

# Seeing the Forest AND the Trees: A Top-Down Approach to Measuring Residential Market Transformation

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## ABSTRACT

A large-scale residential sector building stock study represents a comprehensive top-down methodology to tracking residential market transformation at scale that fundamentally differs from many conventional market measurement approaches. While most market evaluations focus on bottom-up measurement of program interventions, this study takes a holistic view of entire residential sector across a multi-state region, capturing market evolution through rigorous in-person site visits and energy consumption analysis of more than 2,000 residences.

This paper presents findings from the latest iteration of this recurring assessment, examining its unique methodological approach to quantifying market-wide effects. This assessment employs a market-wide sampling strategy to capture market movement, including both naturally occurring and program-induced changes. The study's comprehensive data collection approach provides granular insights across a diverse geographic area.

By conducting this assessment at regular intervals over the past decade, the research has established a robust framework for measuring and verifying market transformation over time. The study's multi-year design enables trend analysis such as quantifying overall technology adoption rates and changing energy consumption patterns. In this paper, these findings are compared with evaluation results from several residential programs in the same multi-state region.

The paper addresses the challenges of ensuring representative sampling across diverse housing types and demographic groups and discusses strategies for maintaining consistency in measurement approaches while adapting to evolving market conditions. This top-down methodology has proven particularly valuable for understanding complete market evolution, as it provides a robust baseline that captures all market changes, regardless of their drivers, revealing how multiple market forces and interventions collectively shape residential technology adoption over time. This can inform energy planning forecasts, codes and standards development, market transformation efforts, energy efficiency program planning, and data for program evaluation.

## Introduction

Residential energy efficiency program evaluation has traditionally focused on assessing the outcomes of program interventions—such as rebates for high-efficiency equipment or targeted behavioral campaigns—to understand their direct impacts on technology adoption and electricity and fuel consumption. While these bottom-up evaluations provide valuable insights into program-specific effects (i.e., direct program impacts), they often fail to capture the collective influence of multiple market forces, policy changes, and evolving consumer preferences that shape the broader residential sector over time, including broader market effects of program implementation. As a result, program administrators and policymakers are left without a comprehensive perspective on how the entire housing stock evolves, potentially missing emergent trends or unintended consequences that only become visible when examining the market at scale.

The Northwest Energy Efficiency Alliance's (NEEA) Residential Building Stock Assessment (RBSA), a multi-year and regionally representative survey of homes, attempts to fill this gap. By sampling dwellings

across diverse geographies, income levels, and housing types, this approach captures both naturally occurring shifts (e.g., equipment turnover, new construction) and program-induced changes (e.g., rebate-driven upgrades, local code updates) but is not designed to attribute impacts to any particular effort, such as an incentive program. This market-wide sampling strategy enables analysis of key indicators—such as equipment saturation rates, technology adoption timelines, and consumption patterns—without isolating single program interventions. Consequently, stakeholders gain a clearer understanding of how various market drivers interact, informing more effective program design, resource allocation, and policy development.

This paper details the design, implementation, and analytical framework of the NEEA RBSA with a focus on its most recent iteration in 2022. We begin by outlining the sampling methodology, stratified by region, urban/rural location, Bonneville Power Administration (BPA) affiliation, and dwelling type, to ensure representativeness across Idaho, western Montana, Oregon, and Washington. We then describe the on-site data collection protocols, including detailed room-level audits, HVAC performance testing, and integration of utility energy consumption records. Finally, when combined with prior iterations of the RBSA we demonstrate how this multi-year dataset supports trend analyses of technology adoption and compare this with findings from bottom-up evaluations of residential programs in the same region. By presenting this top-down perspective, we aim to illustrate how a comprehensive, data-driven approach, like NEEA RBSA, can reveal the region-wide, collective impact of multiple programs and natural market dynamics on residential building stock over time.

## **Study Background and Methods**

The NEEA RBSA serves as an important resource for the Northwest, supporting various applications including energy planning forecasts, informing codes and standards development, guiding market transformation efforts, aiding energy efficiency program planning, and providing data for program evaluation among other potential use cases. Its usefulness has been recognized both within and outside the region, with other areas either conducting similar assessments modeled on NEEA’s design or utilizing NEEA’s RBSA data in their analyses.

The 2022 RBSA is the third iteration following assessments conducted in 2011 and 2017 and is aimed at delivering a comprehensive and representative characterization of the existing residential single-family and multifamily building stock within the Northwest. The NEEA RBSA is uniquely positioned to provide both broad and deep insights into the residential building stock of the Northwest for several reasons described in depth throughout this paper. First, the RBSA utilized a sampling approach that encompassed every major climate zone, income bracket, building vintage, and attachment type — ensuring that both common and less-prevalent segments of the region’s housing stock were represented. Second, the extensive on-site data collection effort included a blend of demographics, geography, home characteristics, and equipment saturation. Third, the study also collected and analyzed energy usage data for participants yielding high-resolution annual energy consumption estimates. Finally, conducting the RBSA at regular intervals enables tracking of temporal shifts in housing stock characteristics and energy use patterns. For these reasons, the NEEA RBSA is able to provide broad, deep and multi-year insights into the residential building stock in the Northwest.

### **RBSA 2022 Sampling Approach**

The 2022 RBSA included separate sampling plans for single-family and multifamily residential housing. The sampling plans for single-family and multifamily housing consisted of a “core” sample, which provided comprehensive coverage of the Northwest region, and oversamples for single-family housing, which enhanced coverage for specific subregions (i.e., based on utility service territory).

Eligible home types for the 2022 RBSA encompass residential single-family and multifamily residences located across the four Northwest states: Idaho, western Montana, Oregon, and Washington. Single-family homes were defined to include detached or attached dwellings, such as townhouses and rowhouses, as well as individual units in two-unit, three-unit, or four-unit attached residential buildings. A key update from the 2017 RBSA is the inclusion of manufactured homes with permanent foundations within the single-family definition for sampling, recruitment, and reporting purposes. Multifamily housing eligible for the assessment consisted of units (i.e., apartments, condos) in buildings containing five or more attached residential units.

The 2022 RBSA employed distinct sampling approaches for single-family homes and multifamily buildings and units to ensure a representative characterization of the Northwest building stock. For single-family homes, the study utilized a sample design based on American Community Survey (ACS) housing data across the four Northwest states. The core sample of single-family homes was geographically structured around BPA's seven sub-regions (Puget Sound, Western Washington, Eastern Washington, Western Oregon, Eastern Oregon, Idaho, and Montana). Within these regions, homes were stratified by factors including detached or attached status, urban/rural classification<sup>1</sup> (including urban area, urban cluster, and rural area), and BPA-affiliated versus non-BPA utility service. This stratification resulted in 84 potential strata. Figure 1 (detached) and Figure 2 (attached) show the estimated of single-family housing units included in the study. In addition to the core sample, the 2022 RBSA included single-family oversamples funded by Avista, BPA, and Energy Trust of Oregon. These oversamples targeted specific fuel types or geographic areas, contributing to a more detailed representation of the population.

BPA Territory	Rural-Urban Status	Idaho	Montana	Eastern OR	Western OR	Eastern WA	Western WA	Puget Sound, WA
BPA	Rural	43,938	56,677	42,495	69,050	53,540	102,631	56,101
	Urban Cluster	13,307	25,179	29,082	62,521	19,680	61,529	19,814
	Urban Area	27,574	6,869	1,810	90,947	58,322	121,134	527,022
Non-BPA	Rural	139,986	80,243	35,987	114,789	74,952	5,247	107,764
	Urban Cluster	79,013	48,892	34,374	84,458	38,515	3,562	39,837
	Urban Area	225,041	64,069	31,861	504,984	164,100	0	467,845

Figure 1. Single-Family Detached Housing Units by Sub-region, BPA Territory, and Rural-Urban. *Source: NEEA 2025a.*

BPA Territory	Rural-Urban Status	Idaho	Montana	Eastern OR	Western OR	Eastern WA	Western WA	Puget Sound, WA
BPA	Rural	2,397	4,345	3,090	4,662	2,541	4,395	2,219
	Urban Cluster	1,301	5,388	4,444	11,519	4,136	7,096	1,522
	Urban Area	5,715	1,378	232	23,431	8,786	22,521	107,662
Non-BPA	Rural	8,342	5,430	2,448	7,603	3,791	255	4,511
	Urban Cluster	15,107	13,992	6,554	12,765	8,009	363	4,785
	Urban Area	37,708	18,279	5,568	117,630	28,186	0	84,746

Figure 2. Single-Family Attached Housing Units by Sub-region, BPA Territory, and Rural-Urban. *Source: NEEA 2025a.*

<sup>1</sup> based on 2020 Census definitions

Multifamily housing sampling initially employed a two-stage design: first targeting buildings and then targeting individual units within those buildings. Strata for multifamily sampling were based on state, building height (low, mid, high-rise), and BPA or non-BPA utility service. Multifamily homes were also stratified by urban/rural classification, though a 2020 Census update later identified all surveyed multifamily properties as urban. Recruitment challenges due to constraints from the COVID-19 pandemic led to significant modifications to the multifamily sampling approach, including a shift to tenant-first recruitment strategies and the introduction of remote site visits.

### RBSA 2022 Recruitment Strategy

The recruitment strategies for the 2022 RBSA were adjusted to address challenges posed by the COVID-19 pandemic while aiming to achieve representative participation across the Northwest region. Recruitment for single-family homes involved a multi-mode, multilingual approach segmented into the 45 recruitment regions shown in Figure 3. Initially, mailers invited residents to complete an incentivized web survey, which was followed by an invitation for interested participants to an in-home site visit with additional incentives. Due to pandemic-related concerns, the mailer strategy was modified to delay mention of the on-site visit, although this was later revised to include the reference upfront. Recruitment materials were provided in English and Spanish, with participants also having the option to complete the survey by phone. Follow-up calls were conducted to schedule visits for respondents who expressed interest in completing the on-site survey.

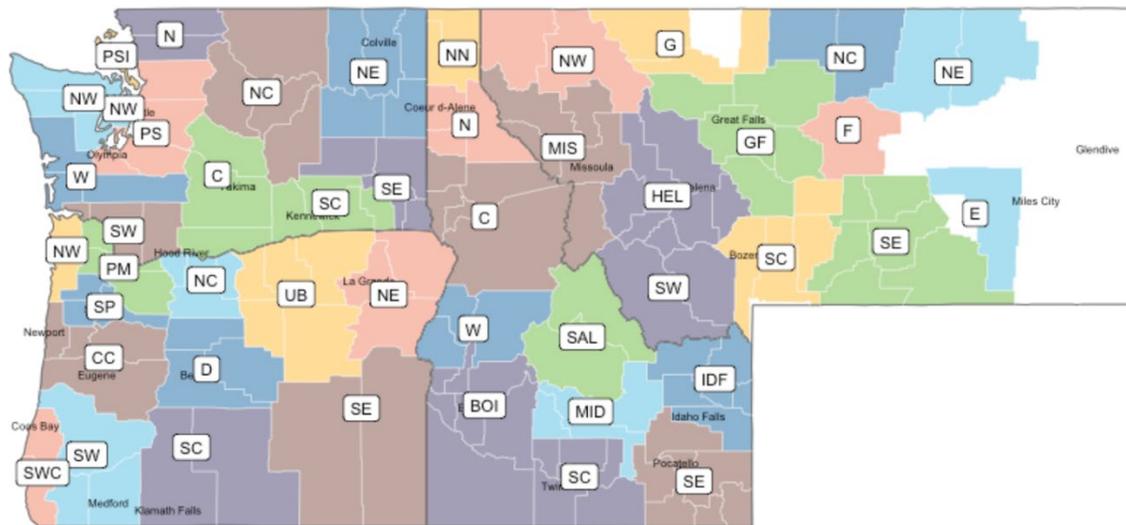


Figure 3. Single-family recruitment regions. *Source:* NEEA 2025a.

Multifamily housing recruitment initially employed a two-stage approach targeting building owners and managers using CoStar data, followed by tenant visits. However, due to recruitment difficulties stemming from outdated contact information and challenges in engaging owners and managers, the strategy shifted toward a tenant-first approach. This involved direct mail postcards, a revised web survey, tenant referrals incentivized with additional rewards, and, as the study progressed, remote-only site visits utilizing video conferencing for multifamily units.

Despite these adapted strategies, recruitment rates were lower than anticipated, largely influenced by the constraints of the pandemic. In single-family recruitment, 294,103 mailers resulted in 6,350 completed web surveys (a 2.2% response rate) and 1,910 completed site visits, equating to an overall recruitment rate of 0.6%. Multifamily recruitment efforts included two distinct phases. The initial

phase involved contacting 5,425 building representatives, resulting in 92 building site visits and 172 tenant unit visits, yielding a building-based response rate of 1.7%. The subsequent tenant-focused effort mailed 26,961 postcards, leading to 197 tenant unit site visits from 127 buildings, including 54 referrals, for a tenant-based response rate of 0.7%. Despite these challenges, the final sample maintained its representativeness.

### **On-site Data Collection in RBSA 2022**

The on-site data collection for the 2022 RBSA was a detailed effort aimed at characterizing the residential single-family and multifamily building stock in the Northwest states. The study successfully documented over 100 building characteristics across nearly 2,000 surveyed homes, with data collection facilitated by ESRI's Survey123 platform.

For single-family homes and tenant units, data collection followed a structured protocol encompassing several stages. The process began with a preliminary site information and resident interview to gather foundational details, such as the number of bedrooms and bathrooms, the presence of unique equipment such as pools or electric vehicle chargers, the location of HVAC and other mechanical systems, any energy conservation measures implemented by residents, and demographic information. This preliminary step allowed field technicians to plan audits and tailor the subsequent data collection in the Survey123 tool based on site-specific equipment.

Technicians then conducted room surveys to systematically document various characteristics and equipment within each room and the exterior space. This included recording water fixture details such as flow rates for faucets and showerheads; appliances and electronics by make, model, size, and specific attributes; and lighting fixtures and lamps with details on type, wattage, and quantity. Ventilation systems, HVAC systems, building envelope components, and exterior doors and windows were also documented. Efficiency attributes for HVAC systems were further augmented by matching model numbers to external datasets such as the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) database. Tools such as IR cameras were utilized to estimate insulation coverage in areas such as ceilings and walls.

The building survey section of the data collection process captured non-room-specific details including HVAC ducts, building construction, and major shell components such as walls, floors, ceilings, and foundations. Additional testing protocols for HVAC systems included blower door testing to measure house airtightness, duct leakage testing, and airflow testing. An exit interview provided an opportunity for additional questions and recruitment for future studies.

Utility billing data for 2020 and 2021 were also collected with participant consent, allowing analysis of energy consumption patterns. These data were cleaned and processed, incorporating weather normalization and filtering sites with insufficient records.

For multifamily buildings, the data collection protocol was adapted due to recruitment challenges and the transition to remote assessments in some instances. Data on building characteristics, shell information, HVAC and water heating systems, and garage and exterior lighting were collected, with remote sources such as participant-provided information, satellite imagery, and building websites supplementing physical inspections.

All data for the 2022 RBSA were collected using ESRI's Survey123 platform, processed regularly, and restructured to align with previous RBSA database conventions. The dataset underwent extensive quality control to ensure accuracy and reliability.

### **Preparing RBSA 2022 Data for Analysis**

The 2022 RBSA sampling design was structured to provide a representative analysis of the Northwest's single-family and multifamily housing stock. While the COVID-19 pandemic led to recruitment

difficulties with multifamily buildings, the core sample was assessed for representativeness against the broader Northwest population. Demographic comparison showed minor differences, attributed mainly to intentional oversampling in less populated areas. However, the geographic bias at a finer level was minimal, and demographic post-stratification was determined to be unnecessary.

To ensure accurate extrapolation of findings from the 2022 RBSA single-family and multifamily data, the study team developed case weights based on best practices for calculating design weights. Case weights were developed for both single-family and multifamily samples, adjusted for 2020 Census data and incorporating oversamples, to ensure findings could be reliably extrapolated to represent the broader Northwest housing stock universe.

## Assessing Market Transformation with RBSA Data

The RBSA is useful for a wide range of analytical purposes, serving as a comprehensive dataset on the Northwest's residential building stock. By systematically collecting detailed and representative information on housing characteristics, building features, and the adoption of energy-efficient technologies, the RBSA provides data users with a robust framework for examining market conditions and tracking changes over time.

One potential analytical application of RBSA data is in assessing the impact of NEEA's residential market transformation initiatives. According to NEEA, market transformation is "the strategic process of intervening in a market to create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of energy efficiency as a matter of standard practice" (NEEA 2025c). NEEA employs a structured initiative lifecycle that begins with pilot activities, incorporates evaluation to verify progress, and transitions to long-term monitoring and tracking (LTMT) to confirm durable market effects (Harnar 2023).

The RBSA is uniquely positioned to support analysis of the impacts of NEEA's market transformation programs because it establishes a consistent baseline and is periodically updated, enabling the measurement of shifts in the prevalence of energy-efficient technologies. In this way, RBSA data can be used to evaluate whether interventions are successfully achieving their intended outcomes and to monitor the persistence of those changes over time at a market-wide level.

In the following section, we highlight three different NEEA market transformation programs and compared the evaluated impacts of the program to the market trends identified in RBSA data.

### Lighting

The multi-year design of the RBSA facilitates the assessment of programs that have concluded, providing insights into both initial market impacts and sustained market transformation effects. One example is NEEA's Residential Lighting Program.

**Program overview and evaluated impacts.** NEEA's engagement in the residential lighting market has evolved over time, starting with initiatives to promote compact fluorescent lamps (CFLs) in the late 1990s and subsequently transitioning to support light-emitting diode (LED) adoption as the technology matured (NEEA 2002). The Residential Lighting Program, launched in 1997, focused on addressing barriers such as high upfront costs, limited availability of LEDs, and consumer concerns around performance and compatibility (NEEA 2025b). While initial efforts emphasized CFLs, NEEA began evaluating the potential of LED technologies as early as 2003 (Ton 2003).

By 2005, LEDs were incorporated into NEEA's LTMT framework<sup>2</sup>. During the 2010s, NEEA conducted annual LTMT studies to track sales, pricing, and market share for various lighting technologies

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<sup>2</sup> As of 2025, NEEA has transitioned to "Market Diffusion" reports in place of LTMT reports.

within the Northwest region. These studies documented the gradual transition from traditional lighting to LEDs (NEEA 2010, Parkinson 2019, Daykin 2019). Concurrently, NEEA partnered with utilities, retailers, and manufacturers to refine incentive structures, promote ENERGY STAR®-certified LEDs, and encourage the adoption of high-efficiency lighting solutions (NEEA 2025b).

According to NEEA, between 2011 and 2017, LTMT data revealed a substantial increase in LED market share, rising from negligible levels to more than half of all lamp sales. By 2020, LEDs accounted for 67% of residential lamp sales in the Northwest. These advancements contributed to substantial energy savings across the region, reduced lighting energy consumption, and informed the development of utility programs and regulatory standards (Colby 2020).

NEEA's approach emphasized targeted incentives and partnerships with stakeholders to encourage widespread adoption of LEDs in the residential sector. This transformation illustrates the effectiveness of coordinated market transformation efforts in achieving long-term energy efficiency goals (NEEA 2025b).

**Findings from the RBSA.** As shown in Figure 4, the NEEA RBSA has tracked the steady adoption of LEDs. The 2011 RBSA reflects the lighting market at the earliest stage of LED adoption with 5.2% of single-family homes having at least one LED bulb and only 0.4% of all bulbs being LEDs. In the 2017 RBSA, however, 76.6% of single-family homes had at least one LED bulb with 18.9% of all bulbs being LEDs. Finally, the 2022 RBSA observed that 99.0% of all single-family homes have at least one LED bulb with 59.0% of all installed bulbs being LED.

Figure 4. Growth of LED adoption in single-family homes. *Source:* NEEA 2013, NEEA 2018, NEEA 2024a

### **Ductless Heat Pump Program**

Another program that can be studied using RBSA data is NEEA's Ductless Heat Pump (DHP) program, for which RBSA data have tracked the adoption of DHPs from the start of the program.

**Program overview and evaluated impacts.** NEEA's DHP program was initiated following a 2010 pilot study that evaluated the potential of ductless heating and cooling systems to replace electric resistance heat in

homes. The primary objective of the program was to advance market transformation for this technology within the Northwest region. To achieve this goal, the program implemented a variety of strategies, including collaboration with supply chain partners, promoting effective installation practices, supporting utility programs, and increasing consumer and market awareness. A notable component of the initiative involved assisting manufacturer training programs by providing technical guidance and materials, which facilitated the proper sizing and design of ductless systems for optimal performance across varying climates. This approach contributed to establishing a more robust market for ductless systems, fostering business opportunities for local enterprises, and improving accessibility for consumers throughout the region (NEEA 2022).

As shown in Figure 5, while NEEA investment in the DHP program peaked in 2014, the program continued to yield significant results with over 150,000 target market installations recorded across the Northwest by the conclusion of 2021. Approximately 70% of these installations benefitted from utility rebates offered by 108 participating entities. According to NEEA, beyond the installations, the initiative fostered partnerships and honed strategies that laid a foundation for broader market transformation within the residential HVAC sector. A 2021 survey revealed that 96% of HVAC installation companies in the Northwest reported experience with installing ductless systems, with the majority frequently recommending them when appropriate. NEEA studies have found that from 2008 to 2021, the program's market transformation efforts resulted in 22.5 average megawatts (aMW) of co-created energy savings. These outcomes highlight the program's success in fostering market readiness for ductless systems, supporting regional businesses, and promoting energy-efficient solutions for residential heating and cooling needs (NEEA 2022).

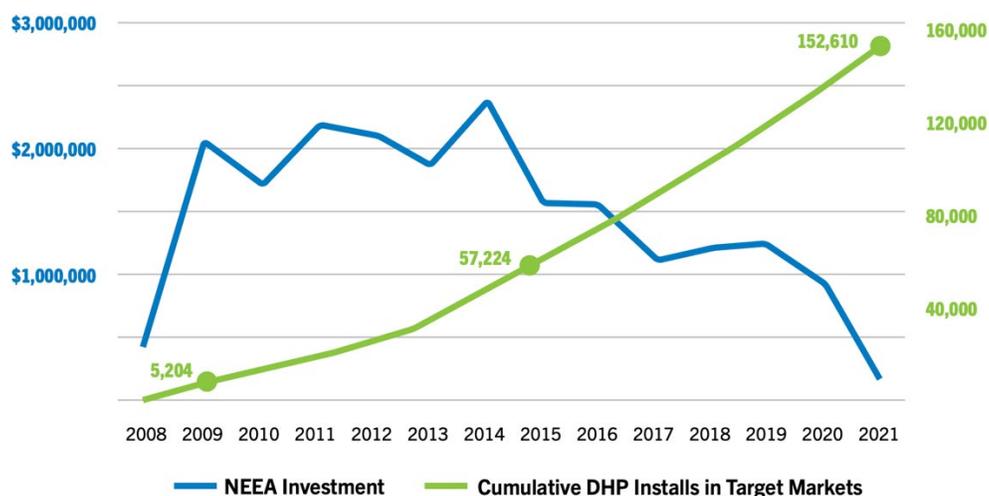


Figure 5. NEEA DHP program investment (annual) and target market installs (cumulative). *Source:* NEEA 2022.

**Findings from the RBSA.** At the time of NEEA’s pilot study on DHPs, the 2011 RBSA identified DHPs in 1.6% of surveyed single-family homes, representing approximately 64,000 homes across the Northwest. By the 2017 RBSA, following significant program investment, saturation had increased to 4.6% of single-family homes, or approximately 196,000 homes in the region. Finally, in 2022, after NEEA had concluded its program investment, the 2022 RBSA documented approximately 560,000 single-family homes in the Northwest with DHPs, reflecting a saturation of 12%. Notably, while NEEA accounted for approximately

140,000 target market installations between 2011 and 2021, the RBSA identified nearly 500,000 DHP installations across the single-family market.

The 2022 RBSA also provided granular insights into the prevalence and characteristics of DHPs. Findings revealed that in 2022, 12% of single-family homes in the Northwest were equipped with one or more DHPs, with higher prevalence observed in Washington and Oregon compared to Idaho and Montana. As primary heating systems, DHPs represented 13% of single-family homes in 2022, an increase from 8% in 2017. As primary cooling systems, DHPs accounted for 10% of single-family homes in 2022, marking the largest increase among all primary cooling system types since 2017 (up from 5%). While less common in multifamily housing, DHPs were noted in 5% of primary cooling systems within tenant units in 2022.

### **Heat Pump Water Heater Program**

Finally, RBSA data can establish a baseline for newer programs like NEEA's Heat Pump Water Heater (HPWH) program.

**Program overview and evaluated impacts.** NEEA's HPWH Market Transformation program was implemented to increase the adoption of HPWHs in the Northwest, which held 0% market share prior to 2012. Recognizing barriers such as higher upfront costs and limited awareness, the program collaborated with manufacturers to develop products suitable for the region's colder climates, leading to the establishment of the Northern Climate Specification (NCS) and its evolution into the Advanced Water Heater Specification (AWHS). Additionally, the program engaged supply chain participants, including distributors and installers, through educational initiatives and targeted interventions. Consumer awareness was bolstered via resources such as [smartwaterheat.org](http://smartwaterheat.org) and rural outreach campaigns. Furthermore, the program contributed to advancing codes and standards by providing data and participating in federal rulemaking and ENERGY STAR specifications, aiming to ensure long-term efficiency gains (NEEA 2024b).

As shown in Figure 6, the program demonstrated measurable impacts, with the regional market share of HPWHs (as a percentage of all water heating sales) increasing from 0% pre-2012 to 15% by 2021, significantly outpacing the national average of 3%. Specific initiatives, such as a retailer pilot, showed notable success, with a reported 1,200% increase in HPWH sales. Installer recommendation rates were recorded at 30 to 57%. Program efforts also contributed to improved product performance, with 98% of HPWH sales in the Northwest since 2019 meeting Tier 3 or better Advanced Water Heating Specification (AWHS) standards. These efforts supported the introduction of a new federal water heating standard, with the U.S. Department of Energy citing the AWHS as a key industry benchmark. Projected energy savings from this standard are substantial, adding to the 15 aMW of energy savings already generated through voluntary adoption within the region. Overall, the program has effectively increased the adoption of HPWHs, improved market readiness, and provided a framework for improved energy-efficient practices in the water heating sector (NEEA 2024b).

Figure 6. Northwest market share of HPWHs, as a percentage of sales. *Source:* NEEA 2024b.

**Findings from the RBSA.** Figure 7 summarizes the findings from the RBSA regarding HPWHs. As shown in the figure, the 2017 RBSA identified HPWHs in 1.8% of single-family homes. By the 2022 RBSA, this figure had increased to 3.2% of homes. However, adoption was not consistent across the building stock. For instance, among homes constructed between 2017 and 2022, 8.9% were equipped with a HPWH. Similarly, among water heaters manufactured after 2017, 14.8% were HPWHs. These observations suggest that while the expected useful life (EUL) of traditional water heaters may slow the adoption rate, newer homes and recently produced water heaters demonstrate a higher prevalence of HPWHs.

Figure 7. Prevalence of HPWHs found in single-family homes. *Source:* NEEA 2018, NEEA 2024a.

## Conclusion

This paper identifies NEEA's RBSA as a fundamentally different, top-down methodology for tracking residential market transformation at scale. Unlike conventional bottom-up evaluations that isolate individual program impacts, the RBSA captures a holistic view of the market by combining rigorous in-person audits with energy-use analysis of over 2,000 homes, establishing a comprehensive baseline for understanding sector-wide change.

Central to this approach is a market-wide sampling strategy that spans multiple states, housing vintages, income levels, and utility territories. By consistently repeating these assessments over the past decade, the study has quantified both naturally occurring shifts (e.g., equipment turnover, new construction) and program-induced upgrades, enabling robust trend analyses of technology adoption rates and consumption patterns.

The RBSA's multi-year, regionally representative design fills a critical gap for policymakers, program administrators, and evaluators. It reveals how diverse market forces—ranging from rebate incentives and code changes to evolving consumer preferences—interact to shape the housing stock. At the same time, it is important to recognize that the RBSA and program-specific evaluations each serve different but complementary purposes. Bottom-up, program-specific evaluations attempt to attribute causal impacts to particular programs or interventions, providing granular estimates of cost-effectiveness and program savings. In contrast, the RBSA offers breadth and context: it establishes a market-wide baseline, tracks long-term trends across multiple technologies, and identifies naturally occurring adoption alongside program-driven change. The RBSA data can support energy planning forecasts, inform codes and standards development, guide market transformation efforts, aid energy efficiency program planning, and provide data for program evaluation in addition to providing baseline data for initiatives that extend beyond NEEA's current scope. Combined, bottom-up and top-down methods can provide a complete picture of shifts in market-wide technology adoption.

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