

Not Your Grandma's Water Heater: Customer Take on Load-Shifting Technology

Poster Author(s): Kumar Chittory and Elizabeth Bullard, Verdant Associates

Introduction

Heat pump water heaters (HPWHs) are emerging as key technologies for building decarbonization, offering significant energy efficiency benefits compared to traditional electric resistance water heaters. HPWHs consume considerably less energy and have the capability to shift energy use to off-peak hours, reducing customer bills while relieving stress on the electric grid during periods of high demand.

Despite these advantages, adoption of HPWHs has been slower than expected due to several barriers, including high upfront costs, installation complexity, lack of familiarity with HPWHs among contractors and customers, and concerns regarding consistent hot water availability. To address these challenges, programs have been developed to support HPWH adoption. These programs provide rebates, access to trained contractors, workforce training, and customer education as well as opportunities to participate in time-of-use (TOU) rates and demand response (DR) programs. Participation in these programs can help customers maximize energy savings and support grid reliability.

Study Objectives and Survey Methodology

To understand real-world customer experiences with load-shifting HPWH technology, we conducted a survey of 147 Self Generation Incentive Program (SGIP) HPWH participants. These participants included both general market and equity-focused customers who had recently installed HPWHs in single-family homes.

The survey was designed to address the following research questions:

1. How satisfied are customers with their new HPWH and program participation?
2. How did TOU and DR program requirements impact bills and hot water availability?
3. Did customers' expectations of the benefits of a load-shifting HPWH align with their actual experience?
4. Did customers adopt additional energy efficiency measures or change their energy behaviors following HPWH installation?

Survey Findings

Demographics and Response: The survey captured responses from a diverse group of participants, providing insights into adoption trends and household characteristics. Response rates were sufficient to generate meaningful conclusions about customer experience with HPWHs.

Customer Perceptions on Energy Bills and Hot Water Availability: Most customers reported satisfaction with their energy bills after HPWH installation. The survey also assessed whether the load-shifting functionality impacted hot water availability during peak periods. Findings indicate that most participants experienced minimal disruption, demonstrating that load-shifting HPWHs can provide both energy savings and reliable hot water supply.

Customer Satisfaction and Investment Perceptions: Survey respondents were asked to rate their satisfaction with their new HPWH and their perceived value of the investment. Results show generally positive feedback, highlighting both energy savings and reduced reliance on conventional water heaters as key drivers of satisfaction.

Equipment Issues and Repairs: While most customers did not experience significant problems, the survey collected information on any maintenance issues or repairs that arose following HPWH installation. Most of the reported issues were related to connectivity and understanding the HPWH controls. This information can inform future program improvements and contractor training initiatives.

Behavioral Changes and Additional Energy Efficiency Measures: An important aspect of the survey was understanding whether participation in the HPWH program influenced broader energy behaviors. Many participants indicated interest in, or actual adoption of, additional electric technologies and energy efficiency measures after installing their HPWH, suggesting that HPWH adoption can serve as a gateway to further energy savings.

Conclusion

Load-shifting HPWHs offer substantial benefits for both customers and the electric grid, combining energy efficiency, cost savings, and peak demand reduction. Customer feedback from the SGIP program indicates strong satisfaction with the technology, minimal disruption to hot water availability, and interest in further energy efficiency measures.

Key Takeaways

- Customer satisfaction with HPWHs is generally high, with positive impacts on energy bills and minimal disruption to hot water availability.
- HPWH programs can drive further energy efficiency adoption and positive customer engagement.
- Load-shifting HPWHs reduce energy consumption during peak hours.