DEMAND RESPONSE EMERGING TECHNOLOGIES PROGRAM

SEMI-ANNUAL REPORT 2022

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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 Q2 2022 and Q3 2022 is being submitted pursuant to Ordering Paragraph 59 and the discussion at pages 145-146 of Decision (D.) 12-04-045. During Q2 and Q3 2022, San Diego Gas & Electric DR-ET Program completed one (1) project, continued to manage four (4) ongoing projects, and no new projects were started.

I. Completed Projects during the Reporting Period

A. Smart Thermostat Software Evaluation

1. Overview

The Smart Thermostat Software Evaluation project evaluated the energy and on-peak demand savings attributable to a software feature that has been rolled out to selected thermostats in the SDG&E service territory. The software features five energy and demand savings functions:

1) Feels Like - This function detects fluctuations in the home's indoor humidity to ensure that it feels like the temperature homeowners set on their thermostat. This function is designed for both energy efficiency and home comfort even during periods of high or low humidity.
2) Schedule Assistant - This function monitors the thermostat's schedule. When the schedule does not match with the home's historic HVAC usage routine, Schedule Assistant recommends a new schedule to the user.
3) Smart Home and Away - This feature adjusts the temperature setpoint when it detects that the home is unoccupied. It quickly restores the temperature settings when it detects that the home is occupied again.
4) Time of Use - This function pre-cools and pre-heats the home during off-peak times of day. For customers that are on time of use electricity rates, this function can lower electricity bills by shifting cooling and heating to times of day when electricity is less expensive.
5) Community Energy Savings (CES) - The CES function makes small thermostat setpoint adjustments to reduce energy consumption from cooling or heating during demand response events.

SDG&E worked with the manufacturer to identify customers who would receive the software offer. Of the 1,300 customers who received the offer, 950 enrolled.

The primary objective of this evaluation was to develop ex post load impact estimates for overall energy (kWh) consumption and average reduction of on-peak demand (kW). The evaluation was completed in accordance with the California Demand Response (DR) Load Impact Protocols adopted by the Commission in Decision (D.) 04-08-050.

The evaluation included the following tasks: development of an EM&V Plan; data collection and validation; load impact estimation and ex ante forecasting; and a final report that summarized the findings of this evaluation.

2. Collaboration

The progress and results were shared with other CA IOUs ET-DR Leads. SDG&E's ET Team collaborated with its Demand Response Program team on this study.

3. Status

The project has been completed, and the report has been published to the Emerging Technologies Coordinating Council (ETCC) website for public review and reference.

II. Ongoing Projects thru the Reporting Period

A. Dehumidification & Water Purification Demand Response Project

1. Overview

This project is evaluating the electric load and demand response capabilities of two (2) types of dehumidification drinking water systems. Ten (10) dehumidification units from two different vendors were 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 reasonable 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 were shared with other CA IOUs during scheduled monthly DR-ET Leadership conference calls. SDG&E's ET Team also collaborated with its facilities by placing two units for comparison study at its Energy Innovation Center (EIC) and Company office.

3. Status

Due to COVID-19, all units that initially were placed in facilities throughout the SDG&E territory have experienced a significant decline in usage due to business operations adjustments in response to the stay-at-home orders. SDG&E worked with its Measurement & Verification consultant to attempt to resume operation of the units where possible.

4. Next Steps

The project has been extended thru Q4 2022 to allow time for the data collected from the units to be analyzed. The final report is expected to be available in Q4 2022. The final report will be published to the ETCC website for public review and reference.

B. 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 rooftop units (RTUs), are typical for many small to medium commercial office buildings. Replacing

RTUs with more energy efficient HVAC alternatives, such as heat pumps, 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 are also to be shared with other CA IOUs ET-DR Leads.

3. Status

All DR testing of the controller units at both the Energy Innovation Center (EIC) and the site in SCE territory is complete. Post trending has concluded, as well as the analysis of the data. Due to an unanticipated staffing change, the vendor has continued to experience delays in preparing the final report.

4. Next Steps

The final report is expected to be completed in Q4 2022 and will be posted to the ETCC website for public review and reference.

C. Electric Vehicle (EV) Charging Impact Study

1. Overview

This study is being conducted to test the real-world impact of Electric Vehicle (EV) charging on a commercial office building located in the SDG&E service territory.

The study will examine the impact of introducing EV level 2 charging on a 57,000 sq. ft. commercial office building. The site is equipped with a 90 kW (AC) solar PV system, a 30 kW / 40 kWh Battery Energy Storage (BES), and four level 2 charging stations (8 ports).

The overriding goal of this study is to identify and quantify solar over-generation mitigation as a benefit of interconnected workplace EV charging. The results should provide insight into the potential for mass EV adoptions ability to achieve this goal.

Below are some of the key questions that could be examined in the study:

- Can EV charging help mitigate the impact of solar over-generation on the grid?

- Can a BES system be utilized to help flatten the usage curves, and is daytime EV charging counterproductive to shifting of demand?

- What charging utilization threshold must be achieved to demonstrate reasonable impact, and how long does it take from launch to achieve this level of usage?

- Is workplace charging cost effective for site hosts?

- What impact will EV charging have on solar sizing for a facility?

- Are current tariff structures amenable to the promotion of EV charging and load shifting?

2. Collaboration

The progress and results will be shared with other CA IOUs ET-DR Leads. SDG&E's ET Team is also collaborating with its Demand Response Program and Clean Transportation team on this study.

3. Status

The vendor has completed the data collection and analysis for the final report.

4. Next Steps

The final report is expected to be complete in Q4 2022. The final report will be posted to the ETCC website for public review and reference.

D. Shelter Valley Virtual Power Plant Project

1. Overview

The Shelter Valley Virtual Power Plant (VPP) project will evaluate the control, dispatch and real-time signaling of behind the meter resources installed throughout a vulnerable community in the SDG&E service territory.

Shelter Valley is a small, unincorporated community located in an area of East San Diego County that is more prone to outages and Public Safety Power Shutoff (PSPS) events. The project seeks to help build a smart, resilient community while boosting energy reliability and emergency preparedness. The project will evaluate the impact the VPP can have during peak energy consumption periods and when load might need to be shifted or curtailed due to severe weather or other grid conditions.

The VPP is expected to include a variety of resources including battery storage, smart thermostats, and other smart devices. New battery storage systems are being prioritized to customers with existing solar who are on medical baseline and/or those with access & functional needs.

SDG&E has contracted with a vendor to assist with administration of the project including the recruitment of customers to participate in the study and installation of devices inside participating customers' homes. A separate vendor is contracted to enable a cloud-based platform that can control multiple resources integrated into the VPP.

2. Collaboration

The progress and results will be shared with other CA IOUs ET-DR Leads. SDG&E's ET Team is also collaborating with its Advanced Clean Technology, Sustainability, Marketing & Communications and Demand Response Program teams on this study.

3. Status

The cloud-based VPP control platform was tested with multiple device types in Q2 & Q3 2022. Customer outreach and recruitment continued thru Q3 2022. Site visits have been conducted at customer homes to verify eligibility and identify existing and/or new resources that could be incorporated into the VPP.

4. Next Steps

Devices are planned to be installed at customers' homes and the Community Center in Q4 2022. SDG&E plans to extend the project thru 2023 to provide additional time for installed devices to be signaled and

controlled by the VPP platform. The final report will be published to the ETCC web site for public review and reference.

III. New Projects Initiated during the Reporting Period

No new projects were initiated during the reporting period.

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)