings from a Market Diffusion Evaluation of the Northwest Energy Efficiency Alliance's (NEEA) Manufactured Homes program. The program, which is no longer active in the market, worked to encourage uptake of an above-ENERGY STAR® efficiency standard in the manufactured homes market (the Northwest Energy Efficient Manufactured Housing (NEEM) Program's NEEM+ homes designation). In doing so, NEEA also anticipated that the program would increase uptake of lower-tier, NEEM 1.1 homes, which are largely equivalent to the ENERGY STAR Version 2.0 (V2) specification. The evaluation addressed two key research objectives:

- Review the assumptions underlying NEEA's natural market baseline forecast for NEEM 1.1 homes in light of changes to the standard and specification landscape for manufactured homes.
- Assess the program against its Diffusion Indicators, which track the availability of meaningful efficiency specifications to differentiate efficient manufactured homes and the viability of those specifications to continue influencing the market without NEEA's direct support.

To address these research objectives, Apex Analytics reviewed key documents related to specification and standard changes and analyzed market data including data on homes certified to meet various voluntary specifications in the Northwest (Idaho, Montana, Oregon, and Washington) between 2021 and 2025, as well as data from the U.S. Census Bureau's Manufactured Housing Survey, which provides state-level market size estimates. Apex also gathered background information from NEEA staff during semi-structured working sessions and conducted in-depth interviews with seven market stakeholders, including four manufacturers and one representative each from Northwest Energy Works, the American Council for an Energy Efficient Economy (ACEEE), and the National Association of State Energy Offices (NASEO).

Key Findings

Market share of NEEM 1.1 homes grew from 2023 to 2025, largely driven by tax credits. Market share of NEEM 1.1 homes increased from 54% in 2023 to 68% in both 2024 and 2025. Market stakeholders reported that this growth was driven by Inflation Reduction Act (IRA) tax credits incentivizing manufacturers to produce efficient homes that were available between

January 2023 and June 2026. For example, one large manufacturer increased production of Zero Energy Ready Homes (ZERH), which qualified for larger tax credits than homes meeting the baseline ENERGY STAR specification.

The recent increase in NEEM 1.1 market share is not likely to be sustained once tax credits expire. Market stakeholders predicted that market share of qualified homes would fall once tax credits were no longer available. Without tax credits to incentivize efficient construction, manufacturers will pass the cost of efficiency improvements on to consumers as an upgrade option when they purchase a home. Manufacturers predicted that few home buyers would select efficient homes when doing so required an active choice that adds cost, rather than efficiency improvements being part of the default offering. Manufacturers anticipated that competition and price pressure could lead them to reduce the efficiency of their standard offerings.

The 2022 federal standard, the compliance date of which has been delayed indefinitely, has had limited impact on building practices in the Northwest, and market stakeholders do not expect regulatory action in the near future. Interviewed manufacturers reported that, due to the region's history of manufactured home efficiency efforts, compliance with the 2022 federal standard would have required relatively minor changes to their building practices. Stakeholders reported that compliance with the standard would have required more significant changes for manufacturers outside the Northwest. Despite the relatively minor nature of the changes needed, interviewed manufacturers reported they had not changed their production processes to prepare for the standard. Manufacturers and other market stakeholders did not anticipate that the 2022 federal standard would take effect or that there would be other regulatory action in support of energy efficiency in the near future.

Conclusions and Recommendations

Manufactured home builders did not make significant changes to building practices in preparation for the 2022 federal standard. The growth of qualified homes between 2023 and 2025 was largely attributable to the IRA tax credit for efficient homes, rather than any effort on manufacturers' part to prepare for the standard. Market share of qualified homes is likely to decrease once the tax credit is no longer available as the cost of efficiency upgrades falls on home buyers. Manufacturers may also increase their non-qualified home offerings in response to price pressure.

- **Recommendation: NEEA should maintain its assumption that natural market baseline market share of NEEM 1.1 homes will remain flat through the next few years.** NEEA had anticipated adjusting its natural market baseline when a new federal standard took effect (accounting for NEEA's influence on that standard). However, no new federal standard or other federal efficiency regulation is likely until at least 2030. A new federal administration that pursues efficiency regulation could take office in 2029, and it would likely take at least a year to bring any regulation into effect. Of note, a proposed shift in the federal department with authority over manufactured home efficiency regulation could further delay regulatory action.

The program's goal of establishing a meaningful efficiency specification that will drive ongoing improvement in manufactured home efficiency is at risk without further intervention. Multiple specifications currently exist in the market to differentiate energy efficient homes, but the viability of those specifications may be limited without continued program support**.** As the IRA tax credits demonstrated, financial incentives can motivate manufacturers to produce homes meeting more advanced efficiency specifications. However, manufacturers are unlikely to bear the costs of meeting and tracking these certifications if tax credits or other incentives are not available. Although manufacturers will likely continue to offer more efficient homes as an option, they will not heavily promote qualified homes.

- **Recommendation: NEEA should reengage in the manufactured homes market to ensure that meaningful efficiency specifications remain viable.** One way that NEEA could engage is through collaboration with partner organizations in the Northwest to encourage the continuation of incentive programs promoting efficient manufactured homes and to provide research and analysis that will support those programs. Incentive programs both provide manufacturers with a selling point for qualified homes and provide certification bodies with leverage to motivate manufacturers to build to more stringent standards. Ultimately, these programs strengthen the viability of the efficiency specifications they support.

Introduction

This report presents findings from a Market Diffusion evaluation of NEEA's Manufactured Homes program.

Program Background

Program History

NEEA's Manufactured Homes program works to increase adoption of manufactured homes meeting the Northwest Energy Efficient Manufactured Housing Program™ (NEEM)+ specification. The NEEM+ specification is more stringent than the ENERGY STAR® Version 2.0 (V2) specification for manufactured homes. At the time of the NEEM+ program's launch in 2016, NEEA anticipated that the ENERGY STAR V2 specification would become the basis for an updated federal efficiency standard for manufactured homes and sought to position the NEEM+ specification for adoption as a new ENERGY STAR specification when that occurred.

The Manufactured Homes program initially focused on demonstrating the feasibility of building to the NEEM+ specification, building relationships with manufacturers and taking steps to educate them about the certification and encourage them to offer qualified homes. With the initial delay in adoption for the proposed 2016 standard, the program's focus shifted from demonstrating the feasibility of NEEM+ homes to driving adoption of qualified homes. As a result, the program began working more directly with retailers, providing training and technical support for salespeople as well as marketing materials they could provide to home buyers. The program also incentivized retail sales staff to sell qualified homes during a sales challenge in 2019 and offered incentives to retailers in the following years to include qualified options as display models on their lots. The program also used print and online advertising to build consumer awareness of NEEM+ and drive visitors to the NEEM website.

NEEA's Manufactured Homes program stopped directly intervening with market actors in the Northwest (Idaho, Montana, Oregon, and Washington) in 2024, in anticipation that the 2022 federal standard would take effect, requiring all homes to meet efficiency levels similar to the NEEM 1.1 specification. NEEA further anticipated that the ENERGY STAR V3 specification would take effect, allowing for differentiation of more efficient homes. Since then, NEEA has continued to monitor the market and track relevant regulatory developments.

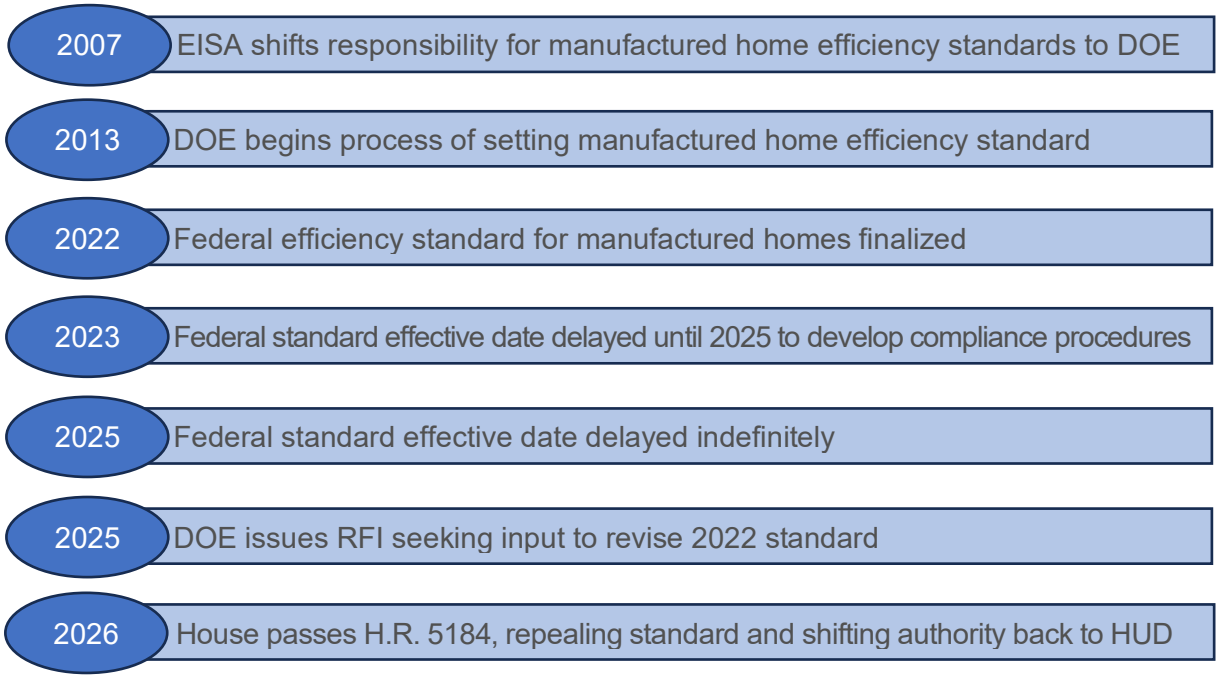
Market Context

The Energy Independence and Security Act (EISA), which became law in 2007, shifted responsibility for setting energy efficiency standards for manufactured homes from the Department of Housing and Urban Development (HUD), which had previously set manufactured home building codes, to the Department of Energy (DOE). HUD had last updated energy

efficiency requirements for manufactured homes in 1994. DOE began the process of setting a new energy efficiency standard for manufactured homes in 2013, but adoption of a new federal standard, originally expected to be finalized in 2016 or 2017, was delayed. DOE ultimately finalized the new federal standard in 2022, adopting efficiency requirements similar to the ENERGY STAR V2 specification for multi-section homes (see Appendix A for a detailed comparison table of the specifications).

In 2023, shortly before the standard was set to take effect, DOE delayed the compliance date until July 2025 to enable more time to establish compliance procedures. In July 2025, the compliance procedures were still not established, and DOE delayed the compliance date of the standard indefinitely, until those procedures are in place.[1] In September of 2025, DOE issued a Request for Information seeking input that could inform revisions to the 2022 standard.[2] In January of 2026, the House of Representatives passed H.R. 5184, the "Affordable HOMES Act," which would repeal the 2022 standard and return authority over manufactured home efficiency to HUD. At the time of this report, the Senate had not taken action on the act. Figure 1 summarizes this timeline of events.

FIGURE 1: TIMELINE OF MANUFACTURED HOMES REGULATORY ACTION



[1] https://www.federalregister.gov/documents/2025/07/02/2025-12328/energy-conservation-standards-for-manufactured-housing
[2] Federal Register :: Public Input on Energy Conservation Standards for Manufactured Housing

The EPA updated the ENERGY STAR standard for manufactured homes following finalization of the federal standard in 2022. The new, Version 3.0 (V3) specification was set to take effect at the beginning of 2026 but was delayed indefinitely as of September 2025, consistent with the delay to the federal standard.[3] The ENERGY STAR V3 specification sets minimum building shell requirements and awards points for additional energy efficiency measures with a minimum point value required for certification. However, the minimum building shell requirements for ENERGY STAR V3 are less stringent than the NEEM+ specification requirements, and meeting NEEM+ requirements alone does not provide enough points for a home to qualify for ENERGY STAR. Rather than building shell measures, the ENERGY STAR V3 specification focuses on heat pump installation for space and water heating.

The EPA also created a Zero Energy Ready Homes (ZERH) certification (since renamed Efficient New Homes), which used the same scoring system as the ENERGY STAR V3 specification but set more stringent requirements. The Inflation Reduction Act (IRA) established federal tax credits offering manufacturers $2,500 for each ENERGY STAR home they sold and $5,000 for each home meeting the ZERH specification between January 1, 2023 and June 30, 2026.[4]

Research Objectives

This evaluation sought to address two key objectives: a reassessment of natural market baseline assumptions given the changing market landscape, and a review of the program's progress relative to its diffusion indicators that were established in 2023 in the Manufactured Homes Transition Market Progress Evaluation Report (T-MPER).[5]

Natural Market Baseline Assumption Review

NEEA assumes that the Manufactured Homes program has increased uptake of homes meeting the NEEM 1.1 specification, which is equivalent to the ENERGY STAR V2 specification. NEEA developed an estimate of the naturally occurring baseline market share for this specification based on a series of assumptions about the manufactured homes market. Apex last reviewed these assumptions in 2020 as part of Manufactured Homes MPER 1.

[3] https://www.energystar.gov/sites/default/files/2025-09/MH%20Policy%20Record%20Volume%201%202025-09-16.pdf
[4] Through 2025, manufactured homes that met the ENERGY STAR V2 specification were eligible for the tax credit. Homes acquired in 2026 were required to meet the ENERGY STAR V3 requirement. § 45L Tax Credit for Home Builders | ENERGY STAR
[5] https://neea.org/wp-content/uploads/2025/03/Manufactured-Homes-Transition-MPE-Report.pdf

The federal standard update finalized in 2022 is largely equivalent to the NEEM 1.1 efficiency level for multi-section homes, though the requirements for single-section homes are less stringent. As a result, when and if that standard takes effect, market share of NEEM 1.1 multi-section homes will increase to 100%. NEEA had anticipated that it would conduct an evaluation to assess its influence on the timing and stringency of a federal standard once one took effect and use the findings from that study to adjust its natural market baseline assumptions.

While implementation of the federal standard has been delayed indefinitely, it is important to consider whether the proposed standard has had an effect on manufacturers' building practices. If manufacturers have begun to shift their building practices in response to the 2022 standard, even though it has not come into effect, NEEA may need to adjust its baseline estimates to account for any components of those changes likely to have resulted from a standard adopted without NEEA's intervention.

Finally, other market conditions unrelated to the program may have influenced uptake of NEEM 1.1 homes in recent years. Most notably, the IRA offered manufacturers a $2,500 tax credit for each NEEM 1.1 home sold between January 1, 2023 and December 31, 2025.[6] It will be important for the baseline to reflect the likely effects of these tax credits' expiration.

Reflecting these considerations, the baseline review addressed three research questions:

- How has the market responded to the federal standard update? Have manufacturers adjusted their production practices in anticipation of the standard becoming effective, or have they continued to use existing practices?
- When would an updated federal standard likely have been adopted in the absence of program intervention, and how stringent would that standard likely have been?
- What influence have IRA tax credits or other incentives unrelated to the program had on uptake of NEEM 1.1 homes and to what extent are those effects likely to persist once the incentives are no longer available?

Diffusion Indicators Assessment

The Manufactured Homes program sought to establish an above-code energy efficiency specification that would drive increases in manufactured home efficiency in an ongoing way. As

[6] As noted above, despite homes still being able to receive an ENERGY STAR label under the V2 specification, beginning in 2026, homes were required to meet the ENERGY STAR V3 specification in order to qualify for tax credits. The tax credits themselves are set to expire on June 30, 2026.

summarized in Table 1, the program's diffusion indicators assess this objective across two components: whether the specifications are meaningful and whether the specifications are viable.

TABLE 1: MANUFACTURED HOMES PROGRAM DIFFUSION INDICATORS

Area	Indicator
Meaningful efficiency specifications	Manufacturers and retailers offer manufactured homes meeting efficiency specifications that provide whole-home energy savings of at least 10% over a market average efficiency home sold in the Northwest.
Viable Efficiency Specifications	Market share of qualified homes remains steady or increases.
	At least three manufacturers offer qualified homes.
	Qualified home sales are geographically distributed across the Northwest.

Research Approach

Apex carried out three data collection activities to address the research objectives for this study.

NEEA Staff Working Sessions

In order to build a background understanding of program activities and the market, Apex conducted two semi-structured working sessions with NEEA staff involved in the manufactured homes program. These working sessions sought to capture staff members' understanding of and perspectives on the manufactured homes market to inform future interviews and analysis. Apex conducted working sessions with:

- **Planning staff:** This working session focused on understanding NEEA's baseline assumptions for NEEM 1.1 homes, key questions planning staff had about updating those assumptions, and typical approaches to addressing temporary market disruptions like the IRA tax credits.
- **Codes and standard staff:** This working session focused on gathering NEEA staff's perspectives on the federal standard and ENERGY STAR specification update processes for manufactured homes. It also addressed NEEA's efforts to support efficiency standard updates for manufactured homes.

Document and Data Review

Apex reviewed documents related to federal standard activity for manufactured homes and the ENERGY STAR specification update. The review also included press reports and analysis from industry organizations. These documents provided a background understanding of regulatory action and efficiency specification updates related to manufactured homes.

Northwest Energy Works provided data on manufactured homes certified in the Northwest between 2021 and 2025. The data listed home efficiency classifications by both NEEM specification level (NEEM V1.1 vs. NEEM V2.0, referred to as NEEM+) and federal efficiency specification level (ENERGY STAR V2, ENERGY STAR V3, ZERH). In analyzing these data, Apex excluded any homes listed as sold outside the four Northwest states (Idaho, Montana, Oregon, and Washington) as well as any homes listed as sold into retailer inventory, rather than to a homeowner.[7]

Apex also accessed data from the U.S. Census Bureau's Manufactured Housing Survey, which provides monthly estimates of the number of new manufactured homes located in each state.[8] Because Northwest Energy Works data only included homes that had received a certification, we used Manufactured Housing Survey data to estimate the size of the full manufactured home market by year.

Market Stakeholder Interviews

Apex conducted in-depth interviews with seven stakeholders who were closely involved with the manufactured homes market. Respondents included:

- Four manufacturers serving the Northwest market
- The American Council for an Energy Efficient Economy (ACEEE)
- The National Association of State Energy Offices (NASEO)
- Northwest Energy Works

Interviews lasted between 30 minutes and one hour, and interviewers targeted questions to each respondent's areas of expertise. Apex conducted a qualitative thematic analysis of interview data.

[7] Homes sold into retailer inventory are expected to be sold to homeowners and are likely captured in the Census Bureau's Manufactured Housing Survey estimates used as the denominator for market share calculations. This may result in a slight undercount of NEEM market share in a given year.
[8] Manufactured Housing Survey (MHS)

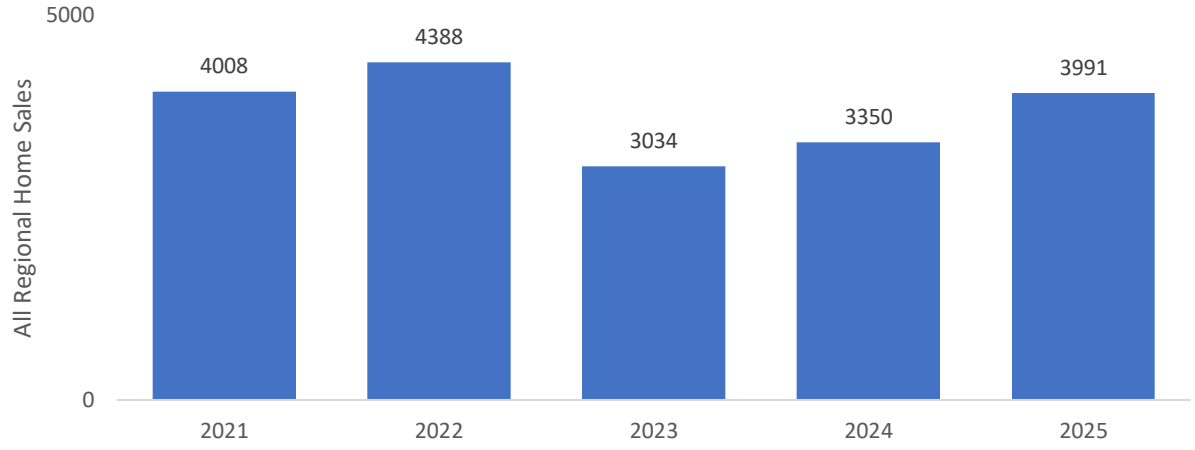
Research Findings

This section presents findings related to recent conditions in the manufactured homes market and market stakeholders' predictions for the likely trajectory of the market going forward.

Recent Market Conditions

Manufactured home sales were strong during the Covid-19 pandemic but fell in 2023 before recovering in 2024 and 2025 (Figure 2). Market stakeholders largely attributed the decrease in sales in 2023 to increases in interest rates. One manufacturer noted that, even though slight shifts in interest rates may not have a significant impact on homebuyers' payments, they can play a psychological role in people's willingness to buy. According to this manufacturer, "I think a 0.5% decline in interest rates, and we would have more business than we could build in the pandemic." Another manufacturer reported that, even though many buyers pay cash, interest rates can impact their ability to sell their existing homes. A market expert noted that, in addition to increasing interest rates, by 2023, the impact of pandemic-era factors that had driven demand for manufactured homes, like the availability of federal stimulus money and the rise of remote work, were fading.

FIGURE 2: TOTAL REGIONAL MANUFACTURED HOME SALES 2021-2025

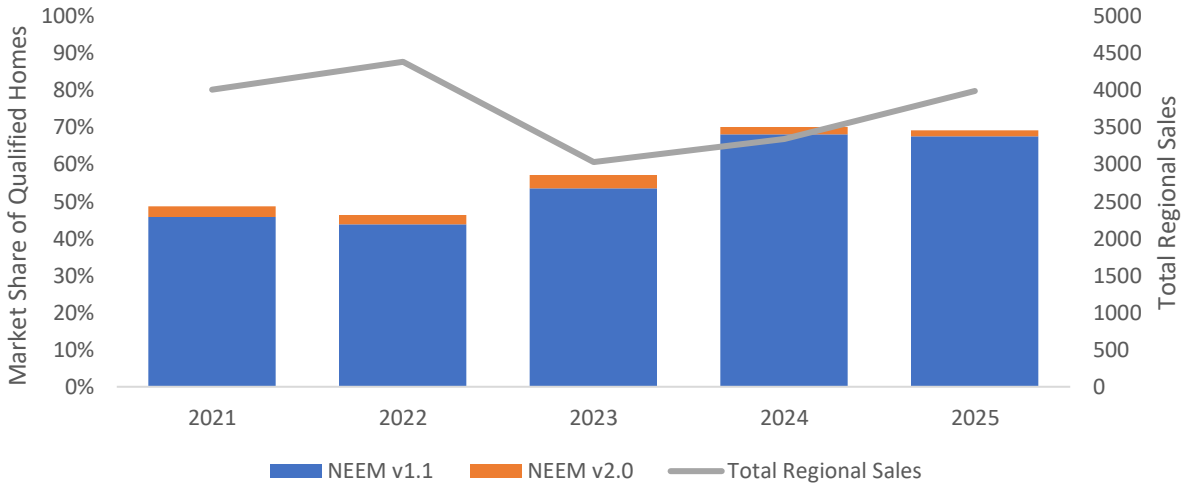


Source: U.S. Census Bureau Manufactured Housing Survey.

During the same timeframe, the total market share of NEEM-certified homes was relatively steady at just under 50% in 2021 and 2022, before growing to approximately 70% in

2024 and 2025. The share of NEEM+ homes, however, declined slightly during that time, from between 3% and 4% between 2021 and 2023 to approximately 2% in 2024 and 2025.

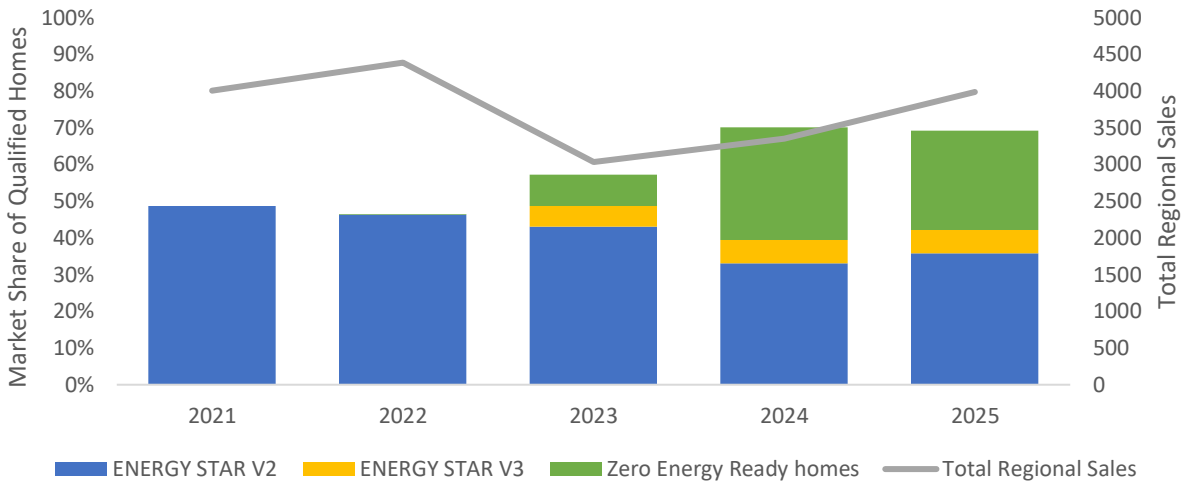
FIGURE 3: MARKET SHARE BY NEEM CERTIFICATION LEVEL 2021-2025



Source: Northwest Energy Works data and U.S. Census Bureau Manufactured Housing Survey.

Both manufactured home sales data and industry stakeholder interviews suggest that this growth in market share of efficient homes is largely a result of the IRA tax credit for energy efficient homes. As one industry stakeholder explained, the "industry went all in on [the tax credit]." As Figure 4 shows, the growth in market share of certified (NEEM and ENERGY STAR) homes was largely driven by a growth in sales of ZERH homes. One large manufacturer in particular increased production of ZERH homes in order to take advantage of the higher tax credit. This manufacturer was responsible for the growth in ZERH home production between 2023 and 2025.

FIGURE 4: MARKET SHARE BY ENERGY STAR CERTIFICATION LEVEL 2021-2025



Source: Northwest Energy Works data and U.S. Census Bureau Manufactured Housing Survey.

Market Outlook

While the IRA tax credits have driven an increase in production of qualified homes in recent years, market stakeholders do not anticipate that increase will be sustained once the tax credits expire in June 2026. Instead, market stakeholders expressed concern that market share of homes meeting the ZERH and even ENERGY STAR V2 specifications could decrease. According to one market stakeholder, with the tax credits expiring, most factories no longer have targets for production of homes meeting these efficiency specifications. Consistent with this observation, one manufacturer noted that, once the tax credits expire, they will continue to offer ZERH homes as an optional package, rather than as a default. This manufacturer expected that sales of efficient homes would decline once home buyers have to actively opt-in to a more efficient package. NEEM+ qualification was not a consideration in tax credit availability, and market share of NEEM+ homes has remained low, but relatively steady.

As discussed further below, market stakeholders primarily cited competitive price pressures as a driver of this anticipated decrease in market share of qualified homes. However, a variety of additional barriers work to compound the price pressures manufacturers face.

Price Pressures

Meeting the ZERH and ENERGY STAR V3 specifications requires installation of a heat pump, and homes must be delivered to the site before a heat pump can be installed. As a result, meeting these specifications requires manufacturers to develop systems to track heat pump

installations after a home is sold and delivered, which can be costly and inconvenient. For example, some manufacturers would split the tax credit proceeds with their retailers, selling eligible homes to the retailer at a discount on the condition that a heat pump installation be documented by a set date. If the heat pump installation was not documented, the manufacturer would "charge back" the amount of the discount to the retailer, which could create tension between manufacturers and their dealers. These requirements do not apply to NEEM+, which is based on building shell specifications. Homes can receive a NEEM+ certification before leaving the factory.

Manufacturers anticipated that home buyers would be drawn to lower-priced homes, and that competitive pressure would lead manufacturers to offer less efficient, lower-cost homes, potentially including more code-level efficiency options. As one manufacturer explained, "When [tax credits] go away, you have to take a look to see if the price pressures are enough to continue to offer [qualified homes]. Or is lowering the cost by taking things out the best way to address pricing pressures?" Similarly, another manufacturer said, "it comes down to, you have to pay this much for it. If you make people pay more, there is an elasticity to that demand that may or may not be there."

Interviewed manufacturers reported that most of their homes are built to meet NEEM 1.1 (and thus ENERGY STAR V2) and reported that they did not have immediate plans to change that approach. As one manufacturer explained, "The industry has spent the better part of 20 years selling ENERGY STAR as a peace of mind for the consumer. Our thinking is: why go away from that? Why take the product down if we don't see any evidence yet that's what consumers want?" However, this manufacturer and another anticipated that market pressure could drive them to produce lower-efficiency homes. According to the manufacturer quoted above, if competitors "go to a base insulation level to achieve a lower price point, and consumers react to that lower price point as opposed to having ENERGY STAR, we will have to answer that." Similarly, another manufacturer said, "I expect I'm not immune to price pressures at this time. There are other manufacturers that have moved. We haven't moved yet, but it's on our agenda."

Perspectives varied between interviewed manufacturers regarding the impacts of price differences on consumer demand. One manufacturer argued that the incremental cost of efficiency improvements was small relative to the total cost of the home. According to this respondent, "If a manufacturer pulls out $1,500 from the base price [of a home] to go to lower [cost] energy [measures], but what the consumer is looking at is a total package of $300,000 and above, is $299,000 going to make a difference?" In contrast, another manufacturer argued

that cost was a key driver of consumer decisions, and small cost premiums could make a difference. This respondent stated, "if you can create demand for an upgrade, that's great. If not, price becomes the dominant buying motive for both the wholesale retail customer and the home buyer. A couple thousand dollars makes a big difference all the way around."

Additional Barriers

Market stakeholders identified three additional barriers to efficiency that compound price pressures:

- The increasing influence of national, corporate owners;
- Growing sales to developers; and
- Risks to continued availability of downstream incentives.

Corporate Control

Stakeholders reported that the level of control national corporate leadership was exerting over manufactured home plants in the Northwest had increased over time. While manufactured home builders in the Northwest have operated under larger corporate umbrellas for several years,[9] market stakeholders reported that control of plants in the region had gradually shifted from the local level to the regional level and then to the national level. Manufactured housing in the Northwest has a long history with energy efficiency, and homes produced in the region tend to be more efficient than homes produced elsewhere. However, the Northwest makes up a small portion (approximately 4%) of the United States manufactured home market.[10] Respondents reported that corporate owners were increasingly pushing for conformity of processes from plant to plant and were less convinced of the value of energy efficiency than Northwest regional leadership had been.

Developer Sales

Market stakeholders reported growth in home sales both to manufactured home parks and to developers who had traditionally focused on site-built homes but were looking to manufactured homes as an option in response to labor shortages and cost increases. These developers plan to sell or rent the homes once they are sited, leading to a split incentive barrier in which the developer bears the upfront cost of the home purchase, while the resident will

[9] For example, Cavco acquired Fleetwood Homes in 2009 and Palm Harbor homes in 2011.
[10] Based on US Census Bureau Manufactured Housing Survey data: Manufactured Housing Survey (MHS)

ultimately bear the energy cost. Market stakeholders reported that these types of developers were the primary buyers of baseline-efficiency (non-ENERGY STAR) homes but expressed concern that uptake of homes built to minimum HUD code efficiency requirements could spread. According to one stakeholder, "once somebody starts losing sales to [less efficient, less expensive homes], it will find its way into the mainstream."

Threats to Downstream Incentives

Market stakeholders noted that the Regional Technical Forum (RTF) had recently adopted a high baseline market share assumption for NEEM 1.1 manufactured homes. This market share value is factored into the RTF's Unit Energy Savings estimates, reducing the energy savings available from NEEM 1.1 homes on the assumption that many homes would have been energy efficient even without program intervention, making the measure no longer cost effective. Market experts were concerned that this could lead utilities to discontinue their incentives for qualified manufactured homes. One market stakeholder explained that eligibility for utility incentives was a key selling point to help convince manufacturers to build to the NEEM specification. According to this respondent, "The story [to manufacturers] has been utility incentives, BPA [Bonneville Power Administration], Energy Trust [of Oregon] programs, home replacement. They are putting a lot of money on the table. You are not footing all of the cost of these homes." One manufacturer noted the importance of incentives in driving uptake of energy efficient homes, saying, "When there are incentives to produce energy efficient homes, they get produced. In a time like we're in right now, this market that forever has produced for ENERGY STAR is going to change. It's going to change quickly."

Efficiency Standards

Two manufacturers and one other market stakeholder reported that, given the region's historical focus on manufactured home energy efficiency, compliance with the 2022 federal standard would not have required manufacturers in the Northwest to make significant changes to their building practices. As one manufacturer stated, "Short story, for us, it was almost nothing; it was just building an ENERGY STAR V2." Another manufacturer reported that compliance would have required them to upgrade some windows, but that doing so would not have been difficult. One manufacturer expressed dissatisfaction with the standard's furnace requirements, stating that they would require too small of a furnace and did not allow for enough regional variation.

Market stakeholders noted that complying with the 2022 federal standard would require more significant, and costlier, changes for manufacturers in other parts of the country. One manufacturer noted that solar heat gain requirements for windows in warmer climates were more difficult to meet.

Despite the relatively minor changes needed to meet the requirements, manufacturers reported that they had not changed their production practices in response to the 2022 standard. As one manufacturer explained, "We're right back where we were just before the announcement of the new…standard. We've zigged and zagged and ended up at the same place. Or thought we were going to have to zig and zag, but we didn't." Similarly, another manufacturer said, "Since it was tabled, we really haven't gone back to look at it. We have the normal business challenges."

Manufacturers and other market stakeholders did not anticipate that the 2022 standard would take effect, or that there would be any other regulatory action in support of efficiency in the near future. Market stakeholders noted that the manufactured homes industry currently has strong support among policymakers and is opposed to any changes that would increase the cost of homes. According to one manufacturer, "As an industry, we have a lot of traction right now…Affordable housing is one of the few things that is bipartisan." Similarly, another market stakeholder reported that "[The industry] is galvanized against making the houses more expensive…[they are] enjoying their moment in the limelight as America's last unsubsidized affordable housing."

Some stakeholders expressed positive views of the prospect of responsibility for manufactured home efficiency reverting to HUD. One manufacturer anticipated that this could help make regulations clearer, rather than having separate building code regulations from HUD and efficiency standards from DOE. One manufacturer and one other market stakeholder anticipated that HUD might take action to strengthen efficiency regulations if it again becomes responsible, although they were uncertain about the likely timing of any changes.

Findings Assessment

This section discusses the implications of the findings listed above with regard to this study's research objectives.

NEEM 1.1 Baseline Assumptions

While the Manufactured Homes program primarily focused on fostering market adoption of NEEM+ homes, NEEA assumes that the program also influenced uptake of NEEM 1.1 homes (which are equivalent to ENERGY STAR V2). NEEA attributes this influence to three factors:

- Program marketing efforts that built awareness of manufactured home efficiency among homebuyers generally,
- Compromise effects making NEEM 1.1 homes more appealing as a mid-range option, rather than a high-end choice,
- NEEA's influence on an eventual federal efficiency standard.

NEEA developed a natural market baseline estimate that assumed, absent any intervention from NEEA and its partners (including, but not necessarily limited to, NEEA's funding stakeholders and other energy-focused organizations and agencies active in the Northwest), market share of NEEM 1.1 homes would remain flat at approximately 33% until a new federal efficiency standard took effect.[11] NEEA planned to reassess its baseline market share assumptions once a new HUD code or federal efficiency standard for manufactured homes took effect. Staff anticipated that NEEA would conduct an evaluation of its influence on the timing and stringency of a new standard at that point, and findings from that study would inform updated baseline assumptions. Given the changing regulatory environment for manufactured homes, this Market Diffusion evaluation sought to determine whether any updates to NEEA's baseline approach for NEEM 1.1 homes would be appropriate.

As stated above, manufacturers have not made significant changes to their production practices in response to the 2022 federal standard. Manufacturers also reported that it would not have been difficult to comply with federal standard requirements had they come into effect. This level of readiness reflects manufacturers' experience building NEEM 1.1 homes, which NEEA's program and its funding partners' downstream incentive programs helped to accelerate. Thus, in a baseline case, manufacturers would likely be less prepared to adapt to a federal standard.

IRA tax credits drove growth in uptake of qualified homes, but this growth is not likely to be sustained once the tax credits expire. In fact, there is risk of backsliding in efficiency levels as manufacturers look for ways to cut costs in order to maintain their profits and respond to

[11] 35% was the market share of NEEM 1.1 homes in 2018, the year before the Manufactured Homes program ramped up activities anticipated to lead to growth in sales of NEEM 1.1 homes.

competitive pressures. As a result, the tax credits do not justify adjustments to NEEA's baseline approach going forward.

NEEA's justifications for reporting savings for NEEM 1.1 homes remain valid, even though the program is no longer intervening in the market. Above ENERGY STAR specifications, like NEEM+ and ZERH, remain available. As a result, until it is adopted as a mandatory standard, NEEM 1.1 remains a mid-range choice and will continue to benefit from compromise effects.[12] The influence of NEEA's program marketing efforts has likely faded over time, but there may be some continuing effects to the extent that those efforts raised dealers' awareness of, and ability to sell, efficient homes. As a result, it remains reasonable for NEEA to continue to assume that market share of NEEM 1.1 homes that exceeds NEEA's baseline estimates are attributable to the program.

When a new standard ultimately takes effect, NEEA should assess its influence on the timing and stringency of that standard and adjust its baseline accordingly. It is reasonable to assume that a new standard would be approved at some point absent program intervention, given the length of time since any meaningful update to manufactured home efficiency requirements has taken place. However, the industry has shown itself to be resistant to standard updates and has successfully delayed update efforts for more than ten years.

Diffusion Indicators

The Manufactured Homes program's diffusion indicators focus on ensuring that an efficiency specification is available in the market to differentiate energy efficient homes. The indicators assess efficiency specifications across two dimensions:

- **Meaningful efficiency specifications:** Specifications should draw a meaningful distinction between more efficient homes and less efficient homes. The indicators define a meaningful specification as one that leads to whole-home energy savings of at least 10% in qualified homes, relative to a market average efficiency home sold in the Northwest.
- **Viable efficiency specifications:** A specification is considered viable if manufactures continue to use it to certify homes and consumers continue to reference it without ongoing support from NEEA. Viability of a specification is reflected in 1) the market share of qualified homes remaining steady or increasing, 2) multiple (at least three)

[12] In business and behavioral economics, the term "compromise effect" refers to consumers' preferences for an option presented as the middle choice between two alternatives. This is due to people's tendency to assess the value of a product in relation to alternatives, rather than independently.

manufacturers offering qualified homes, and 3) sales of qualified homes distributed across the Northwest, rather than concentrated in specific areas.

Both the diffusion indicators and this assessment are agnostic as to which specification the market adopts. This assessment considers the meaningfulness and viability of the NEEM+, ENERGY STAR V3, and ZERH specifications. While the Manufactured Homes program the NEEM+ specification, widespread adoption of any of these specifications could fulfill the program's goal of providing an above-code target to drive greater efficiency in the market.[13]

Meaningful Efficiency Specifications

Meaningful efficiency specifications exist in the market. The NEEM+, ENERGY STAR V3, and ZERH specifications provide meaningful efficiency improvements over a market average home, although a direct comparison of savings between NEEM 1.1 and the latter two specifications is difficult. Table 2 compares requirements across key building elements for each specification. Appendix A provides a more detailed comparison table.

TABLE 2: COMPARISON OF EFFICIENCY SPECIFICATIONS FOR MULTI-SECTION HOMES ACROSS KEY MEASURES

Building Element	NEEM V1.1	ENERGY STAR V2 (Envelope Only Package)	2022 Federal Standard	NEEM+	ENERGY STAR V3/ZERH*	
					Level	Point Value
Ceiling	R-40	R-40	R-38	R-44**	R-38	Required
Walls	R-21	R-21	R-21	R-21	R-21	Required
Floor	R-33	R-33	R-30	R-33**	R-33	Required
Windows	U-0.35	U-0.34	U-0.35	U-0.25***	U-0.30	Required
Coeff. of heat transmission	Ro=0.053	Ro=0.056	Ro=0.055	Ro=0.049	Ro=0.054/0.049	Required/4.5
Heat Pump HSPF2/SEER2	*Not Specified*	*Not Specified*	*Not Specified*	*Not Specified*	⩾7.5/14.3	17
Gas/Propane Furnace AFUE	*Not Specified*	*Not Specified*	*Not Specified*	*Not Specified*	⩾90/⩾95/⩾96	5.5/7.5/8.5
Lighting	*Not Specified*	*Not Specified*	*Not Specified*	All LED	All LED	0.5
ENERGY STAR Appliances	Dishwasher	*Not Specified*	*Not Specified*	Dishwasher, Refrigerator	Dishwasher, Refrigerator/ Clothes washer	0.5/0.5

*Required measures + 8 points needed for ENERGY STAR V3; required measures + 16 points needed for ZERH.
**Alternately, homes can qualify with R-40 ceiling insulation and R-33/52 floor insulation.
***Homes with added insulation can qualify with U-0.28 windows.

[13] A comparison of the merits of the various specifications would require engineering analysis that is outside the scope of this study and would depend on a subjective assessment of NEEA's priorities regarding different types of measures and energy savings.

As Table 2 indicates, NEEM V1.1, ENERGY STAR V2, and the 2022 Federal Standard impose roughly similar requirements for building shell measures. The NEEM+ specification requires a notable increase in ceiling insulation and window U-values relative to these requirements, requiring an approximately 10% improvement in coefficient of heat transmission (Uo). The ENERGY STAR V3 and ZERH specifications do not require as substantial improvements in insulation levels over the proposed federal standard, but they offer extra points to homes that achieve a coefficient of heat transmission equivalent to the NEEM+ requirement. These specifications also include heating system efficiency requirements that are not part of the NEEM+ requirements.

Viable Efficiency Specifications

As noted above, the Diffusion Indicators identify three elements to assess the viability of specifications to identify efficient homes.

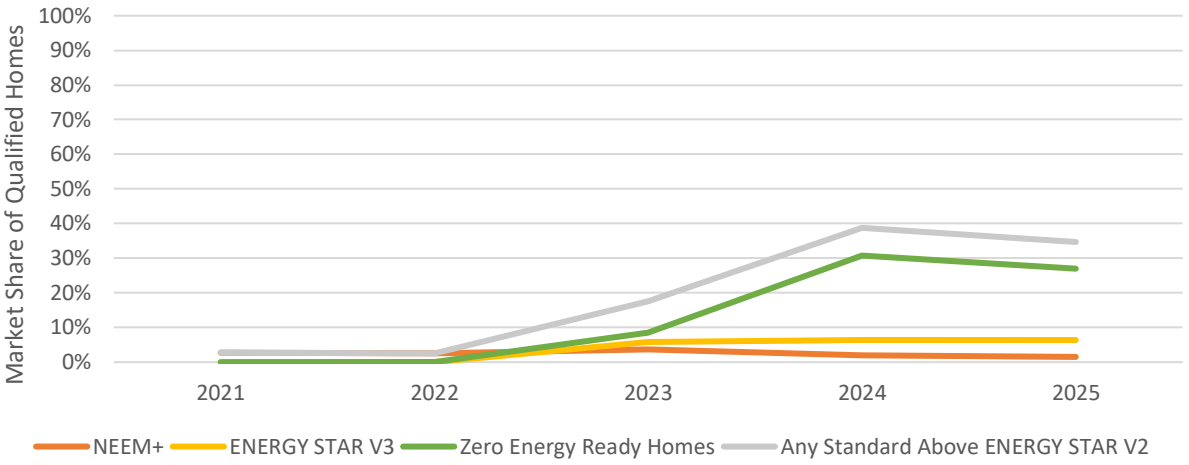
Market Share of Qualified Homes

The market share of higher-tier efficiency specifications has risen. This higher market share is unlikely to be sustained, however, once IRA tax credits are no longer available.

A steady or growing market share is a core element of a viable efficiency specification because it indicates continued or increasing engagement with the specification among home buyers and other market actors. As Figure 5 shows, recent market share growth for qualified homes has been led by homes meeting the ZERH specification. ENERGY STAR V3 and NEEM+ market shares have remained low, and NEEM+ market share has declined somewhat. As noted above, market stakeholders anticipate that ZERH market share will fall following the expiration of the IRA tax credits for qualified homes. It is not clear whether manufacturers will shift production from ZERH homes to another efficiency specification, like ENERGY STAR V3 or NEEM+. It may be unlikely as neither specification has strong recognition among consumers, and neither is eligible for widespread financial incentives.[14]

[14] The ENERGY STAR brand itself has widespread consumer recognition. However, manufacturers can continue to market ENERGY STAR V2 homes as ENERGY STAR homes, and few consumers are likely to distinguish between an ENERGY STAR V2 home and an ENERGY STAR V3 home.

FIGURE 5: MARKET SHARE OF SPECIFICATIONS EXCEEDING ENERGY STAR V2 2021-2025



Source: Northwest Energy Works data and U.S. Census Bureau Manufactured Housing Survey.

Figure 5 provides data on market share of specifications exceeding ENERGY STAR V2. The relevant Diffusion Indicator refers to specifications differentiating homes that are above average efficiency, and ENERGY STAR V2 homes make up a majority of manufactured home sales. Manufacturers are likely to continue offering ENERGY STAR V2 homes, although there is a risk that market share will decline as price competition drives manufacturers to offer more unqualified, lower-cost homes.

Availability of Qualified Homes Across Manufacturers

Multiple manufacturers offer homes meeting all specifications but ZERH. Individual manufacturers may go out of business or change their approach to offering efficient homes for a variety of reasons, which may not be related to market conditions in the Northwest. Having qualified homes available across multiple manufacturers insulates an efficiency specification from the circumstances or decisions of any one company. As Table 3 shows, at least three manufacturers offer homes meeting each examined efficiency specification with the exception of ZERH.

TABLE 3: NUMBER OF MANUFACTURERS OFFERING HOMES BY EFFICIENCY SPECIFICATION, 2025

Specification	Number of Manufacturers Offering (N=6)
NEEM V1.1/ENERGY STAR V2	5
NEEM+	3
ENERGY STAR V3	5
ZERH	1

Availability of Qualified Homes Across Geography

Sales of NEEM V1.1, ENERGY STAR V3, and ZERH homes are geographically distributed. NEEM+ home sales are concentrated in Idaho, however.

The geographic distribution of home sales meeting an efficiency specification are an indicator of how widely adopted a specification is in the market. A specification is more likely to remain viable if it is relevant across the Northwest's diverse markets. As Table 4shows, sales of NEEM+ homes were somewhat concentrated in Idaho, while market share of homes meeting other efficiency specifications was more evenly distributed across Idaho, Oregon, and Washington.[15] Market share of homes meeting all efficiency specifications in Montana lagged the other Northwest states.

TABLE 4: 2025 MARKET SHARE OF QUALIFIED HOMES BY STATE AND EFFICIENCY TIER

State	NEEM V1.1	NEEM+	ENERGY STAR V3	ZERH
Idaho	72%	5%	8%	17%
Montana	23%	1%	3%	2%
Oregon	61%	1%	7%	26%
Washington	84%	1%	6%	38%

Conclusions and Recommendations

Apex draws the following conclusions and recommendations from this research.

Manufactured home builders did not make significant changes to building practices in preparation for the indefinitely delayed 2022 federal standard. Market share of qualified homes grew between 2023 and 2025, but this growth was largely attributable to the IRA tax credit for efficient homes. One manufacturer's push to build ZERH homes, which qualified for a higher tax credit, in particular, drove market share of qualified homes. Market stakeholders suggested that this increase in share of qualified homes is not likely to persist once the tax credits are no longer available and the full cost of efficiency upgrades will fall on the home buyer. Market stakeholders do not anticipate a federal efficiency standard or updated HUD code will take effect in the near future.

- **Recommendation: NEEA should adjust its natural market baseline to assume no new federal standard or HUD code activity until at least 2030.** The earliest a federal

[15] Market stakeholders noted that one manufactured home dealer in Idaho has adopted NEEM+ as a point of differentiation from its competitors and heavily promotes the specification.

administration more supportive of efficiency regulation is likely to take office is 2029, and it is likely to take at least a year to bring a regulation into effect. If responsibility for efficiency standards reverts to HUD, where the manufactured home industry holds greater sway, federal standard activity could be further delayed. Once a new federal standard takes effect, NEEA should evaluate its influence on that standard and adjust its baseline accordingly. As long as NEEM 1.1 remains a mid-tier efficiency specification, NEEA's justification for reporting savings over its existing baseline will remain.

The program's goal of establishing a meaningful efficiency specification that will drive ongoing improvement in manufactured home efficiency is at risk without further intervention. While multiple specifications currently exist in the market to differentiate energy efficient homes, the viability of those specifications may be limited without continued efficiency program support. Qualification for the ENERGY STAR V3 and ZERH certifications requires tracking heat pump installations once a home has been sited. As a result, these specifications can be difficult and costly for manufacturers to meet. As the IRA tax credit demonstrated, sufficient incentives can motivate manufacturers to overcome these challenges, however they are unlikely to continue heavily promoting more efficient homes without incentives. The NEEM+ specification does not require tracking once a home leaves the factory, but it is not as well-known to home buyers and retailers as ENERGY STAR. While manufacturers planned to continue offering NEEM+ as an option, they did not plan to heavily promote it. NEEM+ market share has fallen since NEEA stopped actively supporting the specification, although this decline coincided with the launch of tax credits supporting ZERH certification, which may have impacted manufacturers' efforts related to their highest-efficiency homes.

- **Recommendation: NEEA should reengage in the manufactured homes market to ensure that meaningful efficiency specifications remain viable.** One way that NEEA could engage is through collaboration with utilities and other stakeholders like Northwest Energy Works, the RTF, and BPA to encourage continued programs for efficient manufactured homes and to provide research and analysis that will support those programs. Incentive programs provide manufacturers and retailers with a selling point for manufactured homes, encouraging greater production. They also provide regional certification bodies with leverage to motivate manufacturers to build to more stringent specifications rather than the bare minimum needed to achieve an ENERGY STAR certification. As a result, these programs strengthen the viability of the certifications they support in the market.

Appendix A

Detailed Specification Comparison

Building Component		NEEM V1.1	ENERGY STAR V2			2022 Federal Standard	NEEM+	ENERGY STAR V3/ZERH (Required measures + 8 points needed for ENERGY STAR V3, + 16 points needed for ZERH)	
			Envelope-Only Package	High-Efficiency Furnace Package	Electric Heat Pump Package			Level	Point Value
Insulation	Ceiling	R-40	R-40	R-38	R-33	R-38	R-44 (or R-40 with improved floor)	R-38	Required
	Walls	R-21 standard framing	R-21	R-13	R-11	R-21	R-21 Intermediate framing w/insulated headers	R-21	Required
	Floor	R-33	R-33	R-30	R-22	R-30	R-33 (or R-33/52 with R-40 ceiling)	R-33	Required
	Windows (U-factor)	U-0.35	U-0.34	U-0.35		U-0.35	U-0.25 (or U-0.28 w/ added insulation)	U-0.30	Required
	Skylights	U-0.50	*Not Specified*			U-0.55	U-0.50		
	Entry doors	U-0.19	*Not Specified*			U-0.40	U-0.19	U-0.30	Required
	Overall Average U-Value	0.053	0.056	0.065	0.074	0.055	0.049	0.054/0.049	Required/4.5
Building Tightness (ACH @ 50 Pa)		5.0 via standard NEEM measures	Not Specified			*Not Specified*	4.0 via expanded air sealing measures	*Not Specified*	*Not Specified*
HVAC	Heat Pump HSPF2/SEER2	*Not specified*	*Not Specified*	N/A	≥8.2/14	*Not Specified*	*Not Specified*	≥7.5/14.3	17
	Gas/Propane Furnace AFUE	*Not specified*	*Not Specified*	≥95	N/A	*Not Specified*	*Not Specified*	≥90/≥95/≥96	5.5/7.5/8.5
	Duct system	Mastic, 0.06 CFM50/ft3 total	Enclosed in insulation			0.04 CFM25/ft3	Mastic, 0.06 CFM50/ft3 total	*Not Specified*	*Not Specified*
	Crossover duct	R-8, elbows, tensioned straps	R-8			*Not Specified*	R-8, elbows, tensioned straps	R-8	Required
	Thermostat	Programmable	Programmable			*Not Specified*	Wi-Fi Connected "Smart"	Programmable	Required
	Whole house ventilation	32 Watts, <1 sone	*Not Specified*			*Not Specified*	17 Watts, < 1 Sone	*Not Specified*	*Not Specified*
Water Heating	Gas/Propane Water Heater UEF	*Not specified*	*Not Specified*			*Not Specified*	*Not Specified*	0.93	0.5
	Heat pump water heater UEF (with non-heat pump electric space heating)	*Not specified*	*Not Specified*			*Not Specified*	*Not Specified*	≥2.20	1.5
	Heat pump water heater UEF (with heat pump or gas space heating)	*Not specified*	*Not Specified*			*Not Specified*	*Not Specified*	≥2.20/≥3.30	7.5/9.0
	Bathroom faucets/showerheads gpm	*Not specified*	*Not Specified*			*Not Specified*	*Not Specified*	1.5/2.0	0.5
Lighting		*Not specified*	*Not Specified*			*Not Specified*	LED throughout	LED throughout	0.5
ENERGY STAR Appliances		Dishwasher	*Not Specified*			*Not Specified*	Dishwasher, Refrigerator	Dishwasher, Refrigerator / Clothes washer	0.5/0.5
Moisture Management		*Not specified*	*Not Specified*			*Not Specified*	Building wrap & door/window flashing	*Not Specified*	*Not Specified*