DEMAND RESPONSE EMERGING TECHNOLOGIES PROGRAM

SEMI-ANNUAL REPORT 2019

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SDGE

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Summary

The Demand Response Emerging Technologies (DR-ET) Program Semi-Annual Report for the period of Q4 2018 and Q1 2019 is being submitted pursuant to Ordering Paragraph 59 and the discussion at pages 145 – 146 of Decision (D.) 12-04-045. During Q4 2018 and Q1 2019, San Diego Gas & Electric DR-ET Program completed three (3) projects, continued to manage six (6) ongoing projects, and started two (2) new Demand Response projects.

I. Completed Projects during the Reporting Period

A. Electric Power Research Institute (EPRI) Smart Thermostat Collaborative

1. Overview

This collaborative study defines methods to translate the value proposition from multiple utilities smart thermostat pilots to utility programs of the products and services. Understand all the costs and benefits from the various thermostat hardware and software offerings as well as the data streams that come from the products and services.

2. Collaboration

More than 12 utilities are participating in this study, plus 15 smart thermostat products and/or services vendors, and other stakeholders such as Environmental Protection Agency (EPA), Department of Energy (DOE), Lawrence Berkeley National Laboratory (LBNL), National Renewable Energy Laboratory (NREL), ICF International and Itron. The information from this project is also shared with the statewide DR-ET team on monthly conference calls.

3. Status

The collaborative is scheduled for final close-out by Q1 2019. All participating pilots and demonstrations associated with the project have been finalized or are at the point of completion. Activities in this timeframe include SDG&E as a member of a Technical Advisory Committee looking at barriers and gaps to enabling smart thermostat functionality in affordable housing.

4. Next Steps

Complete final analysis of Kansas City Power & Light (KCP&L) thermostat data. Completion of the project and close-out of the collaborative are scheduled for Q1 2019.

B. Expansion Study of the Statewide Expansion of Auto-DR Express Solutions

1. Overview

The DR-ET Teams of SDG&E, SCE and PG&E are engaged in discussions to develop strategies to increase adoption of Auto-DR into the Small and Medium Business (SMB) sectors (facilities with a peak demand under 499 kW). The Teams selected ASWB Engineering to study how to improve uptake on the existing "Auto-DR Express" and "FastTrack" offerings and to develop a program model that all three utilities could adopt. The Teams decided to co-fund the statewide study with SDG&E being the lead.

The main objective of this effort is to increase automated DR market penetration of SMB customers by expanding SMB eligible measures, adding additional facility types, and increasing customer and vendor awareness of the program.

This will include interviewing past program participants, proposing a streamlined model for the various IOU offerings, along with researching and addressing any barriers the customer may have with respect to program participation. A roadmap for 2018 and beyond will be developed, which focuses on the needs of SMBs.

2. Collaboration

Since this is a co-funded statewide initiative with SDG&E, SCE, and PG&E, each IOU will be updated as the project naturally progresses. SDG&E will lead all the project update conference calls. The results will also be shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls as well as with internal DR strategies and programs team.

3. Status

The statewide team has received the final report and all project deliverables. The statewide team was then presented with the details of the final report. Following the project meeting, the team discussed how and where the results and findings could be implemented in the existing demand response deemed incentive programs throughout the state.

4. Next Steps

The final report will be uploaded to the Emerging Technology Coordinating Council (ETCC) website.

C. Vehicle to Grid Integration Platform (VGIP)

1. Overview

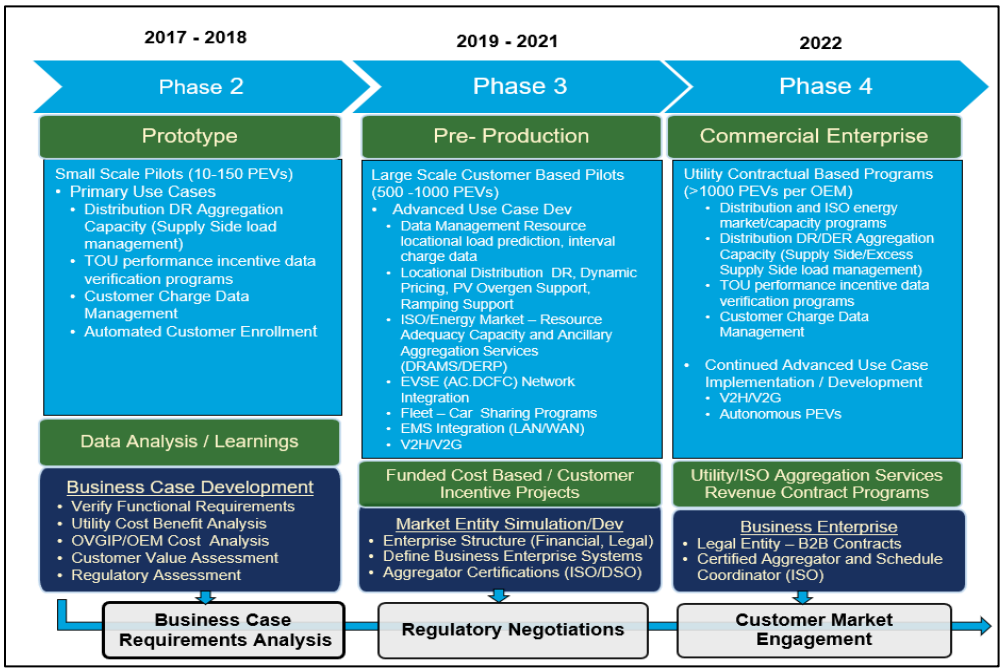
The purpose of this project is to create requirements and use cases for a unified grid services platform that is secure, low cost, and an open source platform. It will also aide in the development of architecture and functionality of the VGIP including OpenADR2.0b, Smart Energy Profile (SEP), and Home Area Network (HAN). Additionally, this project will assess performance of the VGIP against utility requirements through field tests and trials. BMW, Chrysler, Ford, GM, Honda, Mercedes, Mitsubishi, Nissan, and Toyota have agreed to be study participants.

2. Collaboration

The progress and results have been shared with other California Investor Own Utilities (CA IOUs) during scheduled monthly DR-ET Leadership conference calls as well as with various interested attendees at the Internal Technology Transfer meetings.

3. Status

The VGIP project has currently completed Phase 2 of 4 in the total project lifecycle. SDG&E's Emerging Technology Program (ETP) contributed to the program through the completion of Phase 2. Phase 1 was focused on developing the concept of the project and Phase 2 on building a functioning prototype. Phase 3 and4 focus on production for large scale customers, regulatory negotiations, commercial enterprise, and utility programs enrollment. Because Phase 3 and 4 are slightly outside of the ETP scope of work, the team decided not to continue fund the development of the future phases. However, the ETP will support the full completion of next phases if there is scope changes that offer direct value To



4. Next Steps

The next steps for this project include reviewing and agreeing on the final report for SDG&E. Once the final report is accepted and approved it will be uploaded to the ETCC website. Final report is expected to be completed and delivered to SDG&E by the end of March 2019.

II. Ongoing Projects thru the Reporting Period

A. Battery Powered Load Shedding System – Automated Demand Response (ADR) Evaluation

1. Overview

The objective of this study is to evaluate the DR capability of the Energy Storage System (ESS). In addition to peak load shaving capability, the study will evaluate the impact of the ESS on the circuit and analyze customer bill/economic impacts.

2. Collaboration

The progress and results have been shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls as well as with various interested attendees at the Internal Technology Transfer meetings.

3. Status

In Q4 2018 and Q1 2019, the vendor successfully brought all of the Group 2 systems online. The remaining contractually required data collection is in progress with an expected final report completion date in Q2 2019. In Q4 2017 and Q1 2018 the vendor deployed an additional 7 ESS at one of the school districts, these are known as Group 2. In Q2 and Q3 of 2018 the vendor has been working toward getting all the Group 2 sites fully operational, reportedly due to a mix of communications and metering issues.

Below are the highlights for this reporting period:

- The total deployed capacity of the current fleet is rated at 5.47 MW with a 2-hour discharge time, or 10.94 MWh for combined Group 1 and Group 2.

- Group 2 sites are fully operational thru Q3 2018 to Q1 2019. Data collection is currently ongoing at Group 2 sites.

- Demand Response (DR) simulations on the Group 2 sites started in Q3 2018 and were completed in Q4 2018.

4. Next Steps

Due to vendor delays, the M&V team moved the required 16-week data collection period to Q3 and Q4 of 2018 at each site in Group 2 and perform all analyses per the Project Plan. The project is expected to complete in Q2 2019.

In Q2 2019 the M&V team will produce an Addendum to the Summary Report. This Addendum will cover the analysis of Group 2 sites, and any updates or changes to previous findings.

The Names and Sizes of the ESS in each Phase are shown in the two tables below;

PHASE 1			System Size	
#	District	System Name	kW	kWh
1	District #1	Building #1	30	60
2	District #1	Building #2	250	500
3	District #1	Building #3	60	120
4	District #1	Building #4	250	500
5	District #1	Building #5	250	500
6	District #1	Building #6	250	500
7	District #1	Building #7	250	500
8	District #2	Building #1	250	500
9	District #2	Building #2	500	1000
10	District #2	Building #3	60	120
11	District #2	Building #4	250	500
12	District #2	Building #5	60	120
13	District #2	Building #6	250	500
14	District #2	Building #7	250	500
15	District #2	Building #8	250	500
16	District #2	Building #9	250	500
17	District #2	Building #10	250	500
18	District #2	Building #11	250	500
19	District #2	Building #12	250	500
20	District #2	Building #13	250	500
		Total MW / MWh	**4.46**	**8.92**

PHASE 2			System Size	
#	District	System Name	kW	kWh
1	District #1	Building #8	90	180
2	District #1	Building #9	250	500
3	District #1	Building #10	120	240
4	District #1	Building #11	120	240
5	District #1	Building #12	120	240
6	District #1	Building #13	250	500
7	District #1	Building #14	60	120
		Total MW / MWh	**1.01**	**2.02**

Total MW / MWh	
5.47 MW	**10.94 MWh**

B. Whole Connected Home

1. Overview

Whole Home Demand Response (WHDR) is defined as a DR approach where multiple end use systems are triggered by a single DR signal delivered by the utility to either an in-home or a cloud gateway. The purpose of the project is to evaluate various emerging Internet of Things (IoT), connected device technologies, as one unified system for their capability to be developed and integrated into WHDR programs. The demonstration is done at three selected residences. The evaluation will consider both technologies and other program impact factors such as customer adoption, ease of recruitment, persistence, and data availability for M&V.

2. Collaboration

The progress and results have been shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls as well as with various interested attendees at the Internal Technology Transfer meetings.

3. Status

In Q4 2018 the project witnessed the completion of the Demand Response potential analysis of the three homes in the study. The final report of the project is also near completion. Originally the project was slated to end in Q4 2018, however there were some mild delays that pushed the timeline back. The cost analysis of the three ecosystems began in Q1 2019 and is expected to complete along with the final report by the end of Q2 2019.

4. Next Steps

The next steps for the project are to incorporate the following:

- Completion of the cost analysis in collaboration with SDG&E program costing team, including TRC, PAC, and RIM tests.
- Completion of the final report once the costing analysis has been finalized.
- Final project presentation for SDG&E residential programs teams.
- Upload the report to the Emerging Technology Coordinating Council (ETCC) website

C. Permanent Load Shifting Evaluation of a Refrigeration Battery

1. Overview

The Project will demonstrate the Refrigeration Battery's ability to maintain the desired temperature set-points of a supermarket's medium temperature refrigeration systems without running the central compressors or condensers for up to 8 hours at a time. By turning off medium temperature refrigeration compressors and condensers during on-peak hours, as defined by SDG&E's AL-TOU rate schedule, the Refrigeration Battery is expected to reduce the facility's monthly peak demand by up to 75 kW. If successful it would achieve a decrease in monthly peak demand of up to 25%.

2. Collaboration

The progress and results have been shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls as well as with various interested attendees at the Internal Technology Transfer meetings. This project has attracted some national media attention and strong interest from EPRI who is aiming to build on SDG&E's initial research in this space.

3. Status

Following longer than anticipated commissioning of the refrigeration Thermal Energy Storage (TES) system, the vendor announced the "Go Live" milestone and began the M&V period on November 12, 2018. Initial data submitted on November 15 showed significant gaps in trend data caused by settings in the vendor's trend data collection system.

After identifying some equipment issues that needed to be repaired in December 2018, the vendor requested to delay the M&V performance period to begin in January, after repairs had been made.

Following equipment repairs, the project resumed data collection and started the M&V performance period on January 16. Due to the colder than average winter temperatures, the project team expected M&V performance period to extend to the maximum of 8 weeks outlined in the project proposal. The data for the M&V period is expected to be available shortly after the M&V period ends on March 13th, 2019. kW Engineering will analyze this data and provide a draft report on the project in April 2019. There is a slight possibility that the M&V period will get extended again if sufficient savings correlations cannot be made.

4. Next Steps

The next project objectives are to complete project post trending, analyze the load shifting results, as well as analyze the economic merits of the system. Once the data is sufficiently analyzed, the final report will be completed and published to the ETCC website for public review and reference.

D. Demand Response with Variable Capacity Commercial HVAC Systems

1. Overview

Variable Capacity systems, with their onboard instrumentation and communications capabilities, are candidates for implementing both EE and DR measures at the same time. Efficiency rebates have been in place for such equipment in certain areas, but DR capabilities can push the technology further into the mainstream market, which is dominated by rooftop units, split systems and chiller/boiler combos. Commercial HVAC systems being a coincident load (peak power draw occurs during the hottest days) is a prime candidate for DR solutions besides being an efficient technology during normal operation.

The objectives for undertaking this study are:

- Determine the extent to which variable capacity commercial HVAC systems can provide DR services by reducing (or increasing) power draw.
- Define use cases for this advanced DR capability.
- Achieve integration of candidate systems with open protocols like OpenADR as an application layer.
- Provide operational data from field installed systems with advanced DR capabilities.
- Provide data and analysis to fulfill the needs of SDG&E's Technology Incentive (TI) Program as well as traditional DR programs such as Critical Peak Pricing Default (CPP-D) and Capacity Bidding Program (CBP).

2. Collaboration

The progress and results have been shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls as well as with various interested attendees at the Internal Technology Transfer meetings.

3. Status

In Q2 and Q3 of 2018 an ideal site was identified and prospected. After almost one full year of negotiation with the site they decided to participate in this demand response field demonstration. after best effort discussions, negotiations and accommodation with the facility owners, however, there remain to have multiple decision makers and they opted not to move forward.

4. Next Steps

SDG&E believes that the research associated with the premise of the project is important to continue pursuing. The team decided not to scrap the project but start over in the search for another ideal site.

SDG&E and contractors are reaching out to multiple distributors of variable capacity units to maximize the search efforts. The goal is to find another site with 2-8 variable capacity units and perform the analysis to fulfill the intended objectives of the project listed above.

E. Dehumidification & Water Purification Demand Response Project

1. Overview

This project is to evaluate the electrical load and demand response capabilities of two (2) types of dehumidification drinking water systems. Ten (10) dehumidification units from two different vendors will be installed in buildings around the SDG&E service territory. These units cool air below the dew point to produce water. The collected water is filtered, ozone is injected, then chilled or heated to use as an office “water dispenser” for drinking water.

The primary purpose of the assessment is to:

- Determine the load profile, baseline energy use and peak demand of the units.

- Determine the available peak load reduction of the units for a demand response event. Multiple reduction strategies may be analyzed,

including but not limited to turning the unit off or adjusting the water delivery temperature set points.

The secondary purpose of the assessment is to:

- Understand the added load (load growth potential) to the SDG&E territory assuming a penetration rate.

- Use the micro data to theorize what impact these products could have on the embedded energy in water distribution throughout SDG&E service territory.

2. Collaboration

The progress and results will be shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls. SDG&E ET is also collaborating with our Energy Innovation Center (EIC) to place two units for comparison study.

3. Status

The following work has been completed in Q4 2018 through Q1 2019:

- 2 Vendors were selected, and product quotes were furnished and approved.

- 10 dehumidification units were purchased. 5 units each from vendor 1 and vendor 2.

- The 5 units from vendor 1 have been shipped to EFM Solutions.

- Product Testing has commenced at EFM Solutions headquarters.

- Product testing has shown some results that may make this technology difficult for some end users to operate.
    - Offices with temperature settings for the ambient air that is below 74 degrees will not allow for the units to work properly.
    - Machines are very noisy, some client locations will not work if a quiet office setting is required.

- End users (customers) were identified and Field Demonstration Agreements were signed.

4. Next Steps

The Dehumidification & Water Purification Demand Response Project Plan references the project next steps as:

- Identify new customers that can handle the operating requirements that have been uncovered by the EFM product testing.
- Deploy the 5 Vendor 1 units to the end users.
    - EFM Solutions will deliver and install the units.
- Set a shipping and installation schedule for Vendor 2 units
    - Vendor 2 wants to install the units themselves, so this requires a little more logistical planning and training.
- Set the data loggers at time of installation for all 10 units.
- Deploy the Demand Event Simulations and record the data from the units.
- Once the demand response event simulations have occurred, collect the data loggers and analyze the information.

F. SDG&E's Energy Innovation Center (EIC) – Demonstrating DR Performance of a Variable Refrigerant Flow (VRF) – Indirect Evaporative Cooling (IEC) Hybrid System

1. Overview

Rooftop package air condition systems, or RTUs, are typical for many small to medium commercial office buildings. Replacing RTUs with more energy-efficient HVAC alternatives, such as heat humps, offers significant energy savings potential. Within the category of heat pumps, variable refrigerant flow (VRF) heat pumps offer even greater savings potential.

The selected vendor is also contracted with the California Energy Commission (CEC) to demonstrate the application of a hybrid system that combines VRF heat pump systems with Indirect Evaporative Cooling (IEC) units to possibly provide even greater energy savings. While the focus of the CEC project is to document the energy savings impact of the VRF-IEC hybrid system, the DR capability of this hybrid system is beyond the scope of CEC's direction.

However, the DR potential of the VRF-IEC hybrid system could be a potentially compelling value proposition that merits demonstration. Being able to understand the DR characteristics of the hybrid system regulated

by a "master controller" during all modes of operation (IEC Only, VRF Only, and simultaneous IEC and VRF) is critical to validate and quantify their DR impact.

2. Collaboration

This scope of work is an add-on to a larger CEC project that is focusing on the EE potential of the same combination of equipment and controls strategy. The results will also be shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls.

3. Status

The following is a detailed description of the work that was completed from Q4 2018 through Q1 2019:

Define system control architecture:

- Defined and described control architecture of VRF-IEC hybrid system.
- Defined available modes of operation during cooling season (economizer only; IEC; VRF; IEC + VRF simultaneously).
- Modes of operation determined as a function of the following variables:
    - Ambient temperature
    - Internal temperature and humidity
    - Internal thermostat setpoint
    - Internal comfort band (sensible- and latent- heat)
    - Occupancy (as measured by CO_2 sensors)
- Objective function to optimize operation of units for energy efficiency.
- Working with the controls contractor to install its Touch Energy IoT Gateway, integrated with cloud-based software that runs demand response control algorithms.

Develop DR Test Plan:

- Gateway will directly receive DR signals (e.g. event, price, or other grid signals) and shift system operation accordingly.
- Range of demand responsive actions (while maintaining occupant comfort band).
    - Switch from IEC mode to economizer mode
    - Switch from VRF mode to IEC mode

- Switch from VRF full loading to partial loading (reduce compressor and/or fan loads)
- Pre-cooling (with day-ahead notification) to minimize compressor operation

4. Next Steps

The next steps for this project are mainly to continue the development of the Demand Response Test Plan. The following actions need to take place in order for the project to stay on track.

- Specify communications protocols to deliver DR signals to the controls Gateway.

- Define DR use cases, e.g.
  - Day-ahead
  - Fast response (for frequency regulation, etc.)
  - Price response (e.g. simulated CPP, VPP, etc.)

- Script procedures based on use cases for a variety of conditions.

- Measure demand reduction impact.
  - Using Regression Analysis
  - Using 10-in-10 Baseline Analysis

- Implement DR Test Plan.

III. New Projects in 2019

A. In-Home Display & Smart Phone Application (PEEK) Behavioral Conditioning with Time of Use Billing for Energy Efficiency & Demand Response

1. Overview

Peek Smartphone App for iOS and Android for customer download, registration and activation. The application is complimentary to the in-home device, enabling the customer to view TOU pricing periods and period prices via their smartphones. The application also can provide other functions such as SDG&E message pushes to the customer, helpful links and other functionality as developed by the vender.

The goal of this project is to see if an SDG&E residential customer will:

1. Interact with the in-home display

2. Interact with the smart phone application
3. Yield any meaningful annual kWh savings verified using the NMEC analysis
4. Yield any Demand Response values due to smart phone application messaging using regression analysis as well as a 3-in-5 baseline
5. Yield a positive residential program design in the form of TRC, PAC, and RIM tests

2. Collaboration

The progress and results will be shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls. SDG&E ET is also collaborating with internal Residential Customer Program Advisors to keep them informed of potential measure value as the project yields positive cost-effectiveness. The ET Team is also collaborating with internal rates team and marketing groups to ensure effective messaging efforts to reach a total number of 500 targeted participants for this project.

3. Status

The necessary project contracts have been issued to the engineering review firm as well as the vendor for materials procurement. Project full kickoff will begin in Q2 2019.

4. Next Steps

The next step in this process will be to bring the complete project team together and have everyone agree on roles and responsibilities. Once the kick-off meeting has been completed SDG&E internal marketing teams will begin outreach to enroll customers who are on the SDG&E TOU-DR2 rate. The goal will be to reach participation saturation and then have the in-home devices mailed directly to the participants for self-installation.

B. Voice Activated Assistant for Energy Savings (IDSM Project)

1. Overview

Voice Assistants have found impressive nearly 30% market penetration in the US in just about a year. This is an incredible rate compared to hubs for energy management that have been tried and tested over the last decade and a half. Given that the voice assistants have now become a gateway for many consumer products, it is critical to understand how they can advance utility customer engagement and drive energy benefits acting as the point of entry for residential customers (and potentially small commercial customers as well). EPRI research from 2017 and 2018

indicated the potential for voice assistants to enable growth in customer engagement from basic messaging to personalizing customer experiences, with varying degrees of engagement in between. From a customer programs perspective, it is important to understand how voice assistants could play a role in allowing new programs or increasing adoption of existing programs.

This project will consist of the following tasks:

Task 1: Site identification. SDG&E will provide EPRI with up to five (5) qualified sites where the site owners are willing to accept proxy (or actual) time-of-use (TOU) rates. EPRI intends to interview potential site owners to convey optimal and suboptimal scenarios with new technologies, gauging the potential site owner's interest to engage despite potential outcomes. Site owners will also be interviewed by EPRI to see if they can be adopted into SDG&E's TOU rates with bill payment protection. Selected site owners will be required to provide EPRI with access to two years of prior AMI data to conduct the evaluation.

Task 2: EE cost saving measure selection for individual sites. This project will involve a total of up to five homes, with up to three of those homes with behavioral load management, providing messaging through voice assistants for higher cost periods and emergency events, and up to three of those homes with a mix of energy tools for cost savings through TOU rates. The site owners will be allowed to select from a pre-approved pool of end-use systems and devices illustrated in the table below:

Thermostats	Ecobee, Venstar, Rheem
Batteries	Sonnen
Water Heaters	Rheem
Blinds	Hunter Douglas

Task 3: Development of Voice Assistant Skills:

EPRI will work with SDG&E to develop versions of voice assistant skills that may include:

1. Integration of voice assistant to end-use devices using cloud-cloud integration. This is a technically complex initiative, EPRI has prior experience with some end use devices.
2. Messaging to homeowners about upcoming high price periods.
3. Messaging a high-price period and recommend a specific set of changes for customers to make (reset thermostats, etc.).

4. Messaging a high-price period and, based on customer response, automatically adjusting settings on end-use devices.
5. Provide customers feedback using AMI data (and device data as available) on energy use during normal and high-price periods using the voice assistant.
6. Providing customers an opt-out functionality for high-price periods (a "don't bother me" command).

Task 4: Device installation and testing. This task involves working with the homeowners to install devices (voice assistants or voice assistants + energy management devices). The end-use devices selected for installation may be influenced by the time required for procurement, installation, and code official approval. Should the time for installation of end-use devices jeopardize the time schedule required by SDG&E, those devices may be omitted from the project. Homeowners will then be required to enroll in the SDG&E TOU plans. Information is expected to be delivered through the voice assistants on pricing and energy savings. The intent is to measure customer engagement and end-use device performance over a range of weather conditions, including summertime when the potential for electric use reduction is high. If batteries are to be installed, EPRI will need to seek and obtain permits, which have a variable timeline. EPRI will notify SDG&E and seek permission (if needed) for installation contractors selected.

Task 5: DR events. This task initiates DR events through the voice assistant and measures impact through NMEC at the meter. This measurement is expected to provide a sum of both behavioral operation and automated device operation for DR. Up to 4 events should be implemented in each home during the summer of 2019.

Task 6: Analysis. The project seeks to compile energy use data using both AMI data and additional monitoring points (using device level data and circuit metering). The energy data should then be correlated with pricing signals to understand cost savings over the test period. These cost savings should be extrapolated to annual savings using building energy performance models. Working with SDG&E, the resultant data is expected to be plugged into program development tools for subsequent filings.

Task 7: Reporting. The reports will include a preliminary report by April 2019 that outlines the costs and implementation challenges for voice assistants in a programmatic setting as well as any measured savings using real TOU rates for selected homes. A final report is anticipated in October 2019 that includes both EE and DR impacts over the summer. A formal project handoff through a final presentation is expected at the end of 2019.

2. Collaboration

The progress and results will be shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls. SDG&E ET is also collaborating with our Residential Program Advisors to keep them informed of potential measure value as the project yields positive cost-effectiveness. The ET Team is also collaborating with rates team and internal marketing groups to ensure effective messaging efforts to reach the total desired number of targeted participants (500) for this project.

3. Status

Contracts have been negotiated and signed by SDG&E to kick off this project in Q1 2019. Site selection and evaluation have started to secure five (5) residential participants.

4. Next Steps

The next steps for this project are to complete the site selections as well as perform five job sites walk thru to detail the specific voice activation scope of work for each residence. These steps are expected to be completed by Q2 2019.

IV. Budget

Program Approved Budget 2018-2022[1]

	2018	2019	2020	2021	2022	TOTAL
ET-DR	$656,100	$675,900	$695,700	$717,300	$738,900	$3,483,900

[1] Approved Budget per D.17-12-003 (dated December 14, 2017)