

Energy Division Central Files Document Coversheet

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1. Fill out coversheet completely. Coversheet can be embedded as page 1 of the electronic compliance filing, or can be submitted as a separate document that is attached to the email that delivers the compliance filing.
2. All documents are required to be submitted in an electronically *searchable* format.
3. Documents need to reference the reason for the mandate that ordered the filing in Section B or C. If you are unable to reference a proceeding or explain the origin of your filing, please contact Energy Division Central Files.
4. To find a proceeding number (if you only have a decision number), go to <http://docs.cpuc.ca.gov/DecisionsSearchForm.aspx>; enter the decision number, and the results shown include the proceeding number.

A. Document Name

Today's Date (Date of Submittal) [3/31/2022](#)

Name:

1. Utility Name: [San Diego Gas & Electric](#)
2. Document Submission Frequency (Annual, Quarterly, Monthly, Weekly, Once, Ad Hoc): [Semi-Annual](#)
3. Report Name: [SDG&E's Demand Response Emerging Technologies Semi-Annual Report 2022](#)
4. Reporting Interval (the date(s) covered by the data, e.g. 2015 Q1): [2021, Q4 and 2022 Q1](#)
5. Name Suffix: [Cov](#) (for an Energy Division Cover Letter), [Conf](#) (for a confidential doc), [Ltr](#) (for a letter from utility)
6. Document File Name (format as 1+2 + 3 + 4 + 5): [SDG&E Semi-Annual DR Emerging Tech Report - Mar 31 2022](#)

Sample Document Names:

Utility Name + Submittal Frequency + Report Name + Year + Reporting Interval

SCE Annual Procurement Report 2014

SDG&E Ad Hoc DR Exception 2015Q1 Conf

SEMPRA Monthly Gas Report 201602

SEMPRA Daily Gas Report 20160230 <no suffix for regular, non-confidential compliance data>

SEMPRA Daily Gas Report 20160230 Cov

SEMPRA Daily Gas Report 20160230 Ltr

7. Identify whether this filing is original or revision to a previous filing.
 - a. If revision, identify date of the original filing: [Click here to enter text.](#)

B. Documents Related to a Proceeding

All submittals should reference both a proceeding and a decision, if applicable. If not applicable, leave blank and fill out Section C.

1. Proceeding Number (starts with R, I, C, A, or P plus 7 numbers): [A.11-03-001](#)
2. Decision Number (starts with D plus 7 numbers): [D.12-04-045](#)
3. Ordering Paragraph (OP) Number from the decision: [59](#)

C. Documents Submitted as Requested by Other Requirements

If the document submitted is in compliance with something other than a proceeding, (e.g. Resolution, Ruling, Staff Letter, Public Utilities Code, or sender's own motion), please explain: [N/A](#)

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D. Document Summary

The Demand Response Emerging Technologies (DT-ET) Program Semi-Annual Report for the period of Q4 2021 and Q1 2022 is being submitted pursuant to Ordering Paragraph 59 and the discussion at pages 145-146 of Decision (D.) 12-04-045. During Q4 2021 and Q1 2022, SDG&E DR-ET Program completed 3 projects, continued to manage 4 ongoing projects, and 1 new project was started.

E. Sender Contact Information

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F. Confidentiality

1. Is this document confidential? No Yes
 - a. If Yes, provide an explanation of why confidentiality is claimed and identify the expiration of the confidentiality designation (e.g. Confidential until December 31, 2020.)

G. CPUC Routing

Energy Division's Director, Edward Randolph, requests that you not copy him on filings sent to Energy Division Central Files. Identify below any Commission staff that were copied on the submittal of this document.

1. Names of Commission staff that sender copied on the submittal of this Document: [Aloke Gupta, ED](#)

ver.7/6/2016

**DEMAND RESPONSE
EMERGING
TECHNOLOGIES
PROGRAM**

**SEMI-ANNUAL
REPORT 2022**

March 31, 2022



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Summary

The Demand Response Emerging Technologies (DR-ET) Program Semi-Annual Report for the period of Q4 2021 and Q1 2022 is being submitted pursuant to Ordering Paragraph 59 and the discussion at pages 145-146 of Decision (D.) 12-04-045. During Q4 2021 and Q1 2022, San Diego Gas & Electric DR-ET Program completed three (3) projects, continued to manage four (4) ongoing projects, and one (1) new project was started.

I. Completed Projects during the Reporting Period

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

1. Overview

The TOU display device works in conjunction with a smartphone app that is available for customer download, registration, and activation. The application is complimentary to the in-home device, enabling the customer to view time-of-use (TOU) pricing periods and period prices via their smartphones. The application can also provide other functions such as SDG&E message pushes to the customer, helpful links and other functionalities as developed by the vendor.

The goal of this project is to verify if a 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 (Normalized Metered Energy Consumption) analysis.
4. Yield any Demand Response values due to smart phone application messaging using regression analysis as well as a 3-in-5 baseline; and/or
5. Yield a positive residential program design in the form of Total Resource Cost (TRC), Program Administrators Cost (PAC), and Ratepayer Impact Measure (RIM) tests.

2. Collaboration

The progress and results have been shared with other CA IOUs ET-DR Leads. SDG&E's Emerging Technologies Team has collaborated with internal Residential Customer Program Advisors to keep them informed of potential measure value as the project yields positive cost-effectiveness. The ET Team also collaborated with SDG&E's rates team and marketing groups to ensure effective messaging efforts.

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.

B. Voice Activated Assistant for Energy Savings (Integrated Demand Side Management Project)

1. Overview

Voice Assistant type products have found nearly a 30% market penetration in the US in under a year. This is an incredible rate compared to hubs for energy management that have been tried and tested over the last 15 years. Given that 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 personalized 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 consists 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) 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. EPRI will also interview site owners 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 Advanced Metering Infrastructure (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:

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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 assistants to end-use devices using cloud-based integration. This is a technically complex initiative, and EPRI has prior experience with certain 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. Providing customers feedback using AMI data (and device data as available) on energy use during normal and high-price periods using the voice assistants.
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 collaborating 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.

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Task 5: DR events. This task initiates DR events through the voice assistants and measures impact through Normalized Metered Energy Consumption (NMEC) at the meter. This measurement is expected to provide a sum of both behavioral operation and automated device operation for DR. More than four events were implemented in each home during Q3 2020.

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 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 formal project handoff to internal stakeholders through a final presentation will be held in Q4 2021. The final report is undergoing final review and is anticipated to be completed by Q4 2021.

2. Collaboration

The progress and results have been shared with other CA IOUs ET-DR Leads. SDG&E's ET Team is also collaborating with its Residential Program Advisors to keep them informed of potential measure value as the project yields positive cost-effectiveness.

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.

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 eight (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

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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 ET-DR Leads 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 Electric Power Research Institute (EPRI) who is aiming to build on SDG&E's initial research in this space.

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:

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- 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 Q2 2022 to allow time for the data collected from the units to be analyzed. The final report is expected to be available in Q2 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

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(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 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

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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 is conducting analysis for the final report.

4. Next Steps

The data analysis and final report are expected to be complete in Q2 2022. The final report will be posted to the ETCC website for public review and reference.

D. Smart Thermostat Software Evaluation

1. Overview

The Smart Thermostat Software Evaluation project will evaluate 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:

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

The evaluation will include 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 summarizes the findings of this evaluation.

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 team on this study.

3. Status

The vendor has completed its analysis and has prepared a draft final report that is currently undergoing review.

4. Next Steps

The final report is expected to be completed in Q2 2022. The final report will be posted to the ETCC website for public review and reference.

III. New Projects Initiated during the Reporting Period

A. 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 smart plugs. 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.

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3. Status

The project fully contracted in Q4 2021. The cloud based VPP control plan was enabled in Q1 2022. Community outreach events began in Q1 2022

4. Next Steps

Community outreach and customer recruiting will continue into Q2. Site visits will be conducted at customer homes to verify eligibility and identify existing and/or new resources that could be incorporated into the VPP. New resources are expected to be installed in Q2 2022 with testing taking place in Q3 & Q4 2022. The project expects to continue thru Q1 2023 with a final report published to the ETCC web site for public review and reference by Q2 2023.

IV. Budget

Program Approved Budget 2018-2022¹

	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)