

**Emerging Markets & Technology
Demand Response Projects
2024 Q4 – 2025 Q1 Semi-Annual Report**

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I. Summary

Pacific Gas and Electric Company (PG&E) submits this semiannual report as directed in *Decision Adopting Demand Response Activities and Budgets for 2012 through 2014*, Decision (D.) 12-04-045, Ordering Paragraph (OP) 59 and continued per D.14-05-025 and D.16-06-029 adopting Bridge Funding for 2015-16 and 2017, respectively. The Demand Response Emerging Technologies (DRET) Program was also approved in the *Decision Adopting Demand Response Activities and Budgets for 2018 through 2022*, D.17-12-003.

PG&E's DRET program continues to explore new technologies and applications that have the potential to enable or enhance demand response (DR) capabilities and can include hardware, software, design tools, strategies, and services. Examples of some of the types of enabling technologies that have been investigated are advanced energy management control systems (EMCS), direct load controls, and advanced heating, ventilation, and air conditioning (HVAC) controls.

PG&E's DR Portfolio Strategy centers on addressing both customer and grid needs today and, in the future, taking into account Rule 24, and the enablement of DR integration into the ISO wholesale markets. In addition, PG&E acknowledges the rapid development of "smart" devices, storage, and other technologies that are seeing increasing customer adoption across sectors and have the potential to help customers better perform in DR programs and or dynamic rates.

PG&E, Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E), collectively referred to as the Investor Owned Utilities (IOUs), share updates on individual projects, including project status and findings, at monthly DRET conference calls as well as via participation in the Emerging Technologies Coordinating Council (ETCC) quarterly meetings.

II. Projects Completed in Q4 2024 and Q1 2025

No DRET study was completed during this time.

III. Project Initiated since Q4 2024

A. CEC Industrial, Agricultural, Water (IAW) Flex Hub

1. Overview

The goals of the IAW Flex Hub is to demonstrate demand-flexible technologies in the industrial, agricultural and water sectors, to validate technologies and business cases for industry that will accelerate technology options, gather and share data to support innovative rates that

unlock the potential of demand flexibility in these critical industries, and to provide benefits to disadvantaged communities across the state. The proposed Industrial Flex Hub will target four (4) demonstration projects in PG&E's service territory across a diverse set of industries that will enroll in PG&E's demand response or dynamic pricing programs or pilots. Information gathered and generated through the Industrial Flex Hub will be shared to help inform PG&E about opportunities to optimize the benefits of demand flexibility across its service territory.

2. Collaboration

IAW Flex Hub partner includes the Electric Power Research Institute (EPRI), University of California, Davis (UC Davis), Lawrence Berkeley National Laboratory (LBNL), Stanford University, Fresno State University, DNV, community partner PSE Healthy Energy, and IAW Flex Hub lead Momentum.

3. Results/Status

Momentum is in the contracting process with CEC.

4. Next Steps

The DRET team will participate in the kick off meeting and all other tasks necessary to contribute to the scopes of this Flex Hub.

B. Field Test residential EMS with Matter standard

1. Overview

The goal of this project is to demonstrate the feasibility of optimizing off-the-shelf Matter devices, such as thermostats, through direct communication with grid signals. The demonstration will explore how and whether Matter, the new smart home connectivity standard, can enhance interoperability, improve user experience, and enable optimized energy usage through seamless integration with a smart home automation hub. The grid signals may come from different sources such as OpenADR 3.0, showcasing how Matter devices can be paired with a Matter enabled central smart home automation hub to establish seamless interaction between devices from different manufacturers within the local area network (LAN).

2. Collaboration

The DRET study will partner and two third party vendors to implement this study. One providing Matter certified technologies and the other one providing OpenADR 3.0 Virtual Top Node.

3. Results/Status

No result is available at this time.

4. Next Steps

PG&E will start contracting process with these two vendors in the second quarter of 2025.

IV. Ongoing DRET Projects

A. Smart Electric Panel Lab Test

1. Overview

In recent years, electric panel manufacturers have started to add connected technologies to traditional electric panels. These technologies include integrated or add-on software controls that provide customers with additional information, control and capabilities beyond a traditional panel.

Below are the objectives of the study:

- Evaluate smart panel installation difficulty
- Evaluate smart panel customer app functions
- Evaluate smart panel utility app functions
- Validate that the smart panel is safe to operate for field demonstrations

2. Collaboration

PG&E's DR Emerging Technology and PG&E's Applied Technology Service (ATS) teams jointly designed and will implement the test cases and procedures for the lab tests.

3. Results/Status

The ATS team installed two smart panels at its San Ramon location. The panels are connected to a load simulator, which may expand to real residential electric loads such as air conditioning, electric vehicles, and

water heaters in the future. The team is currently developing test cases for the customer and utility apps.

4. Next Steps

The ATS team installed a new EV charger coupling with the existing smart panel. New testing will be done on how well the smart panel can respond to different demand response and load management use cases. In addition, the team identified a new smart panel from a different manufacturer for testing and comparison. This new smart panel is designed for SMB customers, therefore, new use cases will be developed in this area. The installation of the second panel was completed and the ATS lab plan to start testing the new panel in second quarter of 2025. In addition, the original smart panel manufacturer have developed new load management functions and the lab is in the process of testing these new functions.

B. Residential load management software platform

1. Overview

Home Energy Management system provides the functions and capabilities for residential customers to manage their energy use by behavior changes and/or automation through different energy end uses. The Study will assess residential customers' receptiveness and ability to perform load management with the support of a load management app, which serves as a home energy management system.

1. What is the effectiveness of emissions reductions messaging in:
 - Reducing household emissions
 - Shifting energy usage to off-peak periods
 - Engaging customers in load management awareness and education
2. What are the incremental load impacts of emissions reductions messaging to existing DR participants.
3. Can new communication protocol (e.g., Matter) be leveraged to automate load management measures.

2. Results/Status

The DRET team have contracted with a 3rd party software company to develop an advanced API to enable the residential load management

software platform and app last quarter. The DRET team successfully developed the advanced API with the software company and a partnership agreement with the residential load management software platform company.

3. Next Steps

The DRET team will continue to work with the residential load management software platform company to evaluate its GHG impact and develop new LM functions in 2025. PG&E have contracted with a M&E company to start evaluating the effectiveness of this software in the third and fourth quarter of 2025.

C. Voice Automation Technology for Load Management Study Phase 2

1. Overview

PG&E started to default residential customers to TOU rates in April 2021. Therefore, PG&E continue to expand the existing tools and technologies offered on its website to help customers understand new time varying rates. Similar to Phase 1 the objective of this DRET study is to leverage residential voice assistant technology (such as Amazon Alexa) and mobile app to educate residential customers on energy usage and bill forecasts, rates, TOU and RTP automation/optimization, and notification of utility events.

Customer engagement through Voice Assistants require the customer to have access to Amazon Alexa via speakers, display, and/or mobile app. Information was collected and processed from PG&E's internal rate engine and Share My Data (SMD) to a third-party system. The customer would then interact with a third-party system (Energy Expert) through their smart speakers, smart display, and mobile devices. The Energy Expert advised the customers to optimize their energy use based on the customer's rate schedule. In addition, the app provided customer notification such as Smart Days and PSPS events.

2. Collaboration

The DRET team will partner with the internal customer care Pricing Product and Marketing teams to develop frequently asked questions (FAQs) that relate to TOU and load management. In addition, this mobile app has the capability to support the recently approved expanded RTP pilot. The DRET team will work with the pilot team on such collaboration

when appropriate. PG&E hired the same third party to continue the development of the mobile app for this study.

3. Results/Status

A contract was developed for this study and the DRET team is working with internal customers experience team to enhance the look and few of this application.

4. Next Steps

PG&E will work with internal marketing team to expand the user base of this mobile app.

D. Flexible Demand Response Collaborative

1. Overview

The objectives of the project are to: 1) demonstrate the capability and value of large loads like water pumping, EV fleets, and data centers to flex usage; 2) characterize and model the capability and availability of large pumps and other loads for better integration in power system operations; and 3) foster industry collaboration to explore program alternatives and share best practices in sustainably engaging Flex DR to support system flexibility needs.

2. Collaboration

The DRET study is a partnership with the Electric Power Research Institute (EPRI).

3. Results/Status

PG&E contracted with EPRI and started to engage with this project. There was a meeting with other participating utilities in February, which PG&E participated remotely.

4. Next Steps

PG&E will continue to participate in this collaborative and identify if there is any best practice and lessons learned that can apply to PG&E's programs.

E. Field Test OpenADR 3.0 for dynamic rate

1. Overview

This DRET Study will contract with an Automated Service Provider (ASP) to bring small medium business customers into the dynamic rate using the recently developed Open Automated Demand Response (“OpenADR”) 3.0 specification. The DRET Study is intended to assist in accessing the cost and benefits of day ahead hourly rates, including required infrastructure, manufacturer interest, and customer impacts when using this new open standard.

2. Collaboration

The DRET study will partner with internal pricing product team since they will be leading the development and implementation of the expanded RTP Pilots.

3. Results/Status

No results to share at this point.

4. Next Steps

The ASP have enrolled two customers into the study, and is in the process of developing a OpenADR 3.0 VEN. PG&E expect the ASP and customers to start receiving price signal in the second quarter of 2025.

V. Budget

2024-2027 DRET Budget (Excluding VCE Pilot)

The following is a breakdown of the total expenditures for PG&E’s 2024-2027 DRET budget. These values are based on accruals made each month. Values do not reflect commitments for projects, including those described in this report, which have been scoped and contracted for, but not yet executed.

Approved 2024-2027 Budget	\$5,784,000
Budget Spent as of February 2025	\$457,254
2024-2027 Budget Remaining	\$5,326,746