# SCE EM&T PROJECT: DR19.03 SMART SPEAKERS

Status: In progress

Overview

Virtual voice assistant devices such as Amazon's Alexa are increasingly popular with residential electricity customers for use in entertainment, shopping, education, and communications. Since 2015, Amazon has sold over 100 million Alexa-enabled devices across the world. Smart speakers are becoming exceptionally popular, and according to public market research reports, as of 2019, an estimated 35% of U.S. households were equipped with at least one smart speaker. By 2025 the adoption rate is expected to increase to 75%.

With smart speaker technology already integrated into more than 100,000 different smart home products from nearly 10,000 brands in thousands of SCE homes, these devices offer a creative way for SCE to both connect with customers (such as making a payment or receiving energy-saving tips) and enable smart home devices to effectively manage their energy costs through demand response programs and dynamic tariffs.
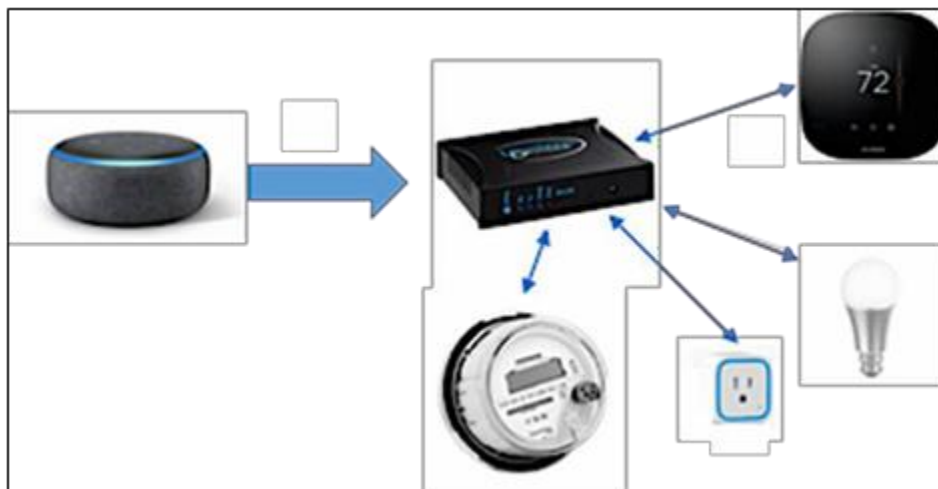
In Home Smart Speaker and Control Equipment

As customers are changing their digital interactions with utilities — especially within the connected home arena — SCE wanted to explore the possibility of a voice-enabled smart home service as a "gateway" for customer interaction. This could allow customers to engage with SCE's demand response rates and programs without having to use a computer, phone, or laptop. The primary goals of this project are to:

- Better understand how connected smart thermostats and other "smart" household end-uses can optimize their energy usage via "smart speaker"

voice commands subject to SCE's time-of-use (TOU) rates and customer comfort and savings preferences.

- Evaluate how voice interactions related to energy — usage, estimated bill, best times to use appliances — can be improved to identify optimal voice command "skills" and "smart speaker" interactions.

- Develop optimization algorithms and voice interaction vocabulary specific for the new SCE TOU rates and demand response programs.

The secondary objectives of the EM&T Smart Speaker demonstration project are to:

- Better understand how customers can effectively interact with and use the smart speaker and other connected technologies in the home, for their preferences for energy management.

- Determine how customer satisfaction is impacted by the customers' experience with smart speakers and connected technologies for managing energy, and if the interaction persists or is just a novelty.

- Estimate the change in customer energy use that can be attributed to the enabling technology of a smart energy management hub with Smart Speaker and associated Alexa skills as an "integrated energy management package".

Customers in the study will receive training on how to ask energy-related questions and set their home energy optimization preferences using the smart speaker. A "smart hub" provides algorithms to use various data points, such as the customer TOU rate, energy use, and preferences, to optimize connected devices. Device settings are adjusted to run less during peak times. This project will demonstrate the smart speaker's interactive capabilities with household occupants and will assess whether the smart speaker can enable customers to manage their energy use and cost by optimizing all their connected devices.

The project will use a meter-based assessment that is individualized for each home to assess impacts of energy savings, load shifting, and load reduction. The goal will be to understand energy usage impacts and to potentially develop a deemed IDSM measure for both residential energy efficiency and demand response programs, using real time meter data to assess incremental changes in usage.

The project was funded under the EM&T Technology Assessments and Technology Transfer investment categories, as there are elements of both research goals in this study. The Technology Assessments category assesses and reviews the performance of DR-enabling technologies through lab and field tests and demonstrations designed to verify or enable DR technical capabilities. The Technology Transfer category advances DR-enabling technologies to the next step in the adoption process, including raising customer awareness, developing capabilities, and informing stakeholders during the early stages of emerging technology development for potential DR program and product offerings.

Collaboration

This work leverages the previous "smart speaker" work funded by the CEC and supported by SCE under the CEC EPIC GFO 15-311 RATES transactive energy project ($3.1M CEC grant). This was a transactive energy pilot that developed certain software and smart speaker skills that are foundational to this current project. This new work is a collaboration among multiple groups within SCE — EM&T, SCE Product Development — other technology stakeholders, and the CEC grant awardees, such as Universal Devices. The technology transfer from this effort leverages over $3M of funding. The M&V study to assess the load impacts or price elasticity effects will be conducted by Nexant under contract to SCE. No other direct cost-sharing or co-funding with any other parties was enabled.

Results/Status

Customer site visits and installation activities were completed in Q2 2020, and no additional installation activities were performed in Q3-Q4 2020. A total of 74 customers were confirmed as active participants. The project team compiled documentation and preliminary information from the activities of the initial rollout of the Amazon Alexa Energy Expert skills and initiated measurement and verification (M&V) activities. The project's M&V team procured interval usage data to begin analysis on the "first-phase" impacts of the Smart Speaker project demonstration and is slated to present these results in early Q2 2021.

Additionally, "first-phase" activities identified a near-term opportunity to explore further refinement of the Amazon Alexa Energy Expert skill-set: to incorporate use of SCE Green Button data to enable participants to engage in billing and rate related inquiries. Feasibility of Green Button functionality was explored, and incremental skills were successfully developed and tested. Customers will be able to authorize Green Button functionality to enable the following inquiries:
- How much is my bill?
- How much is my bill compared to this time one year ago?
- What rate am I enrolled in?
- Am I on the best rate?

A "second-phase" rollout of these skills and re-engagement of participating customers is targeted for Q2 2021.

Next Steps

The research team will conduct a "second-phase" re-engagement with customers and rollout of smart speaker skills in 2021 that will give participants the option to authorize Green Button-enabled functionality for billing and rate related inquiries. A second customer survey has been drafted and will be finalized and issued at the end of the second phase (Q3-Q4 2021). The project team is slated to finalize all M&V activities in Q4 2021 and to draft a final report at that time.