

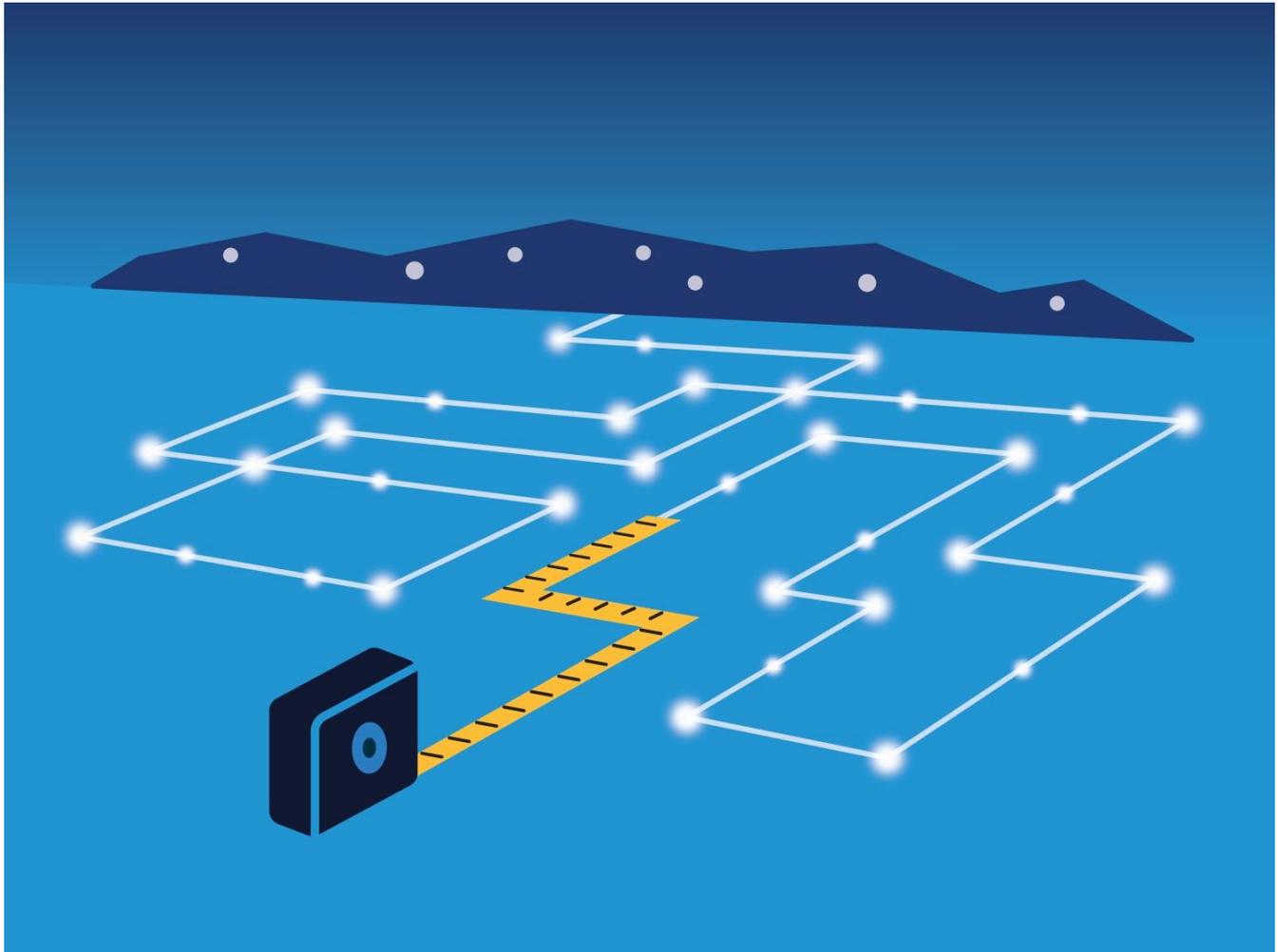


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PG&E Smart Thermostat Program Process Evaluation

Final Report – CALMAC ID PGE0422.01

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1. Introduction

In this report, Opinion Dynamics provides a summary of the key findings from our assessment of PG&E's Smart Thermostat Rebate Program. The assessment draws on participant surveys conducted between October 2017 and February 2018. Participants provided feedback on their experience with the program including their motivation for participation, thermostat installation and use, the influence of the program on their purchase decision, satisfaction, and housing characteristics.

Survey Methodology

Opinion Dynamics conducted five monthly online surveys with participants who had rebates distributed during the prior month.¹ The survey target population included all program participants who had rebates approved and distributed between June 15, 2017 and January 15, 2018. A total of 8,399 customers received rebate checks during this timeframe. We sent up to three emails to participants requesting they complete the survey – one initial invitation and two reminder emails. We completed interviews with 3,357 participants and completed partial interviews with 44 participants. Partials include participants who completed the survey through all satisfaction questions and are included in the results. The survey had an overall response rate of 41%, and an average survey length of 4 minutes. The ability to interview customers close to their participation date, coupled with a concise survey, contributed to the high response rate.

2. Classification of Previous Thermostats

Participants have a difficult time correctly identifying the type of thermostat they replaced, which has implications for program savings. We found differences between the information that participants provided on their rebate application and what they reported on the survey regarding the type of thermostat they replaced. In addition, some participants reported that their previous thermostat was a smart thermostat on the survey, which was not an option on the application but would make them ineligible for the program.

We were first alerted to the issues of potential thermostat misclassification during the first month of survey data collection. While most respondents reported replacing a manual or programmable thermostat in the survey, more respondents than expected said that their previous thermostat was a smart thermostat (9% in October). To better understand if respondents were confused about their previous thermostat type or if they truly had replaced an existing smart thermostat, we added clarifying questions to subsequent survey waves.

For the next wave of the survey in November, we added an open-ended question asking respondents who said their previous thermostat was smart why they were replacing a smart thermostat with a new one. While the responses provided information about customer motivations for purchasing a smart thermostat, most responses did not reveal if the old thermostat really was a smart thermostat or if the respondent was somehow confused or misreporting.

In the final wave of the survey in February, we asked respondents for the age of their previous thermostat. The first smart thermostats launched in 2011 so any thermostat installed prior to 2011 could not be a smart thermostat. We found that 43% of the respondents who reported replacing a smart thermostat had replaced a thermostat that was installed prior to 2011. Given the age of their previous thermostat, they could not have replaced a smart thermostat. We did not have enough information to reclassify these respondents'

¹ The first survey, conducted between October 18th and 31st, included participants who were issued rebates between June 15th and September 15th.

thermostats as manual or programmable, but we were able to confirm that they did not previously have a smart thermostat and were eligible for the program. This adjustment reduced the percentage of participants who were classified as having replaced a previous smart thermostat from 12% to 7%. If we extrapolate the 41% reduction in the February results to the previous months, the overall percentage of participants who replaced a smart thermostat drops from 11% to 6%.

After survey fielding was complete, we were able to compare results from the survey effort to information participants provided on their rebate applications. The percentage of respondents who reported replacing programmable thermostats is similar between the application and survey, but respondents reported replacing half as many manual thermostats on the survey (Table 1). The application did not have an option for smart thermostats or “other” thermostat type, suggesting that customers who replaced a smart thermostat or mistakenly felt they did, were more likely to select manual thermostat on the application.

Table 1. Thermostat Selected on Application Compared to Survey Results

Thermostat Type	Application (n=3,401)	Survey (n=3,401)	Survey with adjustment based on thermostat age (n=3,401)
Manual Thermostat	21%	11%	11%
Programmable Thermostat	79%	76%	76%
Smart Thermostat	--	11%	6%
Other / Unknown	--	2%	7%

Note: The application did not allow participants to select a smart or other type of thermostat. The smart thermostat survey responses presented are not adjusted based on subsequent clarifying questions.

The thermostat age adjustment extrapolates the findings from the February results to the full survey population. We can confirm that 11% of respondents with smart thermostats would be reduced to 6% but the true thermostat type is unknown since we did not know if it was instead manual or programmable.

By comparing the application and survey responses of the same participants, we found that participants who reported replacing a manual thermostat on their rebate application were more likely to give a different response on the survey than participants who said they replaced a programmable thermostat. However, participants who said they had replaced a manual thermostat on their application were only slightly more likely to change their response to a smart thermostat on the survey. They were much more likely to change their response to programmable. More specifically, we found that 38% of participants who selected manual on the application also selected manual on the survey while 45% selected programmable and 14% smart thermostat. A large majority of participants who said they replaced a programmable thermostat on their application gave the same response on the survey (83%) while 11% selected smart thermostat and only 4% selected manual (Table 2). The discrepancies between the previous thermostat selection on the application and the survey further highlight respondents’ classification error.

Table 2. Change between Thermostat Selected on Application and Survey

Previous Thermostat – Application vs. Survey	Total (n=3,401)
Manual Thermostat (Application)	21%
<i>Manual Thermostat (Survey)</i>	38%
<i>Programmable Thermostat (Survey)</i>	45%
<i>Smart Thermostat (Survey)</i>	14%
<i>Other (Survey)</i>	3%
Programmable Thermostat (Application)	79%
<i>Manual Thermostat (Survey)</i>	4%
<i>Programmable Thermostat (Survey)</i>	83%
<i>Smart Thermostat (Survey)</i>	11%
<i>Other (Survey)</i>	1%

The program did require that participants upload images of their previous thermostat, which could be used to produce an adjusted distribution of baseline equipment to estimate program savings. We were able to obtain photos for 45 of the 106 participants that indicated they previously had a smart thermostat in the February survey. Looking at this data, 20 of the 45 submitted photos of a Nest or Ecobee thermostat, while the remaining 25 submitted photos of a manual or programmable thermostat. This information indicates that there is a portion of applicants that may truly have previous smart thermostats. However, a new issue arose as we noticed that participants were also uploading pictures of their new smart thermostat in addition to their old one. While the data is helpful as an additional check, the uploaded pictures may be of their new smart thermostats. The program or future evaluators should consider utilizing the information from these photos as a sample indicator for adjustments while looking at additional survey responses and a larger sample of participants.

We recommend the program focus on improving the online rebate application form and also making program requirements clearer so ineligible customers are disqualified before they receive a rebate. The program should consider the approach we used in the survey where we included thermostat images and descriptions to help respondents correctly classify their previous thermostat. In addition, we would also recommend continuing to require that participants upload pictures of their previous thermostat and comparing it to the self-reported thermostat type. Differences between the image and self-reported thermostat type would alert the program that further adjustments to the application form may be necessary.

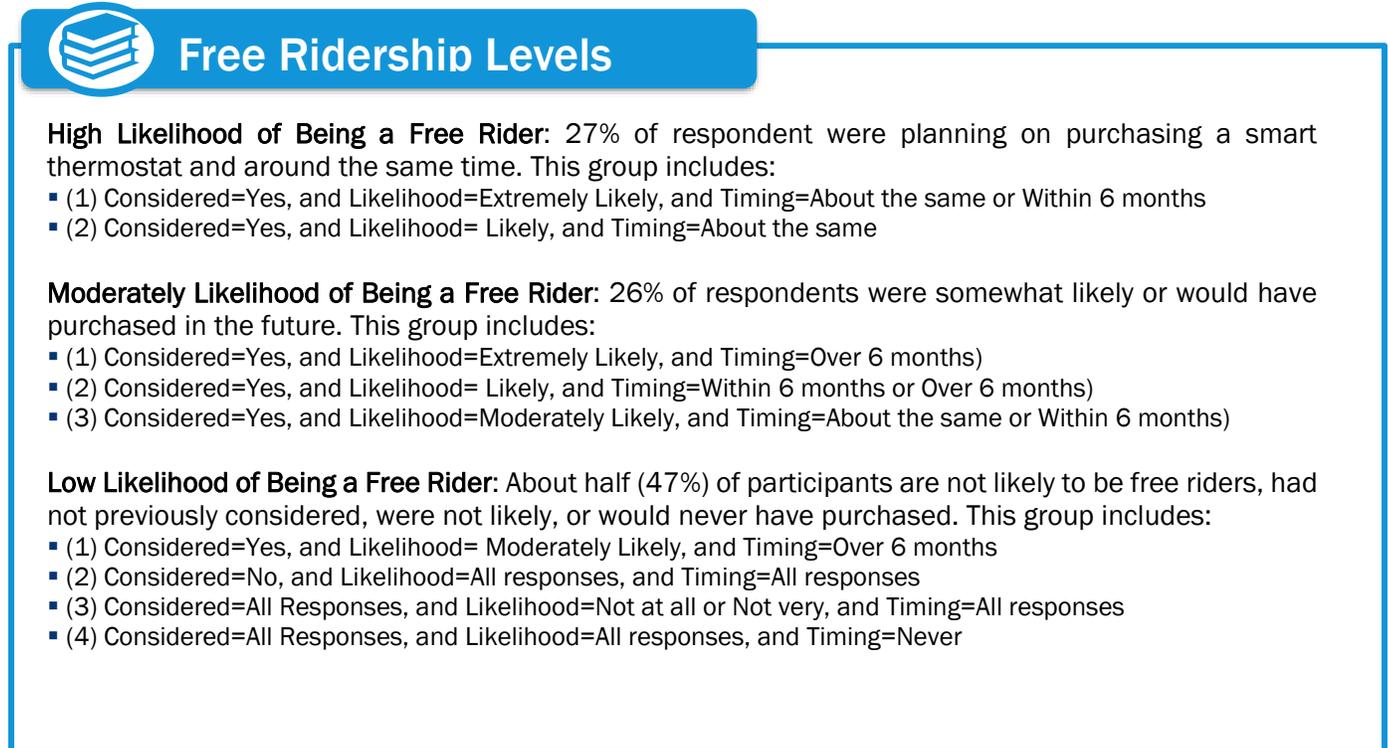
3. Program Influence on Smart Thermostat Purchase

Rebate programs like this one influence customers to purchase energy efficient products in multiple ways. The program can encourage customers to purchase a more expensive energy efficient version of a product by lowering the price. The program can nudge customers to purchase a product they were already considering but had not purchased because the price was too high. The lower price can encourage some customers to speed up a purchase they were delaying because it did not fit into their budget. The program can also expose customers to products they had not been considering.

We asked three questions to assess these different influences on participants’ purchase decisions. We asked customers if they had considered a smart thermostat before hearing about the program, their likelihood to have purchased a smart thermostat without the rebate, and when they would have made the purchase if PG&E

was not offering a rebate. We combined the responses and grouped respondents into three categories based on their likelihood to be free riders (see Figure 1.)

Figure 1. Free Ridership Level Calculations



Most participants were influenced by the program, though to varying degrees. We asked participants if they had already considered purchasing a smart thermostat before they heard about the program, if the rebate had not been available how likely they would have been to purchase a smart thermostat anyway, and if the rebate had not been available what the timing for purchasing a smart thermostat would have been. Based on the combination of responses to the three questions, approximately half of customers (47%) are unlikely to be free riders. Approximately one-quarter (26%) were moderately influenced by the program and would likely be “partial free riders”. Finally, just over one-quarter (27%) are likely to have purchased their smart thermostat on their own and are likely free riders.

As we discussed in the previous section, approximately 6% of participants replaced an existing smart thermostat with a new one. Technically, because these customers were not eligible for the program, their purchase would generate zero savings and the proper adjustment would be through gross savings. Though we asked these respondents the program influence questions, their responses would not be used in an evaluation to estimate program-level free ridership. We compared the responses of the respondents who replaced an existing smart thermostat with respondents who replaced a manual or programmable thermostat and found no difference in the degree of program influence on their purchase. While we might expect experienced smart thermostat users to be free riders, it is possible that the lower price encouraged some to replace an existing thermostat with which they were dissatisfied. Though the program cannot claim savings from these thermostats, it still did influence the purchase.

4. Satisfaction & Program Requirements

Overall, participants were very satisfied with their smart thermostat and the program's application process. Across the five surveys, 93% of respondents reported being either extremely satisfied or satisfied with their smart thermostat. Satisfaction with the application process was also high with 88% being either extremely satisfied or satisfied.

However, some customers did provide constructive feedback about confusion regarding the program requirements. Specifically, participants were confused by number of thermostats for which they could rebate and were surprised when they later learned that they would only receive a rebate for one thermostat. Many customers with multiple zones in their homes thought that they would get a rebate for each smart thermostat they purchased and installed. Of the participants who reported they were dissatisfied, 45% mentioned application requirements as the reason for their dissatisfaction. In addition, 19% of those who provided feedback at the end of the survey mentioned the same application requirement as a concern. One reason for the confusion was the question within the application form that asks for the number of units purchased. Participants requested that the requirements be more clearly defined within the application form and that PG&E not allow customers to enter multiple thermostats into the form.

Satisfied Customer Feedback

"Often times, these rebates can be a cumbersome process. But this was possibly the easiest rebate I have ever submitted. And it only took about 2 weeks from beginning to end!"

Program Requirements Feedback

"PG&E website made me believe rebate applies to each thermostat replaced. I have a 2 zone system and replaced both thermostats with Nest and applied for rebate. Only 1 application was approved while the other was rejected."

We would recommend noting the limit of one rebate per customer more prominently in the description of the rebate and on the application. Additionally, removing the quantity field for the smart thermostat rebate would help lessen the confusion.

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