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# ENERGY STAR® Windows, Doors, & Skylights Version 7.0 Evaluation

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## **Executive Summary**

This report presents findings from an evaluation of NEEA's influence on the ENERGY STAR<sup>®</sup> Version 7.0 (V7) Windows, Doors, & Skylights specification. The evaluation draws on a review of NEEA's documents, as well as formal comments that NEEA and other stakeholders submitted during the specification revision process and US Environmental Protection Agency (EPA) responses to those comments. The evaluation also draws on in-depth interviews with stakeholders involved in the revision process, including former NEEA staff (n=2), EPA staff (n=1), and Partnership for Advanced Windows Solutions (PAWS) members (n=2).

NEEA and other PAWS members supported EPA's proposal in the V7 revision process to establish a more stringent requirement for Northern Zone U-Factors. NEEA saw this requirement as a way to push the industry toward thin triple pane windows.

### **Key Findings**

**The PAWS collective provided important support that enabled EPA to enact a more stringent ENERGY STAR V7 specification.** A notable group of stakeholders opposed EPA's proposals to increase the efficiency requirements in the V7 specification. Interviewed stakeholders reported that support from PAWS members helped EPA staff justify maintaining the higher standards that they proposed in the face of this opposition.

**NEEA staff played a critical role in forming the PAWS collective and facilitating its work in support of the V7 specification.** Stakeholders reported that, as a non-governmental, non-profit organization, NEEA was uniquely positioned to lead PAWS as a collective that included a wide range of industry stakeholders. NEEA also encouraged PAWS members to become involved in the V7 specification revision process and provided a response template they could use. Some PAWS members that had not previously been involved in ENERGY STAR specification revisions submitted comments in support of the proposed V7 efficiency specifications.

### **Conclusion & Recommendation**

Conclusion: The ENERGY STAR V7 specification for windows included a more stringent U-Factor requirement for the Northern zone due to NEEA's involvement, particularly NEEA's efforts through PAWS. NEEA played an important role in forming PAWS and coordinating its response to the specification, and PAWS members' involvement helped EPA justify maintaining more stringent proposed efficiency levels.

• Recommendation: NEEA should seek out and pursue opportunities to build and support industry coalitions that can contribute to future ENERGY STAR specification revision efforts. These coalitions can strengthen NEEA's efforts to encourage specifications that more effectively influence markets.

## 1. Introduction

This report presents findings from a review of NEEA's influence on the ENERGY STAR<sup>®</sup> Version 7.0 (V7) Windows, Doors & Skylights specification. NEEA was involved in the specification development process both directly and through its involvement in the Partnership for Advanced Windows Solutions (PAWS).

## **1.1 Research Objectives**

This study sought to document what influence, if any, NEEA staff had in the stringency of the ENERGY STAR V7 specification, considering both NEEA's formal engagement in the specification revision process and any influence resulting from NEEA staff members' engagement with the market more broadly. The review considered both the influence of NEEA independently and of NEEA's efforts as part of the PAWS collective.

## **1.2 Research Approach**

This evaluation draws on two research activities:

- Secondary data review: Apex reviewed and cataloged the formal comments that NEEA and other stakeholders submitted as part of the specification revision process as well as the Environmental Protection Agency's (EPA) responses to the comments received. This review identified NEEA's key recommendations for the specification and tracked whether other commenters supported or opposed those recommendations.
- **Stakeholder interviews:** Apex conducted in-depth interviews with former NEEA staff members who had been involved in the specification revision process (n=2), EPA staff (n=1), and staff at organizations that were members of the PAWS collective (n=2).

## 2. Background

As summarized in Figure 1, EPA took the first steps to develop an eventual V7.0 ENERGY STAR specification for residential windows in 2014, shortly after the end of the prior (V6) specification revision process. EPA staff reported receiving strong pushback from industry during the V6 specification revision process. Industry stakeholders argued that the proposed Northern zone U-Factor requirement of 0.27 would require manufacturers to make significant investments and increase costs to consumers to the extent that qualified products would no longer be cost effective. As a result of this pushback, the V6 specification was not as stringent as some stakeholders had hoped. One EPA staff member noted that the market share of qualified models had not decreased notably when the specification took effect, as is typical when an industry adapts to a new, more stringent specification.





#### Figure 1: ENERGY STAR Windows V7.0 Specification Timeline

Building on the experience of the V6 specification revision process, EPA sought to develop the V7 specification in a way that was transparent and based on detailed, independent research. The December 2014 stakeholder meeting, which occurred before the V6 specification took effect, sought input on ways to make the specification revision process more collaborative and transparent, as well as gathering information about the market to inform the next specification. Twelve stakeholders submitted written feedback following the meeting. EPA then worked with D+R International to develop a whitepaper examining how manufacturers used various combinations of technologies to reach the V6 performance levels.<sup>1</sup> EPA also released an analysis spreadsheet to detail the analysis methods underlying the whitepaper. Eight stakeholders submitted written feedback on the whitepaper.

The V7 Discussion Guide, released in September 2019 took a similarly transparent analysis approach, describing available market share data and EPA's methodology for collecting evaluation data, and requesting stakeholder feedback on a variety of discussion questions.<sup>2</sup> EPA drew on a variety of data sources to inform the Draft 1 specification, which followed the discussion guide, including mystery shopping for windows in retail environments, and conversations with glass manufacturers and coating suppliers to establish an understanding of the incremental costs of high performance windows.<sup>3</sup> EPA also re-ran its savings analysis with updated modeling software following the release of the Draft 1 specification and provided an updated data package for the industry to review.

EPA staff explained that these approaches helped to mitigate the potential for the type of industry pushback they had received in the V6 specification process. According to one EPA staff member, "By

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https://www.energystar.gov/sites/default/files/asset/document/Window%20Technology%20Pathways%20Metho dology%20White%20Paper.pdf

https://www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Version%207%20Window% 20Door%20Skylight%20Discussion%20Guide.pdf

<sup>&</sup>lt;sup>3</sup> https://www.energystar.gov/sites/default/files/asset/document/ES\_Residential\_WDS\_Draft%201\_V7\_Spec.pdf

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really teeing up the technical aspects, actually having those costs and understanding the technologies a lot better, we just undercut their legs on these broad claims that they tried to make last time, which were just not true."

NEEA was active in the V7 specification revision process beginning with the release of the V7.0 Discussion Guide in 2019. NEEA submitted comments on that document and all subsequent documents that EPA produced during the process. NEEA was also active in the formation of PAWS and coordinated its activities during the specification revision process. NEEA and others recognized thin triple pane windows as an emerging efficiency opportunity and formed PAWS to coordinate efforts around research and program design. PAWS membership included national laboratories, program administrators, and windows manufacturers. PAWS, collectively, submitted comments on the Draft 2 and Final Draft specifications while encouraging individual members to submit comments as well.

The final V7 specification included three main efficiency gains for which NEEA had advocated.<sup>4</sup> The most notable was a lower U-Factor requirement for the Northern zone.<sup>5</sup> Former NEEA staff noted that this requirement was important in moving the market toward thin triple-pane windows.<sup>6</sup> According to one former NEEA staff member, "We specifically wanted to promote triple-pane windows, without specifying a technology. We wanted the performance of the triple-pane window. That required a U-Value of 0.22 or lower." Other efficiency improvements for which NEEA advocated that were included in the final specification included a higher minimum solar heat gain coefficient for the Northern zone,<sup>7</sup> and a set of equivalencies between the solar heat gain coefficient and U-Factors.<sup>8</sup>

## 3. Findings

The PAWS collective provided important support that enabled EPA to enact a more stringent ENERGY STAR V7 specification.

PAWS members represented the majority of stakeholders submitting comments in favor of each of the key efficiency gains in the V7 specification that NEEA supported (Figure 2). In each case, the number of stakeholders in opposition would have been greater than the number in favor if not for PAWS member support.

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https://www.energystar.gov/sites/default/files/asset/document/ES\_Residential\_WDS\_V7\_Final%20Specification% 202022.pdf

<sup>&</sup>lt;sup>5</sup> The U-Factor is also referred to as a u-value. The U-Factor measures the extent that a window insulates and prevents heat loss. Windows with lower U-Factors save energy by allowing less of the home's heat to escape.

<sup>&</sup>lt;sup>6</sup> Thin triple-pane windows allow windows to achieve lower U-Factors without significantly increasing their size or weight by using thin panes of glass with inert gasses between them.

<sup>&</sup>lt;sup>7</sup> The solar heat gain coefficient measures the amount of solar energy a window allows to enter a home as heat. In cold climates, this solar heat gain can offset mechanical heating, reducing energy use.

<sup>&</sup>lt;sup>8</sup> These equivalencies allow windows with very high solar heat gain coefficients to qualify, even if they have a slightly higher u-factor than the base requirement. The equivalencies were designed to provide manufacturers with flexibility to meet the more stringent Northern Zone requirements.







Interviewed stakeholders noted the importance of the public comments in favor of a more stringent specification that PAWS members submitted. A former NEEA staff member stated that EPA staff had provided him with feedback that PAWS support had helped justify a more stringent specification. According to this respondent, "Being able to lead a diverse coalition that represented all those market segments, saying 'yes, this can be done,' it helped internally [at EPA] to know that ENERGY STAR wasn't pushing for something that was unreasonable in the market."

A staff member at a national laboratory that was also involved in the PAWS collective reported receiving similar feedback from EPA staff, saying: "To have some weight, some actually organized, unified weight and provide a voice for the energy efficiency and the public sector – the public interest in this topic – was, according to [EPA staff], really what tipped the scales and made [them] able to improve the spec."

A third PAWS member, who represents an energy efficiency organization, said that the collective's involvement "brought in entities that probably are not usually part of the comment process, so it balanced out the window industry that was also supplying plenty of comments, but in a different direction." This respondent also noted that EPA staff had indicated that the diversity of commenters had been helpful in establishing a more stringent specification.

EPA staff confirmed these assessments in an interview for this research. The interviewed staff member noted that, while conditions had been more favorable for adoption of a stringent specification during the V7 revision process than the Version 6 revision process,<sup>9</sup> "It really helped to have a group that was supportive, interested in the technical aspects in terms of how we moved forward. It's always good to have another voice out there...there weren't that many other NGO-type groups that were stepping up

<sup>&</sup>lt;sup>9</sup> The interviewed EPA staff member noted that one of the manufacturers that worked most actively to oppose more stringent specifications in V6 had gone public and was thus more constrained in the public statements it could make during the V7 revision process. The EPA staff member also noted that the extensive research EPA and others had conducted helped to counter arguments in opposition to a more stringent specification.

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and providing technical information about it. It was great to have a group and NEEA supporting us strongly. That was definitely helpful."

# NEEA staff played a critical role in forming the PAWS collective and facilitating its work in support of the V7 specification.

NEEA staff recognized thin triple-pane windows as an emerging technology opportunity in the windows market. Various organizations, including national laboratories and DOE, the California Energy Commission, and the Energy Trust of Oregon had done research into the technology's potential, but there was little coordination between the various research and program efforts occurring in different areas. NEEA worked with the Pacific Northwest National Laboratory (PNNL) to establish PAWS as a collective that could provide greater coordination to efforts to promote highly efficient windows. The collective ultimately received funding through DOE to support its coordination work.

A staff member at PNNL reported that NEEA's involvement had been important in establishing PAWS' role as an industry collective that was inclusive of different market actor types. According to this respondent, "The concept of PAWS was that we did not want this to be a DOE initiative. We wanted this to be outside of DOE, and we wanted it to be non-profit driven, but open to industry collaboration." This stakeholder went on to explain that NEEA's involvement had helped the collective achieve that goal, saying: "We actually relied really heavily on NEEA as that foundational support...to be both the face and that institutional foundation...The only way we were able to do that was because NEEA stepped in."

In addition to its role in founding the PAWS collective, interview findings suggest that NEEA staff were central to the collective's efforts around the V7 specification development process. In addition to contributing to comment letters submitted by the PAWS collective as a group, NEEA developed a response template that individual PAWS members could use as a basis for their own comment letters. One PAWS member from an energy efficiency organization reported using NEEA's template to submit letters in support of the specification revision. This respondent reported that, "It was our first time submitting comments to an ENERGY STAR spec change for any appliance or any product, so it was probably the first time for other entities, too."

This respondent reported encouraging utilities and other organizations in their area to submit comments as well. According to this respondent, "NEEA kind of...led the push to get more PAWS members to write comments...Anything you see from [our] region, we did that on [NEEA's] request." A contact tracker this respondent shared with the Apex team indicates that, with encouragement from the respondent's organization, a utility, a builder, and a building performance organization had all submitted comments supportive of the higher efficiency requirements proposed for the V7 specification.

## 4. Conclusion

# The ENERGY STAR V7 specification for windows included a more stringent U-Factor requirement for the Northern zone due to NEEA's involvement, particularly NEEA's efforts through PAWS.

In the V7 specification revision process, EPA staff took steps to avoid the type of contentious industry opposition that occurred during the V6 revision process, including basing the proposed revisions on transparent industry data and analysis approaches. While the V7 revision process was not as contentious as the V6 process had been, there was nonetheless notable pushback from stakeholders against the more stringent specifications that EPA proposed, and NEEA supported. NEEA played a critical role, working through the PAWS collective, to encourage stakeholders to voice support for the proposed



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specification, countering the pushback from industry. NEEA's efforts helped bring organizations that had not previously been involved with ENERGY STAR specification revisions into the process. Support from these organizations helped EPA justify maintaining the proposed efficiency levels rather than compromising at a less stringent level.

• Recommendation: NEEA should seek out and pursue opportunities to build and support industry coalitions that can contribute to future ENERGY STAR specification revision efforts. NEEA is in a unique position to bring together efficiency program administrators, researchers, and market actors. NEEA also has more experience than many organizations participating in specification revision processes and can provide information and resources to other organizations. Bringing additional stakeholders into the process in this way can strengthen NEEA's efforts to encourage adoption of specifications that more effectively drive markets toward energy efficiency.