



energy & resource  
solutions

# **Residential Smart Thermostat Evaluation Early Feedback Report**

prepared for

**Roseville Electric Utility**

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<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>2</b>	<b>RESEARCH PLAN .....</b>	<b>1</b>
2.1	KEY QUESTIONS .....	1
2.2	WORK PLAN AND METHODOLOGY.....	2
<b>3</b>	<b>RESULTS .....</b>	<b>2</b>
3.1	CUSTOMER INTERVIEWS .....	2
3.2	KEY FINDINGS.....	3
<b>4</b>	<b>CONCLUSION.....</b>	<b>4</b>

APPENDIX A: INTERVIEW QUESTIONS FOR SMART THERMOSTAT PROGRAM PARTICIPANTS

APPENDIX B: EM&V NOTIFICATION LETTER TO SMART THERMOSTAT PROGRAM PARTICIPANTS

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## 1 INTRODUCTION

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In May and June of 2018, ERS underwent a study of Roseville Electric's (RE) residential smart thermostat program. The intent of this effort is to provide early feedback on the success of the program by assessing the types of thermostats installed, the features of the installed thermostats, and whether the thermostats installed met the intention and criteria of the program.

## 2 RESEARCH PLAN

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ERS conducted an evaluation and assessment of the smart thermostat measure offered by Roseville Electric to its residential customers. This effort represents an industry best practice of obtaining early feedback and identifying areas of improvement. Evaluation is typically conducted after a full year of program implementation, but this, however, delays the opportunity to make program improvements based on evaluation findings, often as long as 1 to 2 years after program launch. Conducting early evaluation activities provides more timely feedback to the program administrator, enables continuous program improvement, and increases the realization rate and validity of the reported energy savings.

### 2.1 Key Questions

For the smart thermostat measure, the following research questions guided our efforts:

- How many thermostats were installed? Or, what is the installation rate of the rebated thermostats?
- Were the purchased thermostats eligible under program rules?
- Were the web-enabled and energy-savings functions of the thermostats being used?
- How close are the underlying assumptions (that were used in developing the measure energy savings estimates) to the conditions found at the RE customer sites? Do any of the differences materially impact the estimated per unit savings?
- Would the customers who installed smart thermostats be interested in participating in a demand response program?

## 2.2 Work Plan and Methodology

Based on the above, ERS performed the following EM&V activities:

- Using RE-provided data, ERS created a list of rebates and developed a random sample of customers. The sample consisted of 30 primary customers; we identified 30 backup customers to be used when customers either declined to participate or were nonresponsive.
- For the primary customers, ERS obtained and reviewed all submitted rebate documentation, including thermostat invoices.
- ERS provided input to RE for the development of a letter sent to customers to inform them they will be contacted by ERS to schedule a site visit. RE offered customers a \$25 gift card to encourage customer participation. This letter was mailed to Roseville Electric customers on Monday, May 21, 2018.
- ERS developed and submitted survey questions to RE for review and approval.
- A week after the letters to customers were mailed, ERS contacted customers to schedule site visits. For those customers who declined a site visit, we asked if they were willing to answer our interview questions. If willing, we asked the same questions planned for the on-site interviews, including if they could confirm (self-report) installation of the smart thermostat.
- During both on-site and phone interviews, we asked questions regarding customer satisfaction and their interest in participating in a demand response program. We also asked if they could confirm the size and age of the home, the size of their air conditioning unit, who installed it, and if they set up and use the web-enabled thermostat functions.
- ERS conducted site visits to confirm installation of the thermostats. While on-site, we collected data on the make and model of the thermostat to confirm eligibility. Site visits were completed during the first week of June 2018.
- After the site visits and over-the-phone interviews were completed, ERS analyzed and compiled all relevant data. The results – and our key findings – are summarized in Section 3 of this report.

## 3 RESULTS

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The following section highlights the results of this study, including a summary of the interview results and feedback received from Roseville Electric customers.

### 3.1 Customer Interviews

A primary component of this study was to complete customer interviews. The interviews answered such questions as whether the smart thermostat was installed, whether it met the

criteria of the program, and whether the customer would be interested in participating in a peak demand reduction program. An overview of the interviews is provided below:

- 60 customers were in the original sample, with 25 total completed interviews
- Of the 25 completed interviews, 3 were done on-site, which included an inspection of the thermostat and HVAC equipment. These 3 customers were the only individuals interested in allowing an on-site inspection of their equipment. The remaining 22 interviews were conducted over the phone at the customer's request.
- It is worth noting that those customers who agreed to have an on-site inspection and interview were very accommodating and enthusiastic about their new smart thermostat.

### 3.2 Key Findings

Key findings are as follows:

- Project documentation provided by RE for all projects was complete and thorough, and it included all rebate information, specification sheets, and invoices/receipts.
- All of the thermostats that were submitted for a rebate were either verified by ERS or reported by the customer to be installed.
- All installed thermostats are web-enabled and accessible via smartphone, meeting program eligibility requirements.
- All thermostats were ENERGY STAR® certified, meeting program eligibility requirements.
- The thermostats installed were Nest (64%), Ecobee (20%), and Honeywell (16%).
- 24% of the thermostats were installed by contractors. Of the 25 customers interviewed, 19 self-installed and 6 had the thermostat installed by a contractor. Of those who self-installed, a reoccurring comment was how easy it was to install their new smart thermostat.
- 22 of the 25 customers surveyed (88%) indicated their thermostat had a smart-learning mode. However, only 12 customers (48%) indicated that they took advantage of this feature. This may be due, in part, to the timing of this evaluation, as the cooling season was just beginning and several customers indicated they had not yet turned on their A/C this year.
- 13 of the 25 customers surveyed (52%) indicated that their previous thermostat was programmable. This is consistent with the savings estimate assumptions in the POU Technical Reference Manual (POU TRM). The savings estimate baseline assumes a mix of nonprogrammable and programmable thermostats are replaced by the new smart thermostat. It also assumes the preexisting programmable thermostats were not functioning optimally. However, we were not able to assess this assumption in our survey.

- The average area of the homes sampled was 2,029 square feet, with an average construction date of 1994, per information provided by the customers. The average home size is slightly larger than the 1,882 square feet assumed in the POU TRM.
- Up to six customers expressed interest in participating in a peak demand reduction program. One customer indicated that they would be interested in voluntarily participating in a peak demand reduction program without receiving a credit. When the remaining customers were asked whether a credit on their bill would motivate them to participate in such a program, one additional customer indicated that they would participate if that were the case. Four more customers indicated that they *might* participate in such a program, but it would depend on the amount of the credit they would receive on their bill and the timing of the demand response period. However, it should be noted that customers not interested expressed strong opinions against participation, such as calling it an invasion of privacy or that it would be unacceptable to setback the thermostat temperature settings during the summer.

## 4 CONCLUSION

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The smart thermostat program has been an early success as customers are installing the thermostats (note that this was a problem identified in older thermostat rebate programs). In addition, customers are installing thermostats that meet program requirements and the installations are consistent with the savings estimate assumptions used for reporting program energy savings. The POU TRM savings estimates are provisional, meaning more data is needed to confirm the deemed savings estimate is representative of average utility program installations. However, the savings estimates are currently the best resource for Roseville Electric for reporting program savings.

There are significant customer barriers to participating in a demand response program. However, there are indications that customers would be willing to participate if Roseville Electric offers a sufficiently high bill credit, certainty in the timing and frequency of DR events, and the ability for the customer to override the DR event.



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**Interview Questions  
for Smart Thermostat Program Participants**

## Roseville Electric Customer Survey Guide

### Programmable/Web-Enabled Smart Thermostats

#### Introduction

My name is Todd Winner and I'm calling on behalf of Roseville Electric. The reason for my call is we are conducting an evaluation of Roseville Electric's smart thermostat rebate program. If possible, I would like to gather some information about the smart thermostat that you recently received a rebate for.

Do you recall receiving a letter from Roseville Electric about this study?

Q1. Our records indicate that you purchased a   make     model   smart thermostat. Is that correct?

Q2. Did you install the smart thermostat?

- 1) Yes
  - a. If yes, ask if they self-installed or if they had a technician install it for them.
  - b. If self-installed, ask if it was difficult.
  - c. If yes, request to schedule a time to visit.
- 2) No
  - a. If no, ask why they didn't install it. [End call]

Make request to complete site visit, referring to the \$25 gift card offer.

#### Schedule Visit

Date:

Time:

*If customer is not interested in a site visit but is willing to answer a few questions, proceed below.*

*For site visits, in addition to the questions, observe thermostat installed and operational, observe phone app is used, record condensing unit nameplate data.*



Q3. Is the thermostat web-enabled? Can you access it via your phone?

- 1) Yes
- 2) No

Q4. Does your thermostat have a smart learning mode? In other words, does your thermostat automatically adjust the temperature based on your typical routines?

- 1) Yes
  - a. If yes, do you take advantage of this feature?
- 2) No

Q5. Have you set up an occupancy schedule (temperature setbacks)?

- 1) Yes
- 2) No

Q6. Was your previous thermostat programmable?

- 1) Yes
- 2) No

Q7. Information regarding home:

- 1) \_\_\_\_\_ Sq Ft
- 2) Built in \_\_\_\_\_

Q8. Information regarding AC unit:

- 1) Make: \_\_\_\_\_
- 2) Model: \_\_\_\_\_
- 3) Capacity: \_\_\_\_\_
- 4) Age: \_\_\_\_\_

Q9. Roseville Electric is continually exploring innovative ways to help save energy. If Roseville offered a voluntary program where they could send a signal to your smart thermostat to activate an energy saving mode during peak demand times, would you be interested in participating?

- 1) Yes
- 2) No
  - a. If no: would you participate if you could receive a credit on your bill?

Closing: On behalf of Roseville Electric, we greatly appreciate you taking the time to answer our questions.



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**EM&V Notification Letter  
to Smart Thermostat Program Participants**

LOGO LETTERHEAD

Dear Resident,

Thank you for participating in the new Smart Thermostat rebate program provided by your community owned electric utility, Roseville Electric.

Roseville Electric strives for quality and innovation in our energy efficiency rebate programs with the end goal of helping you save energy in your home and reduce your monthly utility expense.

We hope that you found it worthwhile to participate in the program, and are enjoying your new Smart Thermostat.

In an ongoing effort to improve the program and validate the energy savings results, we have asked Energy & Resource Solutions (ERS) to evaluate the program. To conduct the evaluation, ERS will interview some of the customers who participated in the program. This will be a brief phone interview.

During the phone interview, some customers may be asked to voluntarily allow ERS into their home to verify the proper installation of the Smart Thermostat. The inspection will be brief and the ERS staff member will carry a City of Roseville contractor badge for identification.

If you are selected to participate in this evaluation, an ERS staff member will contact you within the next month. If you agree to an in home meeting, we will mail you a \$25 gift card in appreciation of your time. This gift card will be mailed to you in July.

If you have any questions regarding this letter or the evaluation, please do not hesitate to give me a call.

Regards,

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