

# Smart Thermostat Best Practices Guide



## Introduction

Since their introduction in January 2017, ENERGY STAR® certified smart thermostats have offered a welcome addition to homes as well as utility efficiency programs. Smart thermostats are an increasingly popular, pragmatic option for consumers interested in reducing their utility bills. Before a smart thermostat earns the ENERGY STAR label, it must reduce HVAC runtime by at least 8%, averaged over 1,000 homes over the course of a year, ensuring every certified smart thermostat intelligently saves energy without sacrificing comfort.

**Why ENERGY STAR?** More than 90% of American households recognize the ENERGY STAR label and, for those who have purchased certified products, almost 75% were influenced by the label. More than 884,000 times a day, people choose ENERGY STAR to help them save energy.

Smart thermostats are the second-most popular incentive program among HVAC products, with smart thermostats making up nearly 30% of all rebates in 2019. For utilities, this popularity translates into potential growth and diversity within a program portfolio. Several utilities have

capitalized on this product's dual-savings opportunity through efficiency and demand response programs. Depending on a utility's existing portfolio, expanding into HVAC products may feel particularly urgent, given the uncertainty associated with lighting programs and pending federal regulations. Smart thermostats offer flexibility, allowing utilities to promote the product using various methods: down-, up-, and midstream programs; direct-install programs; 'bring your own device' programs; and online and brick and mortar stores.

This guide is designed as a tool for those hoping to start or adapt a smart thermostat incentive program and to capitalize on lessons learned from programs to date. Much of the information presented below is based on interviews with utilities and program implementers that administer successful incentive programs across the country. The guide provides an overview of the smart thermostat market, along with detailed information on a variety of successful program designs. Further, the guide addresses potential intersections with demand response and income-qualified programs. Finally, the guide shares insights regarding incentive levels and program savings assessments, while highlighting barriers that other utilities have worked to address.

## Market Info

Currently, the smart thermostat market enjoys significant growth. In 2016, 7.8 million smart thermostats were installed in U.S. homes. By 2021, projections indicate 43 million U.S. homes will adopt the technology—making up approximately 40% of the total market.<sup>1</sup> Once introduced to the market, shipments of ENERGY STAR certified smart thermostats and market share grew significantly, as shown in Table 1 below. Nearly 20 manufacturers, including Google Nest, Ecobee, Emerson, and Honeywell, now certify products as ENERGY STAR. The ENERGY STAR Program works closely with these manufacturers to evaluate energy savings and market data, which can help utilities understand the potential in their market. EPA conservatively estimates each home with an ENERGY STAR smart thermostat will save approximately \$50 or about 8% of heating/cooling costs.

**The ENERGY STAR specification** requires savings of at least 10% for cooling and 8% for heating. Manufacturers have reported higher savings, supported through rigorous studies. For example, one ENERGY STAR partner found that their smart thermostat has saved consumers an average of 10% to 12% on heating bills and 15% on cooling bills.<sup>2</sup>

The broader market for smart home products has also grown, affecting consumer behaviors and smart thermostat manufacturing trends. Forecasted numbers for smart home products shipped to consumers leapt from 643.9 million in 2018 to 840.9 million by the end of 2019. The International Data Corporation expects that number to grow around 17% every year until 2023.<sup>3</sup> The connective nature of these products means that overall interest in smart home technology increases the likelihood that consumers will acquire the technology. As of 2019, one in every five consumers owned a smart product, and one in three owned more than two smart products.<sup>4</sup> This has influenced manufacturing trends,



with major brands working to implement digital assistant and voice-activated technology in newer models.

**Table 1. ENERGY STAR Connected Thermostats**

Year	ENERGY STAR Shipments	ENERGY STAR Market Share <sup>5</sup>
2017	1,236,000	1%
2018	4,321,000	5%
2019	4,622,000	8%

By offering significant incentives and marketing the benefits to consumers, utilities have played an important part in the uptake of smart thermostats. The rapid increase in product shipments may partially be due to the relatively large incentives employed by utilities in early programs, as compared to current programs. These allowed ENERGY STAR certified smart thermostats to attract early adopters and gain momentum. Utilities can have a positive impact on continued growth of this product category by establishing incentives that help make the product more broadly accessible, increasing consumer energy savings. Utilities can also consider the benefits of integrating smart thermostats as part of a demand response program. By capturing consumer interest in the rapidly evolving smart home product market, utilities can better manage their resources during peak demands.

Manufacturers have also implemented products and services that connect partners with available utility rebate programs or offer customers the ability to take advantage

<sup>1</sup> <https://aceee.org/research-report/a1801>

<sup>2</sup> <https://storage.googleapis.com/nest-public-downloads/press/documents/energy-savings-white-paper.pdf>

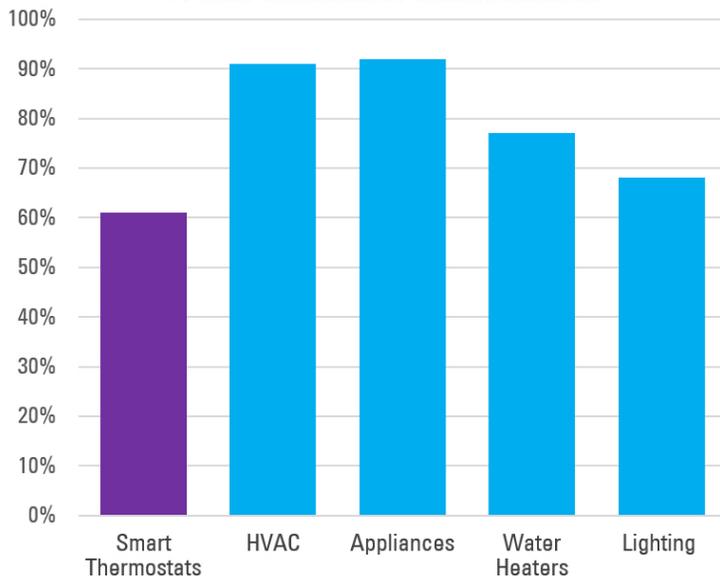
<sup>3</sup> <https://www2.centercode.com/hubfs/files/originals/Consumer-Insights-from-Over-7000-Connected-Product-Users.pdf?hsLang=en>

<sup>4</sup> <https://www.centercode.com/blog/2019/08/smart-home-products>

<sup>5</sup> Approximate market share of total thermostat market. Calculated based on total ENERGY STAR smart thermostats sold since 2017 compared to total U.S. households. Household information sourced from EIA, Annual Energy Outlook 2019, <https://www.eia.gov/outlooks/aeo/data/browser/#/?id=4-AEO2019>.

of demand response programs, such as Nest’s Energy Partners program and Ecobee’s Eco+ software. These add-ons make it easier for consumers to understand and manage their home energy use—saving them energy and money—and at the same time help utilities to reduce load during demand peaks. Manufacturers’ ongoing efforts to stay current with customers’ needs, coupled with a robustly growing market, provides utilities with an excellent opportunity to begin or expand their smart thermostat programs.

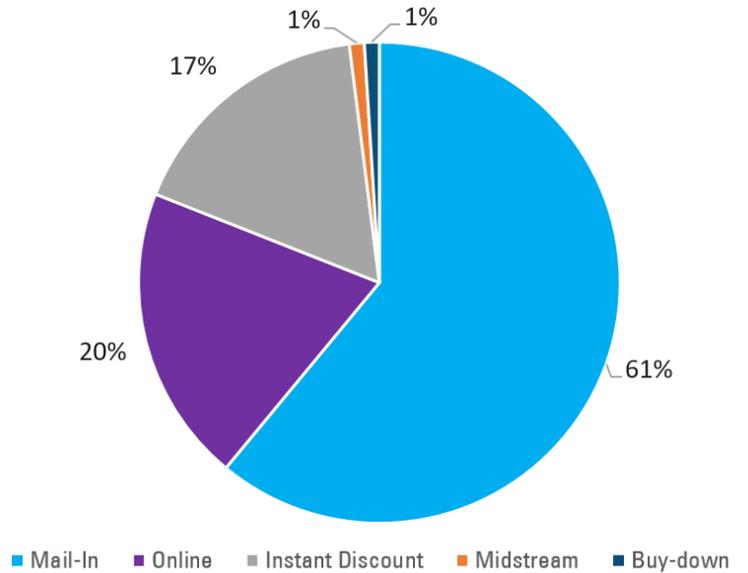
**Figure 1. % Mail-in Rebate of Total Incentives**



## Program Structure

Of utilities’ existing promotions, 61% offer mail-in rebates, followed by online rebates at 20% and instant discounts at 17%; finally, midstream and buy-down discounts tied at 1% (see Figures 1 and 2). In 2019, program incentives averaged about \$65, which represents a 6% decrease from 2018 to 2019. Utilities commonly start with high-dollar promotions—as much as \$100—then gradually decrease as their programs mature.

**Figure 2. Smart Thermostat Incentive by Type**



All utilities interviewed for this guide expressed the importance of flexibility in program structures and the need to plan internally for evaluations and annual adjustments to help programs function at optimal levels. They described using multiple market-intervention strategies with smart thermostats, including upstream, downstream, and midstream incentives. Some examples from the interviews are described below:

**Downstream offerings** include online marketplaces, mail-in and instant rebates, and rebates as a service.

- Utilities find online marketplaces offer an increasingly popular choice for consumers. Interviewees noted the success with marketplaces due to ease of use and high customer utilization. The marketplaces provide a customizable solution that allow utilities and program implementers to provide a much more personal experience for the consumer, including the ability to calculate savings. One utility’s internal tracking found that 70% of its total smart thermostat rebates were claimed through the online marketplace.

- Instant discounts in stores also prove attractive to customers, as demonstrated by utility programs utilizing instant coupon channels that can be validated at select retailers. A large midwestern utility partnered with its implementer to create instant rebates, available at retailers in-store and online. This required partnering with major retailers in the area, allowing customers to simply input their addresses and receive the rebated price at the point of sale. If customers in their service areas visited a manufacturer’s website, they received a pop-up educating them about available rebates.

**Midstream programs** center on ENERGY STAR's Retail Products Platform, which allows utilities to work with retailers as part of a nationally coordinated effort. One interviewee recently ended its downstream approach due to high operation costs and turned to the ENERGY STAR Retail Products Platform as an alternative.

## Program Element Considerations

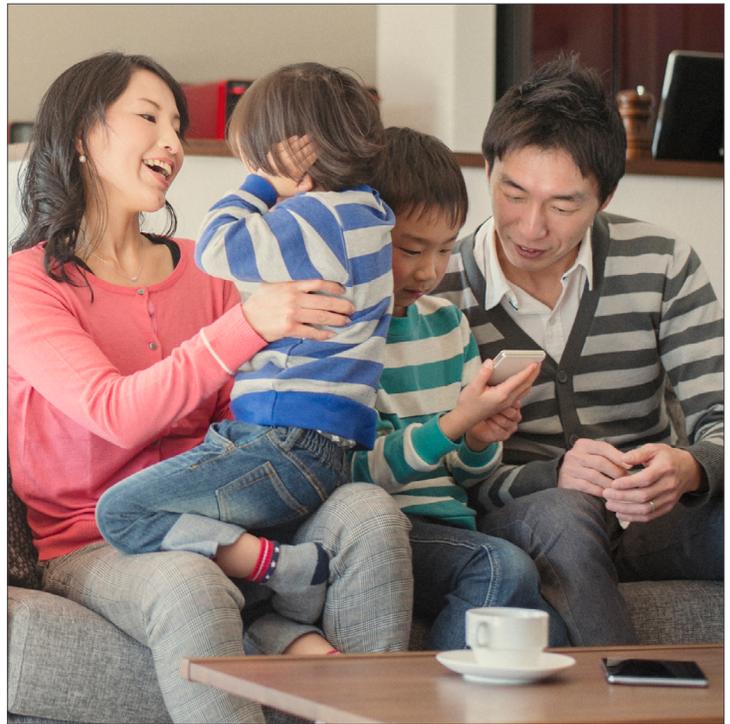
Smart thermostats offer program implementers a valuable opportunity to leverage the products across multiple sales channels, ultimately leading to increased energy savings for the entire service area. Two priorities identified by the interviewees were demand response and income qualified programs.

**Tip:** Compatibility and installation vary by smart thermostat makes and models as well as by existing HVAC systems in customers' homes. Maintaining a robust understanding of system compatibility and installation processes for thermostats incentivized through your program provides an extra layer of assistance to customers.

*Demand Response:* The total incentive amount offered to customers often depends on a demand response program's presence and structure. Utilities can achieve peak demand reduction by incorporating smart thermostats at their programs' inception. Results show average peak demand reductions ranging from 0.6 to 1.2 kW per thermostat for each event and average savings of 10% and 4% in total household gas and electricity use, respectively.<sup>6</sup> Depending on the integration level between grid management and energy efficiency departments, both channels may offer incentives,

## Incentive Levels and Savings Assessments

Most utilities reported starting at high incentive levels, averaging \$100, at a program's inception, but subsequently reduced this by \$20–\$30, depending on budgets, demand, and market saturation. Existing programs interviewed use internal tracking methods and external reports to monitor program uptake and to understand how their incentives compare to others. They found that reducing incentive levels by 20%–30% from initially high levels produced little impact on rebate uptake in their service territories.



increasing total savings and driving consumers interest. One utility interviewed offers a \$50 energy efficiency incentive, plus an additional \$85 for enrollment into a 'Bring Your Own Thermostat' Demand Response program.

*Income Qualified:* Utilities commonly provide rebates to income-qualified households, often incorporating specials and giveaways into preexisting energy check-up or weatherization programs. In 2015, based on responses to a survey conducted by Centercode, price posed the primary concern for non-users, along with a lack of product knowledge and non-permanent residence status.<sup>7</sup> These issues more commonly affect low-income residents, making accessibility a key issue for smart thermostats. Weatherization programs benefit utilities and consumers in tandem, reducing unnecessary grid strain and lowering energy bills—mirroring the benefits of smart thermostats in any home.

<sup>6</sup> <https://aceee.org/sites/default/files/publications/researchreports/u1906.pdf>

<sup>7</sup> <https://www2.centercode.com/hubfs/files/originals/Centercode-Infographic-Smart-Home.pdf>

In some capacity, utilities rely on their state’s Technical Resource Manual to calculate program savings. Some utilities use responses provided by customers to determine savings calculation inputs, while others use a deemed savings value and the number of program participants to calculate savings. One utility emphasized the importance of involving an evaluator at a program’s beginning to prevent knowledge gaps and unnecessary hiccups.

## Common Program Barriers

When developing a new smart thermostat program, utilities may face several common barriers. Based on the experience of existing programs, some considerations for addressing those barriers include the following:

Barrier	Consideration
<p><b>Cost:</b> Downstream implementation may initially incur higher costs.</p>	<p>Utilities may consider offering midstream programs to reduce administrative costs and burdens.</p>
<p><b>Security:</b> While interviewed utilities raved about the high utilization of in-store instant rebate tools, reports of fraud and code-cracking have emerged, resulting in savings distributed to customers that did not qualify. This finding emphasizes the importance of reviewing security measures when setting up an instant verification program.</p>	<p>Utilities and implementers should evaluate security measures prior to program launch.</p>
<p><b>Partnership:</b> Prospects for effective collaboration vary by retailer and manufacturer, and may depend on existing experience with online marketplaces, verification tools, marketing and education for rebates, and other factors.</p>	<p>Utilities may benefit from researching partnerships already in motion in their state or region and building upon these.</p>

## Conclusion

The ENERGY STAR Program anticipates continued growth and innovation in the smart thermostat market, making it a prime candidate for consumer-focused rebates. Existing programs have demonstrated that effective ENERGY STAR certified smart thermostat rebate programs can help deliver energy savings to consumers, while also offering demand response savings for the utility. However, there is no one-size-fits-all path to success and program implementers should look for opportunities to collaborate and evolve their program over time. Retailers already partner with utilities to implement instant rebates and many utilities find success with online marketplaces.

Adding demand response and low-income elements to a program only increases its energy savings and accessibility, benefiting the entire service territory. Utilities starting new programs or revisiting existing ones can use this document as a general roadmap for program considerations, while keeping in mind that their specific, optimal path may differ from the examples discussed above. Together, we can make ENERGY STAR the simple choice for all Americans. Learn more by reaching out to your ENERGY STAR account manager or Dan Cronin, EPA ENERGY STAR, at [cronin.daniel \[at\] epa.gov](mailto:cronin.daniel@epa.gov).



ENERGY STAR® is the simple choice for energy efficiency. For more than 25 years, EPA’s ENERGY STAR program has been America’s resource for saving energy and protecting the environment.