

**Memo to:**

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From:

DNV – Energy Systems

Date:

May 29, 2025

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Residential Smart Home (Residential Adaptive Thermostat) Evaluation Background

The Residential Smart Home offering provides point-of-sale incentives to Enbridge residential customers for purchasing smart thermostats, which create fuel savings while optimizing comfort. The offering is essentially a continuation of the Residential Adaptive Thermostat program, which originated in the 2015-2020 DSM Plan. As Enbridge stated in its initial application, "Adaptive thermostats do not passively await input. Rather, they can anticipate needs, patterns, and behaviours, and can be accessible almost anywhere."¹ While smart thermostats work best when connected to Wi-Fi, smart thermostats are still able to learn from customer behaviour to achieve savings without said connectivity.

For the first four years of the 2015-2020 DSM Plan, despite the fact that incentives were given before installation, Enbridge did not utilize any installation rate adjustment factors. This changed during the Annual Verification of 2019 programs, when Enbridge began using a "ping report" provided by ecobee as a proxy for an installation rate factor.²

Each year, ecobee "pings" all ecobee devices that claimed the offering's discount to identify which purchased thermostats have been installed and connected to the internet. Multiple pings are attempted to mitigate the possibility of an unsuccessful ping from any temporary connectivity issues. If a device is determined to be online during at least one ping attempt, it is considered an installed device. The resulting installation verification adjustment factor is applied to all thermostats incentivized through the Smart Home offering, regardless of manufacturer (others include Google Nest, Honeywell Home, Copland Sensi, and Wyze). For reference, ecobee was 17% of installed thermostats in 2021, 14% in 2022, and 10% in 2023.³

¹Decision and Order EB-2015-0049 for Enbridge Gas Inc. Application for Multi-Year Demand Side Management Plan (2015 to 2020), April 1, 2015, Page 193. (Page 28 of 100)

² From the Residential Adaptive Thermostat Rebate Offer Process Evaluation, January 6, 2025: "Prior to 2023, ecobee used an Energy Control Platform ("ECP") to pull customer Wi-Fi connect data associated with participant device serial numbers; however, the ECP was designed to help enable electricity demand-response and was not designed to verify Wi-Fi connection rates. In 2023, ecobee developed a new tool to enable Wi-Fi ping tracking."

³ The EC compared the total number of thermostats listed in ping reports to the total number of rebated thermostats in the tracking data to obtain percentages for 2021 – 2023.



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The table below shows the ping rate and count of pings (the number of times ecobee attempted to contact the device) annually since 2019. The resulting installation rate remained somewhat consistent but trended slightly upward (from 78% to 85%).

Table 1 Ping Reports by Year

Program Year	Installation Rate (Ping Rate)	Ping Counts
2019	78.40% ⁴	3
2020	81.03% ⁵	3
2021	82.52% ⁶	3 ⁶
2022	86.71% ⁶	5 ⁶
2023	84.15% ⁷	8 ⁷
2024	84.70% ⁸	? ⁹

In 2024, Enbridge conducted a process evaluation which primarily contacted Residential Smart Home participants who purchased ecobee thermostats that were unsuccessfully pinged. Participants were contacted via phone survey to examine why their devices were not responding to the ping. The evaluation found that, among the 69 survey respondents with unsuccessful pings, 89% claimed to have installed their devices. Ninety-five percent of the 89% stated their thermostat was connected to their Wi-Fi. When coupled with findings from a control group of respondents with successful pings, Enbridge's results suggest a 97% installation rate for all incentivized ecobee thermostats.

Considerations and Analysis

- Internal conversations with DNV experts found that thermostats do not need to have a Wi-Fi connection to achieve some savings but achieve less than smart thermostats connected to Wi-Fi.¹⁰
- DNV compared the results of the process evaluation to the ping report (97% from the evaluation compared to 84% from the ping report) and found them to be statistically significantly different; however, the process evaluation did not sample from the entire population, only ecobee participants. Therefore a targeted telephone survey of non-ping ecobee installations isn't sufficient to support the usage of the 97% adjustment factor.
- Additionally, internal conversations with DNV experts found that ping reports are not widely used as installation rates for similar point-of-sale rebate programs. Rather, participant surveys are widely used for similar programs and typically show 80-90% installation rates.^{11 12}

2024 PY Evaluation Recommendations

- The ping report provides a cost-effective method to adjust for non-installation in the absence of a complete population survey of all residential adaptive thermostat installations.

⁴ 2019 Natural Gas Demand-Side Management Annual Verification Report, December 2, 2020, Page 68

⁵ 2020 Natural Gas Demand-Side Management Annual Verification Report, December 2, 2021, Page 62

⁶ Residential Adaptive Thermostat Rebate Offer Process Evaluation, January 6, 2025. Page 4

⁷ 2023 Natural Gas Demand-Side Management Annual Verification Report, December 2, 2021, Page E-9

⁸ At the time of writing, the EC has not requested the ping report. However, adjustment factor (ping rate) is listed in 2024 tracking data and referenced

⁹ Currently unavailable for the 2024 program year.

¹⁰ <https://support.ecobee.com/s/articles/Wi-Fi-FAQ-Setup-Guide-and-Troubleshooting>

¹¹ Residential Direct Install Program Impact Evaluation - Program Year 2021, California Public Utilities Commission, April 26, 2023, page 9

¹² SMART THERMOSTAT PROGRAM Final Report 2022-2023 Impact and Process Evaluation, Puget Sound Energy, February 15, 2024, page 16

- The EC will continue to use the ping report in lieu of an installation rate until an entire population study can be conducted. The ping report provides a cost-effective method to adjust for non-installation in the absence of a complete survey.
- EGI should share any additional information regarding ping report methodology improvements such as updated reasons for an invalid ping for consideration as part of the 2024 Annual Verification process.

Future Evaluation Recommendations

The EC continues to recommend a billing analysis to measure gross energy savings from smart thermostats. The EC also agrees with the first recommendation of the process evaluation which states: *Consider conducting a study to compare the ecobee ping rates with a traditional telephone verification survey of a sample of participants installing devices from all five of the manufacturers included in the Residential Smart Home offering.*¹³ This partially matches the 2023 – 2025 Evaluation Measurement and Verification Plan which recommended a phone survey to calculate free ridership and spillover rates. Such a study may discover an installation rate higher or lower than the 97% suggested within the process evaluation. However, until a telephone survey or billing analysis is conducted, the EC recommends the continued usage of the ping report to complete annual verification work for the 2024 program year and through the current framework. A telephone survey would require additional ad-hoc funds to complete as part of the Annual Verification. A billing analysis would be even more expensive to conduct and should be done as a stand-alone study.

¹³ Residential Adaptive Thermostat Rebate Offer Process Evaluation, January 6, 2025. Page 2