



*Pacific Gas and  
Electric Company*<sup>®</sup>

# **Emerging Markets & Technology Demand Response Projects 2020 Q2 – Q3 Semiannual Report**

**September 30, 2020**

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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*, 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 on DR programs.

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 Q2 2020 and Q3 2020**

PG&E did not complete any DRET assessments during the Q2 – Q3 2020 time period.

## **III. Projects Initiated in Q2 2020 and Q3 2020**

### **A. Develop a residential ADR incentive for EV Charging Controls**

#### **1. Overview**

In 2019, the ADR Program conducted a Collaborative Stakeholder Process to identify and vet emerging residential ADR technologies for potential inclusion in the program. This process found that EV charging control (such as onsite charging station, or manufacturers telematic) were an

excellent fit for the ADR program, based on the rigorous criteria and stakeholder process employed in the study. However, surveys with the vendors and their respective control technologies indicate that they were not ready for full-scale rollouts at the time for various reasons.

In order to develop a residential ADR incentive for EV charging controls, this study will test EV charging controls in a field setting and measure the DR impact of such technologies. The study will:

1. Identify relevant eligibility criteria for EV charging controls' participation in the field test, and more broadly, in PG&E DR programs.
2. Identify EV charging controls and assess their DR impact in a field test.
3. Characterize, to the extent possible, the average load management potential for identified residential EVs in PG&E territory:
  - a. Characterize load management groups of PG&E EV owners based on their EV's, TOU rates, and charging habits.
  - b. Document existing DR incentives available through PG&E programs (e.g., Smart Rate, Demand Response Auction Mechanism (DRAM) and Capacity Bidding Program (CBP)) to inform how the residential ADR program fits into the DR landscape and how ADR incentives for EV ADR controls should apply to these different DR programs.
4. Assess potential ADR incentive designs and amounts for residential EV charging control technologies.

## **2. Collaboration**

The DRET team will collaborate with the internal EV team to implement this study. PG&E is planning to hire the same consultant that lead the ADR Collaborative Stakeholder Process to manage this DRET study.

## **3. Results/Status**

The DRET team scoped this study in the third quarter of 2020, and PG&E started the contracting process with the consultant in September 2020.

## **4. Next Steps**

This assessment is scheduled to start on November 2020 and will last twelve months. PG&E will provide updates on the bi-annual DRET report in the future.

## **B. Using voice automation technology for load management**

### **1. Overview**

PG&E plans to default residential customers to TOU rate starting April 2021. Therefore, it is important to develop tools and technologies to help customers to be successful in this new time varying rates. The objective of this DRET study is to leverage residential voice assistants technology (such as Amazon Alexa, Google Home) to educate residential customers on energy usage and bill forecast, rates and Time-Of-Use automation/optimization, available of Internet-of-Things (IoT) and connectivity, configuration, and notification on utility information. This study has two phases:

Phase I – Customer Engagement through Voice Assistants: This phase has no dependence on smart home energy hub hardware installation, however, it does require customer having access to Amazon Alexa (and in the future Google Assistants, etc.) via speakers, display and/or mobile app. Information is collected and processed from PG&E’s Share My Data (SMD) to 3<sup>rd</sup> party system. Customer would then interact with a 3<sup>rd</sup> party system (Energy Expert) through smart speakers, display and mobile devices. The Energy Expert will advise the customers to optimize energy use based on the customer’s rate schedule.

Targeted customer – up to 50 friendlies (combination of PG&E employees and friends of PG&E employees)

Phase II – Real Time Usage & Optimization: This phase requires the installation and commissioning of a smart home energy hub that connects with the customer’s Smart Meter and IoT devices.

Targeted customer – up to 200 friendlies (combination of PG&E employees and friends of PG&E employees)

### **2. Collaboration**

The DRET team will partner with the internal customer care team to develop frequently asked questions (FAQs) that relate to TOU and load management. PG&E plans to hire a 3<sup>rd</sup> party to provide the voice automation software (Energy Expert).

### **3. Results/Status**

The DRET team scoped this study in the second and third quarter of 2020, and PG&E started the contracting process with the consultant in August 2020.

### **4. Next Steps**

This assessment is scheduled to last until the end of 2021; PG&E will provide updates on the bi-annual DRET report in the future.

## **C. Heat Pump Water Heater barriers and mid-stream solution study**

### **1. Overview**

As CA policy focuses on reducing GHG emissions, residential natural gas use is one of the sources of GHG emissions in the state that warrants attention. The majority of existing single family and low-rise multifamily buildings use natural gas for some or all of the following end uses: space heating, water heating, cooking, clothes drying, fireplace and pool heating. The State has allocated funding from several different sources for residential electrification efforts targeting space and water heating equipment. As the market is developing and initial programs have launched to support these efforts, several challenges have been identified that could significantly delay market transformation.

Converting existing gas water heaters to heat pump water heating equipment across the state will require a comprehensive effort across the entire industry, including education for homeowners and equipment manufacturers, enforcement personnel, distributors and installers. Initial efforts have identified several challenges that inhibit selection and installation of Heat Pump Water Heaters (HPWH), including, but not limited to:

- Insufficient panel capacity,
- location of existing equipment (e.g., most HPWH require 240V supply, no electricity (or only 120V) at equipment location)
- permitting (both electrical and plumbing),
- familiarity with technology – both for homeowners and contractors
- equipment not locally stocked.

As most water heater replacements are triggered by equipment failure with the majority resulting in emergency replacements, the objective of this DRET study is to identify potential solutions to these barriers, with a focus on leveraging mid-stream channels such as contractors, distributors, and retailers to increase adoption of this technology.

## **2. Collaboration**

This study is a joint EE/DR Emerging Technology Study. PG&E is planning to hire a 3<sup>rd</sup> party to lead this research project.

## **3. Results/Status**

The DRET team is in the process of developing the scope for this study and plans to select a 3<sup>rd</sup> party vendor to lead the study in the fourth quarter of 2020.

## **4. Next Steps**

This assessment is scheduled to start in the 4<sup>th</sup> quarter of 2020 and will last for six to twelve months. PG&E will provide updates on the bi-annual DRET report in the future.

# **IV. Ongoing DRET Projects**

## **A. *Water Saver Pilot***

### **1. Overview**

As part of PG&E's Assembly Bill 2868 proposal, PG&E proposed a behind-the-meter (BTM) thermal storage program with a goal to reduce peak load by up to 5 megawatts (MW) by 2025 using smart electric water heaters and/or smart control devices. This proposal will incentivize customers to replace existing propane-based and Electric Resistance Water Heaters (ERWH) with hybrid Heat Pump Water Heaters (HPWH) in single family homes, multi-family homes, and small businesses, as well as provide a pay-for-performance incentive to operate electric water heaters during off-peak hours (late evening, early morning and afternoon).

The purpose of the DRET assessment is to test program implementation approaches that could be used for an actual program when the AB 2868 proposal was approved in 2019 for PG&E to launch the program in 2020. The DRET assessment was separated into two Phases. Phase 1 was a lab test and Phase 2 was a field test, with the following objectives:

Phase 1 Lab Test focus is on evaluating two HPWH units and two ERWH units:

- User interfaces
- Customer platform functions and utility platform functions
- CTA 2045 control and capability
- OpenADR signal capability
- Manufacturers support and warranties

Phase 2 Field Test focus is on evaluating:

- The customers' willingness to adopt connected HPWH
- Test multiple incentive levels for customers who adopted HPWH
- The EE benefit from HPWH and load shifting potential for TOU rate
- Benefits to sending daily OpenADR signals to manage TOU and the effectiveness of different messaging on marketing materials

## **2. Collaboration**

The DRET Program partners with PG&E's internal Energy Efficiency group, its Applied Technology Solution laboratory (ATS), and its Pricing Product team on this assessment.

## **3. Results/Status**

The project team deployed Phase 2 Field Test in 2019, and has installed 49 HPWH, 40 heater controllers as of June 30<sup>th</sup>, 2020. The study introduced a new incentive to customers and contractors in fourth quarter of 2019, which was the major driver of the increase in installations.

Below are some interim findings based on the installed populations:

- The reduction from the heat pump with storage operations is 0.24 kW or a drop of 64.6% relative to the baseline (non-heat pump) unit.
- Most of the reduction, 0.19 kW (51.5% drop), is due to the efficiency of the heat pump.
- Once you factor in efficiency, the amount of water heater load available to shift is very small, 0.18 kW per unit (4-9 pm average).
- Incremental drop of the storage operations over and above efficiency is 0.05 kW. While this may appear to be small, relative to the load available to be shifted (0.18 kW), it's significant with a 28% change.



- The conclusion that efficiency led to a drop in on peak energy use and that storage operations led to an even bigger drop are statistically significant, meaning that the likelihood the differences are due to randomness is close to zero. In technical terms, we have strong internal validity.
- The interim analysis does not include all of the devices in the field.
- The kW load shift capability for the electric water heater control units should be much bigger because they are connected to traditional water heaters that have a lot more load to shift.

#### **4. Next Steps**

The draft final report was provided to PG&E from the project consultant on September 18, 2020, and the DRET team is in the process of reviewing the report. Once the report is finalized, it will be posted at the ETCC website.

### **B. Evaluate 3rd party aggregator and vendor interest on residential digital rate**

#### **1. Overview**

The objective of this study is to evaluate 3rd party (example: IDSM aggregators and smart energy vendors/manufacturers) interest in receiving residential digital rate in order to help residential customers to be successful when enrolling a dynamic rate such as TOU, EV and Smart Rate. Below are the proposed scoping topics for this study:

- Defining what is a digital rate
- Determine the format of the dynamic rate
- Scoping IT infrastructure design that can be scaled in the future
- Documenting 3rd parties' preferences on the channels and different type of rates
- Testing different channels that can provide digital rates to 3rd parties
- Testing the elasticity of different type of rates (dynamic, tier and non-tier, etc.)

#### **2. Collaboration**

PG&E's DR Emerging Technology and Share My Data teams jointly designed and will implement this Emerging Technology assessment.

Internal stakeholders would include the Pricing Product and IT Team. A consultant would be hired to lead the Measurement and Evaluation of this study.

### 3. Results/Status

In Q1 and Q2 of 2020, PG&E developed the research project design/scope. In the third quarter, PG&E evaluated internal IT processes in order to identify a way to develop a digitized residential rate. The DRET team expect to hire a 3<sup>rd</sup> party to develop a digital rate interface in the fourth quarter of 2020.

### 4. Next Steps

This assessment is scheduled to last 15 to 18 months, PG&E will provide updates in the bi-annual DRET report in the future.

## V. Budget

The following is a breakdown of the total expenditures for PG&E's 2018-2022 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 2018-2022 Budget	\$7,230,000
<u>Budget Spent as of August 31<sup>st</sup></u>	<u>\$1,184,007</u>
<u>Budget Committed as of August 31<sup>st</sup></u>	<u>\$3,850,000</u>
2018-2022 Budget Remaining (estimated)	\$2,195,993