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Manufactured Homes Transition Market Progress Evaluation Report

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Executive Summary

This report presents findings from the Transition Market Progress Evaluation Report (T-MPER) for the Northwest Energy Efficiency Alliance's (NEEA's) Manufactured Homes program. The Manufactured Homes program has supported the Northwest Energy Efficient Manufactured Housing Program™ (NEEM)+ specification, developed by Northwest Energy Works. NEEM+ is a more stringent standard than the ENERGY STAR® Version 2 (V2) specification, which has been in effect throughout the program's history. NEEA sought to position NEEM+ as a model for an updated ENERGY STAR specification. In 2022, the Department of Energy (DOE) adopted a federal efficiency standard for manufactured homes, which is set to take effect in 2025. The Environmental Protection Agency (EPA) also adopted an updated ENERGY STAR Version 3 (V3) specification to take effect in 2026.

In the context of these market shifts, NEEA contracted with Apex Analytics (Apex) to assess the status of the NEEM+ specification in the manufactured homes market. Specifically, this T-MPER addresses four key objectives:

- Confirm that the NEEM+ specification will remain viable without NEEA's intervention.
- Summarize initiative history in a narrative that describes the program's work and achievements from its inception to present day.
- Track select market progress indicators (MPIs).
- Recommend viable approaches for conducting subsequent long-term monitoring and tracking (LTMT) efforts.

Apex carried out four key research activities to address these objectives, as summarized in Table 1.

Table 1. Data collection activities

Activity	Number of Respondents	Details
Staff interviews & document review	5	Current and former NEEA staff and Northwest Energy Works staff closely involved in program design and implementation.
Efficiency program administrator interviews	4	Efficiency program administrators in the Northwest offering end-user and/or retailer incentives for NEEM+ homes.
Manufacturer interviews	5	Manufactured home manufacturers producing NEEM+ homes and those not producing NEEM+ who were aware of the specification.
Retailer interviews	18	Manufactured home retailers, including those that sell NEEM+ and those that do not.

Key Findings

Viability of NEEM+

NEEM+ market share is currently low, but stable. Manufacturers see NEEM+ as a niche offering, appealing to customers who are either particularly concerned about energy efficiency or are siting homes in jurisdictions that require manufactured homes to meet efficiency standards similar to those of

site-built homes. Nonetheless, most manufacturers and retailers reported their NEEM+ home sales had been steady or had risen in the past two years. Manufacturers, retailers, and program sponsors were all still uncertain how the shift to the new federal standard and ENERGY STAR V3 specification might affect their NEEM+ offerings, but none had concrete plans to significantly change or discontinue their support for NEEM+ homes.

Shifts in the role of Northwest Energy Works and updated ENERGY STAR requirements could impact future NEEM program viability. Northwest Energy Works is an industry-driven collaborative that provides training and support to help manufactured home manufacturers meet efficiency specifications like ENERGY STAR and NEEM+. Northwest Energy Works is also one of two EPA-recognized Quality Assurance Providers in the country, making it eligible to certify factories to produce homes marketed as ENERGY STAR. Manufacturers value the support Northwest Energy Works provides, and program staff described it as an important driver of efficiency practices in manufactured home construction in the Northwest. Program staff were concerned, however, that the ENERGY STAR V3 specification provides less motivation for manufacturers to engage with an organization like Northwest Energy Works due to its prioritization of heat pumps, which cannot be installed in the factory. NEEA staff are working with EPA to encourage a path to ENERGY STAR V3 certification that would allow NEEM+ homes to qualify without adding heat pumps. As well as maintaining Northwest Energy Works' position in factories, interview findings suggest this path could appeal to manufacturers by providing an opportunity to offer homes that fully qualify for ENERGY STAR when they leave the factory (rather than being marketed as ENERGY STAR-ready with full certification dependent on the installation of a heat pump when the home is sited).

Market Progress Indicators

The Manufactured Homes program achieved each of the MPIs that NEEA identified as a focus for this assessment, as summarized in Table 2.

Table 2. MPI assessment

MPI	Assessment	Detail
Manufacturers are able to build to the NEEM+ specification.	Met	Three manufacturers offer NEEM+ homes. These manufacturers did not describe any significant technical challenges preventing them from continuing to build NEEM+ homes.
Incented incremental cost of NEEM+ is less than 5% over comparable homes.	Met	Retailer and manufacturer estimates of the incremental cost of NEEM+ homes ranged from $1,200 to $6,000, with higher premiums for larger homes. Retailers estimated this typically accounted for 2%–4% of the total home cost. Retailers noted that utility incentives often cover most or all of this incremental cost.
Manufactured home retailers increase sales of NEEM+ homes.	Met	Most interviewed retailers reported that their NEEM+ sales had increased (six respondents) or stayed the same (seven respondents) since 2021. Only two retailers reported decreases in NEEM+ sales. This finding likely represents an overall sales increase.
Factory trainings in NEEM+ construction are held and test homes are built.	Met	Northwest Energy Works staff continue to visit manufacturers to provide advice and help train new staff. Manufacturers reported they value the advice Northwest Energy Works provides.

Long-Term Monitoring and Tracking Approach

Diffusion Indicators are metrics that allow NEEA to track the extent to which market transformation continues to occur once a program enters LTMT and NEEA no longer actively intervenes in the market. Based on this research, Apex recommends Diffusion Indicators to support LTMT focused on two areas, as summarized in Table 3.

Table 3. Recommended Diffusion Indicators

Area	Indicator	Rationale
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.	A specification that effectively differentiates efficient homes is important in driving gains in manufactured home efficiency in the Northwest. The structures of the ENERGY STAR V3 specification and the DOE's Zero Energy Ready Homes (ZERH) specification make them difficult to compare directly against the NEEM+ specification, and market average efficiency conditions (specifically, the prevalence of manufactured homes receiving heat pumps) in the Northwest may limit the energy savings these specifications deliver. Additional research will be needed to ensure these specifications effectively differentiate efficient homes.
Viability of efficiency specifications	Market share of qualified homes remains steady or increases.	If manufacturers see sufficient demand for homes meeting a specification (as indicated by market share), they are likely to continue offering qualified options.
	At least three manufacturers offer qualified homes.	A single manufacturer could go out of business or otherwise shift away from qualified homes; with multiple manufacturers offering qualified offerings, there is less risk to the viability of the specification as a whole.
	Qualified home sales are geographically distributed.	Code requirements in some jurisdictions are a driver of NEEM+ uptake. A broader geographic distribution of sales would indicate a wider uptake of qualified homes.

Conclusions & Recommendations

Conclusion 1: The NEEM program's position in the market is stable in the near term, although the full impact of updated specifications and standards is not yet clear. NEEM+ sales appear to be stable or rising, and none of the interviewed manufacturers, retailers, or program administrators had concrete plans to alter or discontinue their support for the NEEM program. Nonetheless, all of these market actors were still in the process of adapting to a new federal standard and ENERGY STAR specification, and those changes could impact the future viability of the NEEM program.

- **Recommendation 1: NEEA should continue to monitor the manufactured home market as the new ENERGY STAR specification takes effect in 2026 and the new federal standard takes effect in 2025 to ensure NEEM+ or homes meeting other specifications that drive meaningful efficiency improvements remain available and manufacturers continue to engage with Northwest Energy Works and assess whether opportunities for further intervention arise.**

Conclusion 2: Revising the ENERGY STAR V3 specification to allow NEEM+ homes to qualify without additional major upgrades outside the factory would provide important support for the viability of the NEEM program. ENERGY STAR recognition of the quality assurance benefits that arise from Northwest Energy Works' engagement with manufacturers could both help ensure that engagement continues and increase manufacturer interest in NEEM+. Manufacturers may be drawn to the NEEM+ specification in this scenario because it would allow them to build homes that fully qualify for ENERGY STAR before leaving the factory.

- **Recommendation 2: NEEA and Northwest Energy Works should continue to work with EPA to support an update to the ENERGY STAR V3 specification that allows NEEM+ homes to qualify without installation of a heat pump.**

Conclusion 3: There is a need for additional research to determine the extent to which specifications like ENERGY STAR V3 and ZERH will drive manufactured home efficiency in the Northwest. It is difficult to directly compare the efficiency gains from ENERGY STAR V3 and ZERH, which prioritize heat pump installation, to the NEEM+ specification, which focuses on maximizing building shell efficiency. With a substantial share of manufactured homes in the Northwest potentially already receiving heat pumps, there is also risk that a heat-pump-focused specification might provide limited energy savings over the market-average efficiency homes that a homebuyer might consider as an alternative.

- **Recommendation 3: NEEA and partner organizations like the Regional Technical Forum should conduct an analysis to assess the relative energy savings between ENERGY STAR V3 and ZERH manufactured homes and NEEM+ homes and assess typical installation practices to ensure specifications effectively drive manufactured home efficiency in the Northwest.**

1 Introduction

This report presents findings from the Transition Market Progress Evaluation Report (T-MPER) for the Northwest Energy Efficiency Alliance's (NEEA's) Manufactured Homes program. NEEA contracted with Apex Analytics (Apex) to complete this evaluation.

1.1 Program Description

NEEA's Manufactured Homes program supports the adoption of manufactured homes meeting the Northwest Energy Efficient Manufactured Housing Program™ (NEEM)+ specification. To meet the NEEM+ specification, homes must meet a series of requirements designed to increase the efficiency of the building shell, as well as including smart thermostats, ENERGY STAR® appliances, and LED lighting. The NEEM+ specification is more stringent than the ENERGY STAR Version 2 (V2) specification. The market transformation goal of the program was to prepare manufacturers for pending changes in the federal standard so that NEEM-qualified homes (including ENERGY STAR V2 and NEEM+) would continue to maintain higher market shares in the Northwest than in the rest of the country once those changes took effect.

Northwest Energy Works administers the NEEM program for manufactured home manufacturers in the Northwest and maintains both the NEEM and NEEM+ specifications. Northwest Energy Works was the primary partner to carry out a variety of activities funded and guided by NEEA's Manufactured Homes program. Northwest Energy Works developed the NEEM 2.0 specification in 2014 and rebranded it as NEEM+ a few years later. The program provided training and technical support to help manufacturers develop NEEM+ offerings as well as incentives to manufacturers to offset the incremental cost of NEEM+ homes. The program provided training and marketing materials to help manufactured home retailers promote and sell NEEM+ homes and offered incentives to support retailers in purchasing NEEM+ display homes to have on their lots.

Finally, NEEA provided data and feedback to support DOE in the process of updating the federal efficiency standard for manufactured homes, which is set to take effect in 2025, and to EPA in the processes of revising the ENERGY STAR specification for manufactured homes, with the revised specification set to take effect in 2026.

Section 3 of this document provides a more comprehensive description of the program's history and activities.

1.2 Research Objectives

As a T-MPER, a key objective of this evaluation was to determine whether the NEEM program will remain viable in the Northwest without NEEA's active intervention in the market. In addition, the evaluation documented the program's progress against key market progress indicators (MPIs). NEEA defined the following specific objectives for this evaluation:

- Confirm that the NEEM program will remain viable without NEEA's intervention.
- Summarize initiative history in a narrative that describes the program's work and achievements from its inception to present day.
- Track MPIs, which include:

    - Northwest NEEM program manufacturers are able to build to the NEEM+ specification.
    - Manufactured home retailers increase sales of NEEM+ homes.
    - Incented incremental cost of NEEM+ is less than 5% over comparable Northwest manufactured homes.
    - Factory trainings in NEEM+ construction are held and test homes are built.
- Recommend viable approaches for conducting subsequent long-term monitoring and tracking (LTMT) efforts, including:
    - Develop a set of Diffusion Indicators that could be tracked to cost effectively monitor diffusion in the program's target markets over the span of many years.
    - Propose an evaluation plan to track Diffusion Indicators.

2 Research Approach

Apex carried out four primary research activities to inform this evaluation, described below.

2.1 Staff Interviews & Document Review

Apex interviewed three current NEEA staff members and one former staff member who had been closely involved in the Manufactured Homes program. These staff members included two former program managers, the acting program manager, and the manufactured homes product manager. Apex also interviewed one Northwest Energy Works staff member who had been closely involved with the NEEM+ specification development and led the program's engagement with manufactured home manufacturers and retailers.

2.2 Efficiency Program Administrator Interviews

Apex interviewed staff members from four Northwest program administrators with programs offering end-user and/or retailer incentives for NEEM+ homes. These interviews sought to understand whether program sponsors planned to continue their downstream and dealer incentives in light of the new federal standard and updated ENERGY STAR specification, and if so, how they plan to adapt their offerings. Apex worked with NEEA staff to identify program administrators to include in these interviews.

2.3 Manufacturer Interviews

Apex staff interviewed five manufactured home manufacturers: the three manufacturers who currently offer NEEM+ homes; and two non-participating manufacturers who were aware of and had considered offering NEEM+, but do not currently do so. Apex identified contacts for these interviews with help from Northwest Energy Works.

2.4 Retailer Interviews

Apex staff conducted interviews with 18 manufactured home retailers located throughout the Northwest, including retailers that sell NEEM+ homes and those that do not. Northwest Energy Works provided introductions to 10 retailers, 4 of whom were among the sample of 18 interviewed retailers. Apex recruited the majority of the remaining retailer respondents from the 47 retailers listed on the Northwest Energy Works website, with a few additional respondents from among the 585 businesses in

the Northwest listed in the Mergent Intellect business database under NAICS code 459390: Manufactured (Mobile) Home Dealers.[1]

3 Summary of Initiative History

NEEA has a long history with manufactured homes, dating to the 1990s, when NEEA first engaged with the NEEM program. The NEEM program is collectively owned by the nine manufactured home factories active in the Northwest and provides factories with quality assurance and training support and vendor and utility communication. The NEEM program's efforts have achieved a 50-60% market share for ENERGY STAR certified homes among all manufactured homes sold in the Northwest, considerably higher than the national average. The NEEM program is a self-sufficient certification program funded by the small certification charge that the manufacturers pay for each home the program administrator (Northwest Energy Works) certifies.

In 2007, the Energy Independence and Security Act (EISA) directed the Department of Energy (DOE) to set energy conservation standards for manufactured housing. Previously, the Department of Housing and Urban Development (HUD) had set building codes, including energy standards, for manufactured homes. HUD had not updated manufactured home energy codes since 1994. DOE began the process of setting energy efficiency standards for manufactured homes in 2013, with a request for information from the industry.[2]

NEEA saw the adoption of a new energy code for manufactured homes as an opportunity to push the market to achieve higher levels of energy efficiency. Anticipating that an updated federal standard would be equivalent to the then-current ENERGY STAR specification, NEEA worked with NEEM to develop a higher-tier specification for manufactured homes. This specification, called NEEM 2.0 and branded "NEEM+" in the marketplace, drew on research the Bonneville Power Administration had done in 2011 and 2012 to define a High-Performance Manufactured Homes specification and measure the associated energy savings.[3] The program sought to demonstrate the feasibility of building to the NEEM+ specification so that, once the anticipated federal efficiency standard revision took effect, NEEM+ would be positioned for adoption as an updated ENERGY STAR specification.

NEEA officially launched the Manufactured Homes program in May 2016, approximately one month before DOE published a notice of proposed rulemaking (NOPR) describing its proposed standards for manufactured homes.[4] NEEA staff and other market actors anticipated that DOE would finalize the proposed standard within a matter of months after the publication of the NOPR. However, with a change in the federal administration at the beginning of 2017, support for the standard decreased among DOE leadership, and in 2018 DOE announced that it was considering alternatives to the requirements proposed in 2016.

In roughly the same timeframe (Q1 2017), the Regional Technical Forum approved NEEM+ homes as a measure but adopted lower energy savings estimates than NEEA had anticipated due to lighting savings

[1] https://www.mergentintellect.com/

[2] June 25, 2013: https://www.regulations.gov/document/EERE-2009-BT-BC-0021-0035

[3] The NEEM 1.1 specification is the current ENERGY STAR level in the Northwest.

[4] June 17, 2016: https://www.regulations.gov/document/EERE-2009-BT-BC-0021-0140

adjustments and assumptions around the likelihood that a home would receive a heat pump within a year of being sited. Nonetheless, NEEA's utility stakeholders supported continuing the program due to its potential to serve rural and lower-income customers. As a result, NEEA shifted its focus from simply demonstrating the feasibility of constructing NEEM+ homes to building awareness and adoption of the NEEM+ specification in the market.

NEEA's initial Manufactured Homes program efforts focused on manufacturers. The program informed manufacturers about the NEEM+ specification, encouraged them to build NEEM+ homes (including offering manufacturer incentives to offset the incremental cost), and provided training and technical support to help manufacturers meet the specification. In 2018, the program undertook a short-term, auto-upgrade promotion, in which it paid the full incremental cost to upgrade all the ENERGY STAR homes in one manufacturer's queue to NEEM+ to build the manufacturer's capacity to produce NEEM+ homes.

As the program's focus shifted to driving greater adoption of NEEM+ homes, program activities increasingly targeted retailers, and ultimately, home buyers, seeking to build awareness and demand for NEEM+ homes. The program provided training and technical support to train retail salespeople about NEEM+ and its benefits as well as marketing materials they could use to inform customers about NEEM+. In 2019, to build retailer awareness and increase the number of retailers promoting NEEM+ homes, NEEA implemented a sales challenge for retailers. During the challenge, NEEA offered sales staff escalating incentives based on the number of NEEM+ homes they sold. The program also offered incentives to encourage retailers to include NEEM+ options among the display homes on their lots. Finally, the program marketed NEEM+ homes to consumers directly through print and online advertising that sought to build awareness of NEEM+ and drive visitors to the NEEM website.

Program staff noted that, in retrospect, it may have been more effective if the program had launched its retailer- and consumer-focused efforts concurrently with its manufacturer-focused efforts. Staff reported that building retailer sales capacity and consumer demand may have provided additional motivation for manufacturers to adopt the NEEM+ specification. Staff also noted that the COVID-19 pandemic hindered the program's outreach efforts by forcing it to suspend in-person visits to retailers.

In 2021, DOE resumed the process of setting efficiency standards for manufactured homes, proposing a set of standards based on the 2021 International Energy Conservation Code (IECC). In 2022, DOE finalized the new standards for manufactured homes, with the standards originally set to take effect in May 2023. Shortly before the standards took effect, however, DOE delayed the compliance date until July 2025 to allow more time to establish compliance procedures.

As NEEA had anticipated, the federal standard adopted efficiency requirements for multi-section homes that are similar to the ENERGY STAR V2 specification.[5] Building thermal envelope requirements for the ENERGY STAR V2 specification varied based on the type of heating system installed. As Figure 1 shows, the federal standard parallels the insulation requirements for the high-efficiency furnace package for ceiling and floor insulation and the envelope-only package for wall insulation.

[5] DOE adopted less stringent specifications for single-section homes in response to concerns that the standards would hinder the potential for manufactured homes to provide affordable housing.

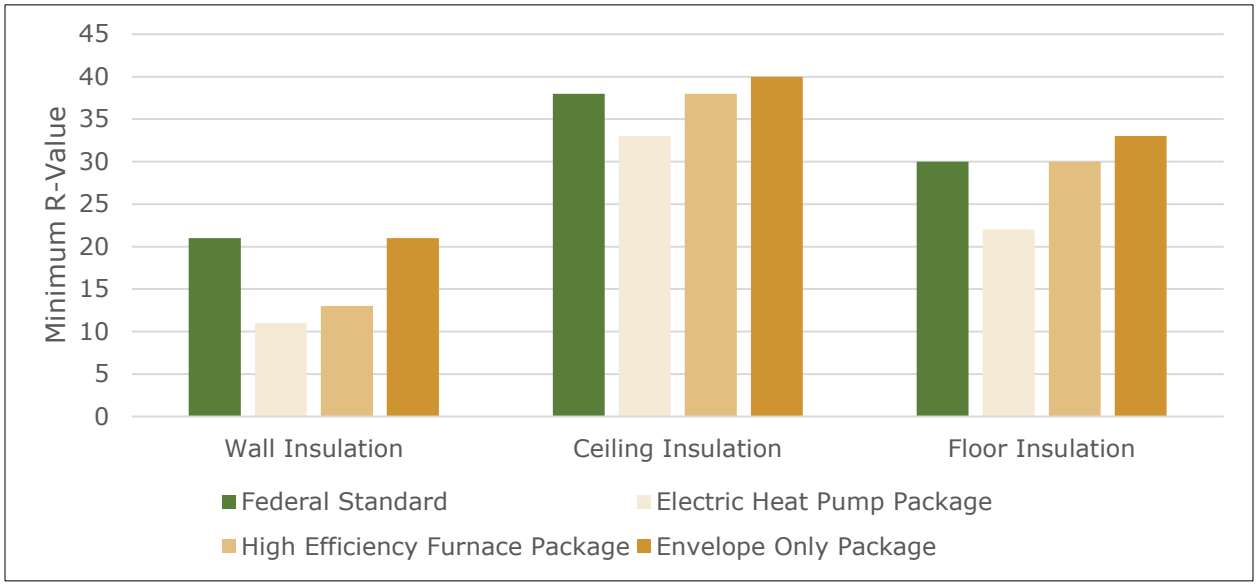

Figure 1. Comparison of insulation requirements for multi-section homes between federal standard and ENERGY STAR Version 2

The Environmental Protection Agency (EPA) updated the ENERGY STAR standard for manufactured homes based on the 2022 final rule, with homes required to meet the new (Version 3) requirements beginning in January 2026. DOE also released a Zero Energy Ready Manufactured Home (ZERMH) specification for manufactured homes in December 2022, with qualified homes eligible for tax credits under the Inflation Reduction Act.

The revised ENERGY STAR specification is based on work DOE developed for the ZERMH specification. DOE adopted an approach that awards points for different energy efficiency measures, rather than a more prescriptive path. As acknowledgement to NEEA, DOE defined a point value for homes for meeting the NEEM+ insulation value. Meeting the ENERGY STAR specification requires 10 points and DOE ZERMH specification requires 18 points. Under the point system, heat pumps receive the highest point values. This creates an unexpected challenge for the NEEM program as heat pumps are generally not factory installed. In addition, some of the value the NEEM program provides is based on the in-factory quality assurance, training, and duct testing criteria which have not been identified in the current table of points for DOE's or EPA's programs.

The ENERGY STAR V3 specification sets minimum wall and ceiling insulation values equivalent to those in the federal standard for multi-section homes, while requiring a slight increase in floor insulation levels (Table 4). NEEM+ requires a higher ceiling insulation level than the ENERGY STAR minimum requirement and more efficient windows and doors. Program staff expressed concern that this could reduce energy savings from ENERGY STAR manufactured homes in the Northwest. A substantial share of manufactured homes in the region already receive heat pumps.[6] If manufacturers rely on heat pumps to qualify for ENERGY STAR and meet only the minimum building shell requirements, homes could meet the updated ENERGY STAR specification with a less efficient building shell than the NEEM+ specification requires. This

[6] The Regional Technical Forum assumes that 40% of new, electrically heated manufactured homes will have heat pumps installed within one year of being sited.

was a concern for program staff since a large part of Northwest Energy Works' quality assurance role focuses on building shell measures.

Table 4. Comparison between federal standard and ENERGY STAR V3 minimum building shell requirements to NEEM+

Measure	Federal Standard (Multi-Section Homes)	ENERGY STAR V3 Minimum Requirement	NEEM+
Exterior Ceiling Insulation	R-38	R-38	R-44
Exterior Wall Insulation	R-21	R-21	R-21
Exterior Floor Insulation	R-30	R-33	R-33
Windows	U-0.35	U-0.3	U-0.25
Doors	U-0.4	U-0.3	U-0.19
Overall Coefficient of Heat Transmission	Uo-0.055	Uo-0.054	Uo-0.049

While NEEM+ homes meet or exceed the minimum ENERGY STAR V3 requirements for all shell measures, NEEM+ requirements alone do not provide a home with a sufficient number of points to qualify for ENERGY STAR V3. A home meeting the NEEM+ requirements for building shell measures, LED lighting, and ENERGY STAR appliances alone would earn 7.5 of the 10 points needed to qualify for ENERGY STAR or the 18 points needed to meet the ZERH requirement.[7] Program staff reported that they continue to work with EPA and DOE to seek additional points for homes meeting NEEM+ building envelope requirements and for the quality assurance and control benefits that the NEEM program provides to manufacturers in the Northwest. Ultimately, staff hope to make it possible for a NEEM+ home to qualify for ENERGY STAR without additional requirements.

4 Ongoing Viability of NEEM+

As a T-MPER, a key objective of this research was to assess the ongoing viability of the NEEM program in the market without NEEA's active support. As described below, this research indicates that the NEEM program will remain viable in the short term. The program's long-term viability will depend on aspects of the market's adaptation to the new federal standard and ENERGY STAR specification that are yet to be determined.

4.1 NEEM+ Market Share Is Currently Low but Stable

Under current market conditions, manufacturer interviews suggest that NEEM+ homes are likely to remain available but will likely maintain a relatively low market share in the near future.

4.1.1 Manufacturers and Retailers See NEEM+ as a Niche Offering

All of the interviewed NEEM+ manufacturers planned to continue their NEEM+ product offerings. Manufacturers reported there was potential that their NEEM+ offerings would need to adapt as the new federal standard and ENERGY STAR specification took effect, but none had concrete plans to change or

[7] A manufactured home receives two points for meeting all mandatory requirements. A NEEM+ home would receive an additional 4.5 points for meeting a coefficient of heat transmission (Uo) of 0.049 or less. Installing LED lighting throughout the home and an ENERGY STAR refrigerator and dishwasher, which are also NEEM+ requirements, would collectively provide one additional point.

discontinue their offerings. Manufacturers reported consulting with Northwest Energy Works as they determined how to adapt to the new standards and specifications.

Manufacturers described NEEM+ as a niche offering, appealing to customers who are particularly concerned about energy and environmental impact and those siting homes in jurisdictions with especially stringent energy codes. According to one manufacturer, “there are always customers that are looking for that next level of efficiency. As energy costs increase everywhere, a higher efficiency package is going to be marketable.” Another manufacturer estimated that 60% of their NEEM+ sales were homes being sited in jurisdictions that require manufactured homes to meet efficiency standards similar to those of site-built homes. The remaining 40% were sold on the benefits of energy efficiency.

While current NEEM+ manufacturers planned to continue offering qualified homes as an option, interview findings suggest they are unlikely to heavily promote the offering. One manufacturer reported that, given the limited demand for NEEM+ homes, they had not developed as efficient processes to build to the NEEM+ specification as they had to build to the ENERGY STAR specification. As one manufacturer described, "We’re really good at building ENERGY STAR because we build over half of our homes with ENERGY STAR. We’ve only built NEEM+ for the last few years, six to eight homes, so we’re not as good at that."

A non-participating manufacturer also suggested that limited consumer awareness of, and demand for, NEEM+ homes reduced their interest in developing NEEM+ offerings, saying, “When you’re talking about a place in the market for NEEM+, how do you make lay people understand when they shop for a home—how much time is someone really going to spend to understand the nuances of solar heat gain or solar performance of a window?”

Retailers echoed manufacturers in framing NEEM+ as a niche offering appealing to customers with a strong preference for energy conservation and environmental impact. Two retailers described how these preferences were strong enough that some NEEM+ buyers came from areas where no utility incentives were available. One of these retailers said, “The house doesn’t always go to someone who lives where the NEEM+ program is—but the customer doesn’t care, he just wants the home.” Another retailer anticipated that the preference for energy conservation motivating some NEEM+ buyers would continue to drive NEEM+ demand as new standards and specifications take effect, saying, “I don’t know—NEEM+ customers are different.”

4.1.2 Program Sponsors Plan to Continue Support for NEEM+ in the Near Term

As a result of this limited consumer awareness and the relative invisibility of the factors that differentiate a NEEM+ home from a standard home, utility programs providing downstream and midstream incentives can play an important role in driving NEEM+ uptake. Manufacturers noted that utility incentives can help increase awareness among retailer sales staff and provide them with an additional selling point for qualified homes. One retailer who reported having an increase in NEEM+ home sales since 2021 reported that incentives are “extremely important” to their sales. They stated, “It makes it easy for us to sell. A lot of the time, people aren’t able to add $5,000 to their home price. It helps offset that cost.” Incentives were significant even to some retailers who had a drop in sales; one retailer who had both decreased general homes sales and NEEM+ sales in recent years said that, in their sales process, “I do use [the rebate] as a sales tool, I tell them it’ll pay off and pay for itself.”

None of the interviewed program sponsors reported plans to alter their incentives for NEEM+ homes under current market conditions, although they acknowledged that changing market conditions could lead them to alter their approach. For example, program sponsors noted that they would reconsider their incentives for NEEM+ homes if Northwest Energy Works changed the NEEM+ specification or if manufacturers shifted away from building NEEM+ to focus on ENERGY STAR or some other specification. One program administrator also noted that changes in the federal efficiency standard for manufactured homes could reduce the amount of energy savings NEEM+ homes provide and thus impact the cost effectiveness of the measure.

4.2 Shifts in the Role of Northwest Energy Works and Updated ENERGY STAR Requirements Could Impact Future NEEM+ Viability

While NEEM+ homes are likely to remain viable (although at a low market share), under current conditions, two key factors could impact the uptake of NEEM+ in the market: changes to the role of Northwest Energy Works and shifts in ENERGY STAR requirements.

4.2.1 Northwest Energy Works Plays an Important Role in the Continued Viability of NEEM+

Northwest Energy Works developed the NEEM+ specification and plays an important role working with manufacturers to help them understand the requirements and find ways to meet them. As one NEEA staff member described, "NEEM is not a utility program; it is an industry-driven collaborative. The administrator, Northwest Energy Works is the keeper of the covenant…and they do that by doing a lot of continuous process improvement." As an EPA-recognized Quality Assurance Provider (QAP), Northwest Energy Works is positioned to continue to play a role in the manufactured home market. Factories must be certified by a QAP in order to produce homes marketed as ENERGY STAR, and Northwest Energy Works is one of two QAPs in the country.

Nonetheless, NEEA and Northwest Energy Works staff expressed concern that Northwest Energy Works' role could shift as manufacturers adapt to the new ENERGY STAR and ZERH specifications. NEEA program staff noted that Northwest Energy Works' role in the market could decline if the number of homes that manufacturers certify no longer provides enough revenue to support regular engagement with the market. An energy efficiency program administrator expressed a similar concern, noting that their program currently has a direct relationship with manufacturers that allows them to address any customer concerns. However, if the focus of efficiency specifications shifts to heat pumps, "our relationship will completely change…our only connection will be to the heat pump installer, and we'll have no connection to the factory."

Northwest Energy Works staff also expressed concern that the ENERGY STAR V3 specification's focus on heat pumps, which are not installed in the factory, could reduce their engagement with manufacturers. One staff member explained that, without specific ENERGY STAR requirements around air sealing and duct sealing, manufacturers may ask, "'Why are you making us do these things?' If these things come down, and those incentives [for homes meeting enhanced building shell requirements] are going to sunset, I lose my lever in the plant."

Despite these program staff concerns, the interviewed manufacturers reported valuing their relationships with Northwest Energy Works and wanting those relationships to continue. All of the interviewed manufacturers reported plans to continue their existing relationships with Northwest

Energy Works. Manufacturers valued the information and support they receive from Northwest Energy Works around efficiency specifications, saying:

- "[Northwest Energy Works] does a great job for us; it takes a lot of legwork off our plate."
- "They come in and audit us; [it is] very helpful. They seem to listen to what our concerns are and help us achieve where we want to go."
- "They are the go-to people for energy within our marketplace and handling the in-plant audits that we have to do…. They have the industry connections."

4.2.2 A NEEM+ Path to ENERGY STAR V3 Certification Could Increase Uptake

NEEA staff are working with EPA and DOE to seek additional points in the ENERGY STAR and ZERH scoring systems that would allow homes meeting the NEEM+ specification to qualify for ENERGY STAR V3 without requiring heat pumps. Creating this type of pathway for NEEM+ homes to qualify for ENERGY STAR V3 could overcome some of manufacturers' key concerns about the specification, which focus on the high value the specification places on heat pump installation. Because heat pumps must be installed onsite, manufacturers will not be able to build homes that fully meet the ENERGY STAR specification when they leave the factory. Instead, manufacturers will have to market homes as "ENERGY STAR ready." As one manufacturer explained, "that means I cannot build an ENERGY STAR rated house any longer. Now, I can still do insulation and U-value windows and higher efficiency furnaces and all the other things. But that piece changes the marketability of that rating."

Manufacturers and retailers were also concerned about the added cost of installing a heat pump, particularly for customers who otherwise would not install air conditioning, the logistics of obtaining and installing the equipment once the home is sited, and contractor availability for installation. One manufacturer reported that they had partnered with a heat pump manufacturer and were considering ways to ship a heat pump with the home. However, they were concerned that it would be difficult for homebuyers to find an HVAC contractor willing to install the equipment, since contractors may earn greater profit on the sale of the equipment than the installation. Some retailers reported partnering with HVAC contractors to install heat pumps, although most demonstrated little awareness of ENERGY STAR V3 requirements. One retailer further expressed concern that climate or elevation differences or other characteristics of the home's site would make it impossible to offer heat pumps on a large scale.

Northwest Energy Works is also working to develop processes to support and verify heat pump installations. This could include identifying HVAC contractors to perform installations and providing a QR code that an HVAC contractor could scan following a heat pump installation to verify that the installation was complete and the home met ENERGY STAR V3 or ZERH requirements. Northwest Energy Works could then provide field verification of those installations as needed.

5 Market Progress Indicator Assessment

5.1.1 Manufacturers Are Able to Build to the NEEM+ Specification

Three manufacturers offer homes built to the NEEM+ specification. These manufacturers did not describe any significant challenges preventing them from continuing to build NEEM+ homes. Manufacturers noted, however, that their processes for building NEEM+ homes were less streamlined than their processes for building ENERGY STAR V2 homes due to the lower volume of NEEM+ homes.

One non-participating manufacturer noted two potential challenges to NEEM+ construction, which largely paralleled those identified in the Manufactured Homes program's first MPER. First, this manufacturer noted that there may not be enough room for the amount of batt insulation needed to meet the specification's floor insulation requirements, potentially leading the flooring to compress the insulation and causing floors to squeak. Second, the manufacturer reported that obtaining windows that meet the specification had been a challenge since they were not available through the national supplier from which their company buys in bulk. This manufacturer noted that they had obtained upgraded windows through their national supplier to meet the ZERH requirements. The manufacturer did not specify whether these upgraded windows would meet NEEM+ standards; the ZERH standard requires a minimum U-factor of 0.30, which is less stringent than the NEEM+ requirement of 0.25.

5.1.2 Incented Incremental Cost of NEEM+ Is Less than 5% over Comparable Northwest Manufactured Homes

Retailer and manufacturer interviews confirmed that the incremental cost of NEEM+ is less than 5% greater than a comparable home built to the existing HUD code. Retailer estimates of the incremental cost of a NEEM+ home ranged from $1,200 to $6,000, with respondents noting that the cost was typically tied to the size of the home. Manufacturers provided similar incremental cost estimates, with one describing a pricing structure in which the premium for homes less than 1,200 square feet was $2,390, and the premium for homes larger than 1,200 square feet was $3,390. Another manufacturer estimated that the NEEM+ premium could go as high as $6,000 after a retailer markup.

Two retailers estimated that these premiums for NEEM+ were between 2% and 4% of the total cost of the home, with one providing an example of a 1,425-square-foot home that sells for $185,000, for which the NEEM+ upgrade would cost $4,160. Two additional retailers noted that utility rebates typically cover most or all of the incremental cost for a NEEM+ upgrade. An updated federal standard is likely to increase the cost of the market average manufactured home as it requires manufacturers to install additional insulation and other measures. As a result, the incremental cost of a NEEM+ home over a that market average home should decrease as the new federal standard takes effect.

5.1.3 Manufactured Home Retailers Increase Sales of NEEM+ Homes

Most interviewed retailers reported that their NEEM+ sales had increased (six respondents) or stayed the same (seven respondents) since 2021. Only two retailer respondents reported decreases in NEEM+ home sales. Retailer reports of their change in NEEM+ home sales typically paralleled their reports of overall sales trends. Both retailers who reported decreases in NEEM+ sales also reported decreases in home sales overall, while four of the six retailers who reported increases in NEEM+ sales also reported increases in overall sales.

Manufacturer interviews were largely consistent with retailers' assessment of NEEM+ sales trends. Two of the three NEEM+ manufacturers reported that sales had been steady, while the third reported that sales rose slightly. The manufacturer who reported a sales increase credited that growth to program activity. This manufacturer noted that more manufactured home dealers had taken advantage of the display-home incentive toward the end of the offering and speculated that these retailers had continued to promote NEEM+ homes.

The importance of retailer awareness and ability to sell NEEM+ homes emerged as a trend in manufacturer interviews. Manufacturers reported that retail staff were pivotal to making NEEM+ sales

occur, although their understanding of NEEM+ and its benefits varied. One manufacturer described the importance of ensuring that education and marketing efforts made it to retailers' front-line sales staff, saying, "It seemed like factories knew what was going on, some of the dealers had an idea of what was going on, but the guys who were selling the products didn't know what was going on.... A lot of [information] did not get to the customer or the people selling the houses."

Manufacturers described sales staff awareness as particularly important given the "invisible" quality of the NEEM+ specification. NEEM+ could be, as one program staff member described, "a hard sell: you can't see more insulation." Manufacturers highlighted the successful efforts of a dealer who sold only NEEM+ homes and promoted them effectively to customers, as well as a Northwest Energy Works staff member who made a point to visit retailer lots to speak about NEEM+.

Retailer interview findings suggest that retailers rarely actively upsell customers to NEEM+, unless the customer is, as one retailer described, "very energy conscious" and seeking the most efficient home available. Multiple retailers reported that customers were typically satisfied with their typical home packages, which, for some, were ENERGY STAR homes. One retailer suggested that educating customers about NEEM+ was outside of their role, saying future uptake would "depend on what the media says about it."

Two of the manufacturers who reported steady sales noted some customer characteristics of NEEM+ buyers. One manufacturer sold homes to retailers in specific areas with higher energy codes (like Bend, OR, or Olympia, WA), as the NEEM+ specification allowed them to meet the code requirements in their areas. This manufacturer further described NEEM+ as allowing them to "future-proof" projects and prepare for manufacturing to higher codes. The other manufacturer who described steady sales described how their NEEM+ customers were primarily manufactured home community lots and parks, rather than private residents. They shared how independent customers in comparison were deterred from NEEM+ sales due to supply chain shortages and rising loan interest rates, making both the final price of the home and build date less certain.

5.1.4 Factory Trainings in NEEM+ Construction Are Held and Test Homes Are Built

Northwest Energy Works staff continue to visit manufacturers to provide advice and help train new staff. Manufacturers reported they value the advice they receive from Northwest Energy Works, particularly as they work to prepare for, and adapt to, the updated federal standard and the ENERGY STAR V3 specification.

6 Diffusion Indicators

NEEA asked Apex to develop a set of Diffusion Indicators as part of the Transition MPER for the Manufactured Homes program. Similar to MPIs, which allow NEEA to assess the extent to which a program is achieving the outcomes described in its logic model, Diffusion Indicators allow NEEA to track the extent to which market transformation continues to occur once a program enters the LTMT phase and NEEA no longer actively intervenes in the market.

This section presents an initial set of Diffusion Indicators for NEEA to consider for the Manufactured Homes program. Each indicator is based on a current or potential new outcome from the program's logic model. For each, Apex describes the outcome, the proposed indicator, the rationale, and potential data sources to assess the indicator.

6.1 Meaningful Efficiency Specifications

6.1.1 Outcome

Efficiency specifications in the market meaningfully differentiate the most energy efficient manufactured homes in the Northwest.

6.1.2 Proposed Indicator

Manufacturers and retailers offer homes meeting NEEA-influenced efficiency specifications that provide whole-home energy savings of at least 10% over a market average home sold in the Northwest.

6.1.3 Rationale

This indicator assumes that the Manufactured Homes program's objective is to establish a specification in the market that drives manufacturers to focus on maximizing energy efficiency and allows retailers to sell homes with efficiency as a meaningful differentiator. Throughout the program's history, that specification has been NEEM+, although an updated ENERGY STAR specification or some other specification that achieved energy savings similar to NEEM+ could fulfill that role.

An effective specification drives energy efficiency in the market by clearly differentiating the most efficient manufactured homes from other offerings. This helps home buyers identify efficient homes, allows retailers to promote qualification as a selling point, and makes qualification a desirable feature that manufacturers can incorporate into their home designs. In order for a specification to effectively differentiate the most efficient homes however, it must provide meaningful energy savings over a market average efficiency home that a typical home buyer would be likely to consider as an alternative to a qualified home.

As a result, this indicator seeks to confirm that whatever efficiency specifications the manufactured home market ultimately adopts – whether that continues to be NEEM+ or shifts to ENERGY STAR V3, ZERH, or something else – effectively differentiates the most efficient homes. It will also be important to document NEEA's influence on those specifications in order to tie the outcome this indicator assesses back to NEEA's program activities.

Given their differences in focus and approach, it is difficult to directly compare the stringency of the ENERGY STAR V3 and ZERH specifications to NEEM+ to confirm that these specifications will be as effective in differentiating efficient homes. The ENERGY STAR V3 specification lists certain minimum requirements for building shell measures and assigns point values for additional efficiency improvements, with homes required to achieve a minimum number of points to qualify. The point system most highly rewards installation of heat pumps for space and water heating. DOE's ZERH specification uses the same point system but requires homes to achieve a higher threshold. This approach contrasts with the NEEM+ specification, which focuses on more stringent, prescriptive requirements around building shell measures.

Changes to the federal standard, which will alter the efficiency of the market average home buyers are likely to consider as an alternative, further complicate an assessment of the relative benefits of an ENERGY STAR V3 or ZERH home. In addition, a substantial share of new manufactured homes in the Northwest already receives heat pumps, and an ENERGY STAR V3 or ZERH home that qualifies primarily

through addition of a heat pump may not provide substantial additional energy savings to a homebuyer who was already planning to install a heat pump.

6.1.4 Approach

This indicator requires assessing three important components: determining the efficiency level of market average homes in the Northwest, comparing that efficiency level to the efficiency of homes meeting various specifications, and documenting NEEA's influence on the specifications. Assessing some of these items may require a relatively large amount of effort; however, this is likely not an indicator that NEEA needs to reexamine each year. For example, the market average efficiency of manufactured homes is likely to change relatively slowly absent a federal standard update or other major event in the market. It is likely sufficient for NEEA to reassess market average efficiency approximately every five years.

Assessing Market Average Efficiency Levels

A variety of secondary data sources are available that could provide insight into the market average efficiency levels of manufactured homes. Northwest Energy Works has been able to gather data on manufactured home sales and will likely continue to do so. The EPA also collects data on ENERGY STAR qualified manufactured homes, while the Manufactured Housing Institute, a trade group, and Sawtooth Mountain Research, a market research provider, also make data on manufactured home sales available.

Ideally, these sources would provide data not only on the number of qualified homes sold, but the specific paths those homes took to qualify for ENERGY STAR V3 or ZERH. For example, whether they installed additional shell measures or other improvements beyond just a heat pump. The Residential Building Stock Assessment (RBSA) may provide some further insight into the characteristics of new manufactured homes installed in the Northwest. However, the number of new manufactured homes in the RBSA sample may be limited.

If secondary data are not sufficient to assess the efficiency level of new manufactured homes, it may be necessary to conduct primary data collection. This could include site visits to a representative sample of homes to gather data on their efficiency characteristics or detailed surveys with homeowners. There may also be opportunities to work with manufacturers and retailers to gather data on the number of homes built or sold with certain levels of insulation, window, and door characteristics, and other efficiency measures.

Comparing Market Average Efficiency to Specification Efficiency

Building energy modeling likely presents the most practical approach to comparing energy consumption of market average efficiency manufactured homes to consumption of homes meeting the ENERGY STAR V3, ZERH, and NEEM+ requirements. The data collection tasks described above could provide inputs for these energy models. For example, in addition to gathering data on market average efficiency homes, data collection efforts could track the paths manufacturers most often use to qualify for the ENERGY STAR or ZERH requirements.

Documenting NEEA's Influence on Specification Adoption

A variety of potential sources could help document NEEA's role in adoption of various efficiency specifications, and a combination of those sources would likely provide the most complete assessment. These sources include:

- An analysis of suggestions made in NEEA's public comments submitted through the federal standard development process, the ENERGY STAR specification revision processes, and any public processes around the ZERH specification. This analysis could compare NEEA's suggestions to the suggestions made by other stakeholders, published DOE or EPA staff responses, and the final specification or standard. Ultimately, this analysis could identify which adopted suggestions were NEEA's alone, which were supported by other stakeholders, and which were adopted over the opposition of other stakeholders.
- A review of any correspondence between NEEA and EPA or DOE staff related to the specifications or standards beyond any public comments NEEA submitted.
- Interviews with DOE and EPA staff involved in developing specifications and standards to gather their perspective on NEEA's role in shaping the final specification.

6.2 Viability of Efficiency Specifications

6.2.1 Outcome

A growing market share of manufactured homes meets meaningful efficiency specification(s).

6.2.2 Proposed Indicators

- The market share of qualified homes remains steady or increases.
- At least three manufacturers offer qualified homes.
- Qualified home sales are geographically distributed.

6.2.3 Rationale

The Manufactured Homes program sought to establish a specification that would remain viable in the market even without continued, active program support. The primary indicator of a specification's viability is the market share of homes meeting that specification. If manufacturers see sufficient demand for homes meeting a particular specification, as indicated by market share of those homes, they will likely continue to offer homes meeting that specification.

The additional indicators proposed will help to assess risk to the continued viability of the specification. There is always a possibility that any single manufacturer could go out of business or change business practices to shift away from producing qualified homes. If only one manufacturer offers qualified homes, this could pose considerable risk to the continued viability of the specification as a whole. This risk is reduced if two manufacturers offer qualified homes, but one of the two discontinuing their qualified offerings could still present a significant challenge. With three manufacturers or more, the loss of any individual manufacturer is less likely to threaten the viability of the specification overall.

Washington state energy codes, which allow municipalities to require manufactured homes to meet the same efficiency requirements as site-built homes, have helped drive uptake of NEEM+ in Washington. Similar regulations could drive uptake of other specifications in certain parts of the Northwest. While these regulations can help motivate manufacturers to offer qualified homes, uptake across the region

would be an indicator of broader demand for qualified homes that is not dependent on regulation alone.

6.2.4 Approach

Manufacturers are typically required to work with a certification body to ensure that homes marketed as meeting a particular specification actually meet the requirements. Northwest Energy Works has historically fulfilled this role for ENERGY STAR V2 and NEEM+ homes, and interviewed manufacturers planned to maintain their relationships with Northwest Energy Works. This certification body is likely the best source of data about the number of qualified homes produced each year.

An estimate of the total number of homes produced is also necessary to calculate market share. If a certification body cannot provide this, it may be possible to obtain from each state. For example, Oregon maintains an online database of manufactured homes registered in the state. Other states may have similar databases that NEEA or its evaluators could leverage.

A certification body could also provide the number of manufacturers offering qualified homes and, potentially, the locations of those homes. A search of manufacturer websites or brief calls to manufacturers could also establish whether they offer qualified homes.

7 Conclusions & Recommendations

Apex draws the following conclusions and associated recommendations from this research.

Conclusion 1: The NEEM program's position in the market is stable in the near term, although the full impact of updated specifications and standards is not yet clear. The three manufacturers currently producing NEEM+ homes planned to continue their offerings and did not describe any significant challenges with the specification. While retailers and manufacturers described NEEM+ homes as a niche offering, most also reported stable or increasing sales. Downstream incentives are also likely to remain available, as none of the interviewed program administrators had concrete plans to change their incentive offerings. Nonetheless, the interviewed manufacturers, retailers, and program administrators were still in the process of adapting to a new federal standard and ENERGY STAR specification. The ultimate impact of those market changes on the future viability of the NEEM program is difficult to predict at this stage.

- **Recommendation 1: NEEA should continue to monitor the manufactured home market as the new ENERGY STAR specification takes effect in 2026 and the new federal standard takes effect in 2025 to ensure NEEM+ or homes meeting other specifications that drive meaningful efficiency improvements remain available and manufacturers continue to engage with Northwest Energy Works and assess whether opportunities for further intervention arise.**

Conclusion 2: Revising the ENERGY STAR V3 specification to allow NEEM+ homes to qualify without additional major upgrades would provide important support to the viability of the NEEM program. First, ENERGY STAR recognition of the quality assurance benefits that arise from Northwest Energy Works' engagement with manufacturers would help to ensure that engagement continues into the future. Second, a path to ENERGY STAR qualification through the NEEM+ specification could increase manufacturer interest in NEEM+, as it would allow them to build homes that fully qualify for ENERGY STAR before leaving the factory. This would alleviate one of manufacturers' main concerns with the

ENERGY STAR V3 specification—that the specification's reliance on heat pumps, which must be installed onsite, will allow them to build and market only "ENERGY STAR ready" homes, rather than fully qualified ENERGY STAR homes.

- **Recommendation 2: NEEA and Northwest Energy Works should continue to work with EPA to support an update to the ENERGY STAR V3 specification that allows NEEM+ homes to qualify with minimal additional upgrades.**

Conclusion 3: There is a need for additional research to determine the extent to which specifications like ENERGY STAR V3 and ZERH will drive manufactured home efficiency in the Northwest. The ENERGY STAR V3 and ZERH specifications prioritize efficiency gains in manufactured homes through installation of heat pumps, while the NEEM+ specification focuses on maximizing the efficiency of the building shell. Due to these differing approaches, it is difficult to compare the ultimate efficiency benefits of each specification. With a substantial share of manufactured homes in the Northwest potentially already receiving heat pumps, there is also risk that an ENERGY STAR V3 home might provide limited energy savings over market average efficiency homes that a homebuyer might consider as an alternative.

- **Recommendation 3: NEEA and partner organizations like the Regional Technical Forum should conduct an analysis to assess the relative energy savings between ENERGY STAR V3 and ZERH manufactured homes and NEEM+ homes and assess typical installation practices to ensure specifications effectively drive manufactured home efficiency in the Northwest.**

Memorandum

April 4, 2024

TO: Anu Teja, Sr. MRE Scientist, NEEA

FROM: Mark Rehley, Acting Program Manager for Manufactured Homes

SUBJECT: Response to Manufactured Homes Transition Market Progress Evaluation Report (T-MPER)

NEEA posted its Transition Market Progress Evaluation Report (T-MPER) for the Manufactured Homes Program on December 22, 2023. The purpose of this memorandum is to summarize the program's response to the major findings and associated recommendations of the T-MPER. Note that T-MPER included three recommendations. This response addresses those recommendations that the program team judged would have the most meaningful impact on the program as the program considers moving to the Long Term Monitoring and Tracking (LTMT) phase of NEEA's Initiative Lifecycle (ILC). Where the T-MPER's recommendations imply a modification in program strategies or activities, this memo outlines the program's anticipated adaptation and timeline for doing so. NEEA programs are not required to accept every MPER recommendation. In instances where the program chooses to reject (or accept with caveats) an MPER recommendation, this memo provides a rationale.

Recommendation 1: NEEA should continue to monitor the manufactured home market as the new ENERGY STAR specification takes effect in 2026 and the new Federal standard takes effect in 2025 to ensure NEEM+ or homes meeting other specifications that drive meaningful efficiency improvements remain available and manufacturers continue to engage with Northwest Energy Works and assess whether opportunities for further intervention arise.

The Manufactured Homes Program plans to accept the recommendation. This is a normal part of the LTMT program phase. In addition, NEEA staff will also continue to monitor DOE's Net Zero Ready specification for Manufactured Homes.

Recommendation 2: NEEA and Northwest Energy Works should continue to work with EPA to support an update to the ENERGY STAR V3 specification that allows NEEM+ homes to qualify with minimal additional upgrades.

The Manufactured Homes Program plans to accept the recommendation and will add DOE's Net Zero Ready specification. NEEA staff and Northwest Energy Works will continue to engage DOE and ENERGY STAR to align the NEEM+ specification as closely as possible. NEEA staff will work with ENERGY STAR to develop a path that doesn't require a factory installed heat pump. This would align well with NEEM+.

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Recommendation 3: NEEA and partner organizations like the Regional Technical Forum should conduct an analysis to assess the relative energy savings between ENERGY STAR V3 and ZERH manufactured homes and NEEM+ homes and assess typical installation practices to ensure specifications effectively drive manufactured home efficiency in the Northwest.

The Manufactured Homes Program will not pursue energy savings research for manufactured homes that include heat pumps. Instead, NEEA's emerging technology program will continue to research this area with a focus on testing approaches to field installation and quality assurance. Factory heat pumps add significant complexity to both items.

If ENERGY STAR doesn't provide a path for NEEM+ to continue without requiring a heat pump, then NEEA staff will consider reengaging manufacturers to develop a factory heat pump option as part of NEEM and through the Manufactured Homes program.

If the factory heat pump option proves effective and the field and QA functions are feasible, NEEA staff may reengage the manufacturers as part of the Manufactured Homes program with an updated product specification. This activity would include research that would support updating the Regional Technical Forum.

In conclusion: As the Manufactured Homes program prepares to move into the LTMT phase, the T-MPER provides valuable feedback to make sure market barriers have been adequately removed and the market will continue to expand without additional interventions. If you have any questions about the Manufactured Homes program's response to the findings of T-MPER, please contact me at mrehley@neea.org.