

DUAL FUEL THERMOSTATS IN UTILITY PROGRAMS REVIEW

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EXECUTIVE SUMMARY

This report explores the current landscape of residential thermostat efficiency programs in the Midwest and highlights the connections and potential friction points these established measures can have with evolving dual fuel heat pump programs. Residential efficiency programs from 50 utilities in the Midwest were reviewed to determine what thermostat rebates are currently offered, if any, and what defines rebate eligibility. Then, commonly supported thermostat models were reviewed to determine how often specific thermostat features were included. Most utility programs were found to either directly sell or offer rebates for smart thermostats, with discounts typically around \$50. However, support for dual fuel compatible thermostats was mixed and information about dual fuel compatibility within program offerings was hard to find. About one-third of thermostats commonly promoted by efficiency programs appear completely incompatible with dual fuel heat pumps. If a dual fuel heat pump is installed with an incompatible thermostat, it will either fail to operate or will operate in cooling mode only, eliminating all beneficial electrification energy savings. Program implementers can help maximize savings from dual fuel heat pump installations by supporting installers with accurate guidance and aligning their existing thermostat programs with the requirements of dual fuel heat pumps. While thermostats may appear to be a small component of a dual fuel system, they are key to achieving energy savings and customer satisfaction.

INTRODUCTION

Thermostats are an integral part of a home's heating and cooling system, the largest residential energy use in the Midwest. Thermostats are also an important entry point for utility customer engagement because of their relatively low cost, high visibility, and significant energy saving potential. As efficient heating and cooling technology evolves toward more advanced controls and dual fuel systems, thermostat selection and compatibility requirements are becoming increasingly consequential for utility program design. Ultimately, thermostat programs should be aligned with all related offerings to ensure customers who participate in multiple programs receive compatible, functional equipment. Misalignment risks limiting program outcomes and eroding trust in utility guidance.

Research on dual fuel heat pumps has increasingly shown that thermostat controls are a make-or-break factor in dual fuel heat pump performance. Field research completed in 2024 in Minnesota and Illinois observed exactly how installers approached dual fuel system installations when a heat pump upgrade was requested at the time of air conditioner replacement¹. While this work demonstrated the viability of an important dual fuel upgrade pathway and showed that heat pumps with third-party thermostat controls can deliver improved comfort and lower energy costs for cold climate homes, it also found that 4 out of 36 (11%) heat pump installations were effectively implemented as air conditioners due to incompatible thermostat selection. The study's variable speed heat pumps were compatible with existing furnaces and 24-volt controls, but if the thermostat lacked the control logic to choose between the furnace or the heat pump during heat calls, the heat pump couldn't operate in heating mode. Using an incompatible thermostat can make a dual fuel system's primary benefits disappear indefinitely, as it can be a problem with no obvious warning sign to homeowners already accustomed to a furnace and air conditioner combination.

This memo reviews existing thermostat incentive programs across the Midwest in context of their compatibility of dual fuel heat pump technologies. We characterize existing thermostat rebate and direct-sales programs, identify the thermostat models most offered or incentivized, and assess those models across a set of relevant technical criteria including programmability, Energy Star certification, demand control capability, dual fuel compatibility, and staging controls. By establishing a clear picture of what programs are currently promoting and where gaps or conflicts may exist, we hope this report can promote alignment between dual fuel and thermostat programs and ultimately maximize ratepayer satisfaction and energy savings in the region. Utilities are in a unique position to support efficient dual fuel systems through smart program design

¹ <https://www.mncee.org/vshp-ac-replacement>

and educational resources, and the thermostat is a natural target for utility program intervention. As the control interface that links the user, heat pump, and furnace together, the thermostat is both integral to dual fuel system performance and central to the user experience.

METHODOLOGY

We began by identifying the thermostat rebate programs of fifty utilities in the Midwest. The utilities reviewed represent a wide selection of large and small, investor-owned and publicly or cooperatively owned companies. Most utilities either provide rebates for thermostat purchases or have an online store where ratepayers can purchase qualifying thermostats directly. For each program, we reviewed the criteria for a qualifying thermostat, the rebate value, which specific models qualify, and which specific models are sold by the program directly.

For each thermostat model explicitly referenced in a program, we determined how many utilities provided a rebate for that specific model and how many sold it directly. The most common thermostats in each of these categories became our list of thermostats to focus on more specifically. We also selected several communicating thermostats commonly encountered in past dual fuel research projects to review.

We reviewed the specifications of each thermostat on this list to determine the following: type of communication supported; number of stages available for heating, cooling, and auxiliary heating; Energy Star certification status; compatibility with dual fuel systems, demand response programs, and scheduled setback controls. We then summarized that information to determine the typical features and limitations of thermostats promoted by utility programs in the Midwest.

RESULTS

The survey included utilities across Midwestern 13 states, 24 electric utilities, 5 gas utilities, and 20 combined gas and electric utilities. Of these, 29 are investor owned, 20 are municipally or cooperatively owned, and one (Focus on Energy) is a state-level energy efficiency initiative. Of the 50 utility programs surveyed, 35 (70%) have a thermostat rebate program or an online store that offers discounts. Of the utilities that have a program, 18 will provide a rebate for any smart thermostat, 9 will rebate any Energy Star certified thermostat, and 8 have a specific list of models which they sell or provide rebates for. Definitions for what constitutes a “smart” thermostat may vary; We assume smart thermostats are defined by having Wi-Fi connectivity and some programmability.

Table 1. Criteria for utility thermostat rebates

Criteria	Utilities	Percent
No Program	15	30%
Model List	8	16%
Energy Star	9	18%
Any Smart	18	36%
Total	50	

Table 2. Statistics on utility thermostat rebate amounts

	Min.	Mean	Median	Mode	Max.
Thermostat Rebate	\$10	\$68	\$50	\$50	\$150

Table 3. Top fifteen thermostats rebated or sold

Model Name	Utilities that Rebate (out of 30)	Model Name	Utilities that Sell (out of 14)
ecobee with Voice Control	30	Nest	13
ecobee3 Lite	30	Nest Learning	13
Honeywell T9	30	ecobee Essential	13
Honeywell WiFi 7-Day	30	ecobee Premium	13
Honeywell WiFi Smart Color	30	ecobee Enhanced	13
Nest	30	Sensi Lite	12
Nest Learning	30	Sensi Touch 2	12
Honeywell T5	29	Honeywell T9	11
Honeywell VisionPro 8000	29	Sensi	9
Sensi	29	Honeywell WiFi 7-Day	8
Sensi Touch	29	Honeywell WiFi Smart Color	8
ecobee3	28	Honeywell T5	6
ecobee4	28	Sensi Touch	4
Honeywell T10 Pro	28	Honeywell X2S	4
Honeywell T6 Pro	28	Amazon Smart Thermostat	3

Program rebates for thermostats range from \$10 to \$150, depending on the utility. Some programs provide different rebates depending on the type of thermostat (e.g., programmable vs. smart). The most common and median rebate amount across utility programs is \$50. Thirty utilities provide rebates for qualifying thermostats, and 14 utilities sell discounted thermostats directly to ratepayers. The utilities that sell

thermostats typically provide a selection of products including models from Honeywell, Ecobee, Nest, and Sensi.

Using the data on sales and rebates detailed in Table 3, we compiled a list of 18 thermostats to investigate further, including every model sold directly by two or more utilities. These thermostats represent the bulk of thermostats rebated or sold through utility programs in the Midwest. Most of these thermostats qualify for rebates from at least 28 (over 90%) of utilities with thermostat programs in this study. Additionally, we selected 8 communicating thermostats from manufacturers of high-performance dual fuel systems. None of these communicating thermostats were explicitly promoted by the study's group of utility programs but were included to compare their features to the commonly incentivized non-communicating thermostat models reviewed. Table 4 summarizes the features available from the top 18 non-communicating thermostat models, while Table 5 provides the same for the select communicating thermostats. In addition to the features listed in these tables, all thermostats were also verified to offer setpoint scheduling and Wi-fi connectivity.

Table 4. Capabilities of the most common non-communicating thermostats promoted by efficiency programs in the Midwest

Model	Dual fuel compatible	Energy Star certified	Demand control	Heating Stages	Cooling Stages
<i>Amazon Smart Thermostat</i>	No	Yes	Yes	2	2
<i>Bosch BCC100</i>	Yes	No	No	4	2
<i>ecobee Enhanced</i>	Yes	Yes	Yes	2	2
<i>ecobee Essential</i>	Yes	Yes	Yes	2	1
<i>ecobee Premium</i>	Yes	Yes	Yes	2	2
<i>Honeywell Prestige</i>	Yes	Yes	No	4	2
<i>Honeywell T10 Pro</i>	Yes	Yes	Yes	3	2
<i>Honeywell T5</i>	No	Yes	Yes	2	2
<i>Honeywell T6 Pro</i>	Yes	Yes	Yes	3	2
<i>Honeywell T9</i>	No	Yes	Yes	2	2
<i>Honeywell VisionPro 8000</i>	Yes	Yes	Yes	3	2
<i>Honeywell WiFi 7-Day</i>	No	Yes	No	2	2
<i>Honeywell WiFi Smart Color</i>	No	Yes	Yes	3	2
<i>Honeywell X2S</i>	No	Yes	Yes	2	1
<i>Nest</i>	Yes	Yes	Yes	2	1
<i>Nest Learning</i>	Yes	Yes	Yes	3	2
<i>Sensi</i>	Yes	Yes	Yes	4	2
<i>Sensi Touch 2</i>	Yes	Yes	Yes	4	2

Table 5. Capabilities of select communicating thermostats for dual fuel systems

<i>Model</i>	<i>Dual fuel compatible</i>	<i>Energy Star certified</i>	<i>Demand control</i>
<i>Bryant Evolution</i>	Yes	No	Yes
<i>Carrier Infinity</i>	Yes	No	Yes
<i>Daikin One+</i>	Yes	No	Yes
<i>Fujitsu UTY-RNRUZ5</i>	Yes	No	No
<i>Lennox S40</i>	Yes	No	Yes
<i>Midea TL04-L</i>	Yes	No	Yes
<i>Mitsubishi MHK2</i>	Yes	No	No
<i>Trane LINK UX360</i>	Yes	No	Yes

The ability to program specific schedules for different setpoints throughout the day was the most defining feature of efficiency program supported thermostats. Every thermostat reviewed, including both communicating and non-communicating options, is programmable. All thermostats in this group also have connectivity features, placing them within the so-called smart thermostat category. Most thermostats (81%) can leverage their connectivity to support some kind of demand control when paired with compatible equipment and utility program. As dual fuel controls are the primary focus of this research, an in-depth evaluation of demand response capabilities was not completed in this work, but further review of those features for thermostat programs is recommended.

Energy Star certification is a feature of all but one non-communicating thermostat in the survey. Some utility programs are defined by Energy Star certification as the sole eligibility criteria. In contrast, none of the reviewed communicating thermostats are certified. Energy Star certification for thermostats requires manufacturers to provide aggregate usage data and statistics that demonstrate measured savings. This reporting requirement can be challenging for thermostats with lower sales volumes to meet. Further, certified thermostats typically demonstrate savings by allowing more setpoint drift overnight or when occupants are away, a control strategy not demonstrated clearly effective for dual fuel systems or air source heat pumps in general. For all electric air source heat pumps, large setbacks have been reported to unfavorably increase inefficient auxiliary heat use during recovery periods².

² Douglass, Christian, and Josh Rushton. 2024. "Getting Heat Pumps Under Control: The Success of the Heat Pump Revolution Requires Getting Heat Pump Controls and Sizing Right." Paper presented at ACEEE Summer Study on Energy Efficiency in Buildings, Asilomar, CA.

A lack of Energy Star certification is not a clear indicator of a communicating thermostat's efficiency outcomes. We included several communicating thermostat models in this review because communicating thermostats are usually recommended for the highest performing and variable capacity systems. In fact, some manufacturers configure their variable speed products to work only with their own proprietary communicating thermostat, while others claim their product's performance will be limited if non-communicating, 24-volt thermostats are used instead of their brand of controls. Advanced communicating thermostats can maximize efficiency by coordinating the modulation levels of the indoor fan and outdoor compressor unit simultaneously. This can improve the system's ability to operate in the lowest possible energy consumption mode more often, saving energy as a result.

Communicating and continuously variable dual fuel systems can be expensive, however, and many lower cost air source heat pumps operate effectively with common 24-volt thermostats, including a variety of variable speed heat pumps where the 24-volt control compatibility is a selling feature. When a heat pump can use 24-volt thermostats, customers have more choice. They can choose from an array of third-party thermostats and a wider selection of furnaces. For example, variable speed heat pumps compatible with 24-volt thermostats can be retrofit on existing furnaces at the time of air conditioner replacement. This can be a cost-effective way for many homeowners to incrementally improve their heating and cooling system without bearing much higher upfront costs.

Additionally, many non-communicating thermostats offer multiple staging controls to increase system modulation. Staging controls work when the connected air handler has multiple fuel options and/or a multi-speed fan, each combination/speed of which defines a stage. Most of the reviewed thermostats support two or more stages of both heating and cooling. This means the thermostat can request a high or low fan speed in either heating or cooling mode, expanding the total number of operating modes from two to four or more. Exceptions include the Amazon Smart Thermostat and the ecobee Essential, which only support one stage of both heating and cooling, and the Honeywell X2S and Nest, which only support one stage of cooling but two of heating in heat pump mode.

The Sensi and Bosch brand non-communicating thermostats both offer up to four stages of heating. In a dual fuel context, this means the thermostat can request low or high fan speeds for the heat pump mode and for the auxiliary furnace mode, providing a total of four heating stages. In general, a thermostat with more staging options is more flexible and offers better performance potential than one with fewer. Staging controls are ideal for dual fuel systems because they can ensure the heating system never fails to meet setpoint, even if the heat pump is undersized for a home's heating load. Should the heat pump miss setpoint by too many degrees or for too long, the thermostat

controls can request a higher capacity heating stage either by increasing the fan speed for the heat pump or, if that remains insufficient, switching to the auxiliary furnace.

Unfortunately, the number of heating stages any thermostat is advertised as capable of accommodating does not directly determine whether it can handle both heat pump and furnace staging in a dual fuel system. In fact, 6 (33%) of the reviewed non-communicating thermostats offer multiple stages of heating but no dual fuel compatibility. To be dual fuel compatible, a thermostat must have four or more wires and software that can distinguish between heat pump heating mode and furnace heating mode. Several Honeywell models and an Amazon brand included in thermostat program offerings lack this important software. If a thermostat without dual fuel compatibility is installed on a dual fuel system, the heat pump will either not work or operate in cooling mode only. To support dual fuel efficiency programs across the Midwest, utilities should consider aligning their thermostat rebate programs to only recommend thermostats that are dual fuel compatible. Utilities may also consider effective staging control options, demand response capabilities, and cost effectiveness as important criteria for their improving their thermostat programs.

CONCLUSION

This review investigated eighteen thermostats commonly incentivized by utility programs in the Midwest. The most significant finding for program planning purposes is the inconsistency in dual fuel compatibility among utility incentivized thermostats. The gap between which thermostat models are rebate-eligible and which are broadly compatible with all heating and cooling system types represents a friction point that could complicate customer upgrades, especially as dual fuel heat pump adoption grows. When a utility's thermostat rebate program promotes or sells models that are incompatible with another program the same utility offers, like a dual fuel heat pump incentive, customers who participate in both can end up with equipment that doesn't work together properly. That's a frustrating and trust-eroding outcome, especially for customers who relied on utility guidance to make purchasing decisions.

It is also important to note that dual fuel compatibility and other specifications of most thermostat models were difficult to determine without extensive research effort and subject matter expertise. This limits the ability of ratepayers and contractors to easily consider or install a dual fuel or demand response compatible thermostat without significant research or experience. This could make installations significantly more difficult, even for those who are interested in such beneficial technologies.

Based on this review, one-third of the thermostats incentivized by utility programs, including popular models from Honeywell and Amazon, are not compatible with dual fuel systems. This decreases the chance that ratepayers would consider upgrading or

replacing their existing equipment with a dual fuel system. On the other hand, there are many incentivized options of non-communicating thermostats that do support dual fuel systems, including options that can modulate fan speeds for two-stage and variable speed heat pumps.

Utilities that sell thermostats directly may want to revisit their selections to ensure dual fuel-compatible options are prioritized, prominently available, and clearly identified, if not promoted exclusively. A secondary consideration is thermostat staging control capabilities. One or two-stage-only thermostats like the Amazon Smart Thermostat and ecobee Essential may be poor fits for systems with multispeed fans, and utilities should consider whether their rebate eligibility criteria adequately account for system compatibility for those more efficient equipment types.

Customers and contractors who participate in multiple utility programs need consistent guidance, and utility programs work best when they're designed as a coherent system rather than independent initiatives. If the thermostat a utility promotes doesn't work with relevant dual fuel heat pumps, contractors can face confusion about what to recommend and install. This slows adoption and increases the risk of installation errors. Targeted adjustments in existing thermostat incentive programs can better position utilities to support the ongoing expansion of dual fuel technologies, maintain customer trust, and build resiliency throughout the Midwest.