

October 14, 2022

Advice 6587-E-A

(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

Subject: Supplemental Filing for 6587-E Advice Letter PG&E's DAHRTP CEV M&E Plan Includes Updated Overall DAHRTP CEV Budget

Purpose

The purpose of this supplemental advice letter is to provide details of the overall budget for implementation of the Day-Ahead Real Time Pricing Commercial Electric (DAHRTP CEV) rate and to show the impact of the Measurement and Evaluation (M&E) budget requested in Advice 6587-E that was submitted May 6, 2022. Attachment 1 of this supplemental advice letter contains the M&E research plan as presented in Advice Letter 6587-E.

Background

On May 6, 2022, Pacific Gas and Electric (PG&E) filed Advice Letter 6587-E to describe the M&E plan for PG&E's DAHRTP CEV rate. PG&E met with Energy Division (ED) staff to discuss the M&E plan on September 9, 2022. As a follow up, PG&E was asked to submit a supplemental advice letter to provide details of the updated DAHRTP CEV rate budget and the impact of the M&E budget increase to the other activities required by Decision 21-11-017 (Decision)¹.

Budget

The table below shows the detailed overall budget for the activities identified in the Decision, including Decision references where budget for the activity was specified, columns (A), (B), and (D). The table also shows the additional budget currently estimated as needed due to scope changes to M&E and Reporting activities, column (C). Currently, aside from M&E and Reporting, PG&E has not identified additional budget needs for other activities yet, beyond what has already been identified in the Decision, although budget

¹ California Public Utility Commission. (2021). Decision 21-11-017: DECISION AUTHORIZING PACIFIC GAS AND ELECTRIC COMPANY TO IMPLEMENT AN OPTIONAL DAY-AHEAD REAL TIME RATE FOR COMMERCIAL ELECTRIC VEHICLE CUSTOMERS
<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M424/K557/424557371.PDF>

needs may change as PG&E progresses with implementation of the DAHRTP CEV rate, tools and other requirements in the Decision. However, as noted in Ln# 1 in the table, pursuant to ordering paragraph (OP) 6, PG&E does expect a need to file an advice letter in the future to request additional funding up to \$1,700,000 to deliver the Rate Comparison Tool requirement, as it was not in PG&E's original proposal.

Ln #	(A) Activity	(B) Authorized Budget	(C) Additional Budget Needed (Due to scope change) Or May be Requested in Tier 2 Advice Letter	(D) Decision Reference	Notes
1	Customer Enablement and Rate Comparison Tools (Tools)	\$2,400,000	Additional funding may be requested in future advice letters under OPs 6 and 12.	OP 6 OP 12	OP 6 If \$2.4M it is exhausted within 12 months of the issuance of the Decision and before the two tools are completed, PG&E may file a T2 AL seeking authorization to recover up to an additional \$1.7M to finish the tools. PG&E estimates that additional \$1.7M will be needed due to increase in scope. OP 12 provides for a second AL that potentially could be utilized for additional funding.
2	Billing System Modifications Program Management Pilot Design			Page 30	PG&E estimated up to \$1.041 million for billing system to accommodate the DAHRTP CEV prices-and \$670,000 for administrative cost. Pilot design was estimated at \$40,000
3	Marketing, Education & Outreach (ME&O)	\$443,000	Additional funding may be requested in future advice letters under OP 12.	OP 5 OP 12	OP 12 If, 24 months after the issuance of this Decision, the \$6 million budget cannot support additional customer enrollment, PG&E may file a Tier 2 advice letter seeking authorization to recover up to an additional \$3.6 million (includes \$1.7M in OP6) to continue enrolling and evaluating customers' responses to the DAHRTP CEV rate.
4	M&E and Reporting	\$150,000	\$515,000 Additional funding may be requested in future advice letters under OP 12.	Page 47, OP 12	
5	Rebate/Incentives	\$1,295,000		OP 4	
6	Total Budget specified in the Decision	\$4,288,000			
7	Total Budget Authorized	\$6,000,000		OP 12	
8	Budget Available to Fund other implementation costs e.g., ME&O, M&E and Reporting	\$1,712,000			

The total authorized budget in the Decision for the optional DAHRTP CEV rate is \$6 million (Ln# 7). The specifically authorized items in the Decision for Tools, ME&O, M&E and Reporting, and the rebates/incentives total approximately \$4.3 million (LN# 6). The difference between the authorized total budget of \$6 million and the cumulative \$4.3 million for explicitly authorized amounts for Tools, ME&O, M&E and Reporting, and rebates/incentives is approximately \$1.7 million (“headroom”), which is authorized budget available to support activities necessary for the DAHRTP CEV rate, including billing system implementation and rebate program design, as well as items such as M&E and reporting. In this advice letter, PG&E is requesting the Energy Division recognize that the additional \$515,000 for M&E could be covered by the headroom, as the Decision is currently written, and/or in the Tier 2 Advice Letter authorized under OP 12.

Additionally, as shown in the ‘Notes’ column of the table, pursuant to OP 12, PG&E may file a Tier 2 advice letter seeking authorization to recover up to an additional \$3.6 million, which includes \$1.7 million stated in OP 6 to continue enrolling and evaluating customers’ responses to the DAHRTP CEV rate.

Protests

Pursuant to GO 96-B, General Rule 7.5.1., PG&E requests to maintain the original protest and comment period designated in Advice Letter 6587-E and not reopen the protest period.

Effective Date

PG&E is submitting this advice letter with a Tier 2 designation, which is the same tier designation as the original advice letter, Advice 6587-E. Pursuant to GO 96-B, General Rule 7.5.1, the submittal of a supplement, or of additional information at the request of the reviewing Industry Division, does not automatically delay the effective date of the advice letter. Therefore, PG&E respectfully requests that this supplemental advice submittal become effective concurrent with original Advice Letter 6587-E, which is effective June 5, 2022.

Notice

In accordance with General Order 96-B, Section IV, a copy of this advice letter is being sent electronically and via U.S. mail to parties shown on the attached list and the parties on the service list for A.20-10-011. Address changes to the General Order 96-B service list should be directed to PG&E at email address PGETariffs@pge.com. For changes to any other service list, please contact the Commission’s Process Office at (415) 703-2021 or at Process_Office@cpuc.ca.gov. Send all electronic approvals to PGETariffs@pge.com. Advice letter submittals can also be accessed electronically at: <http://www.pge.com/tariffs/>.

/S/
Sidney Bob Dietz II
Director, Regulatory Relations

cc: Service List A.20-10-011



ADVICE LETTER SUMMARY

ENERGY UTILITY



MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: Pacific Gas and Electric Company (U 39 E)

Utility type:

- ELC GAS WATER
 PLC HEAT

Contact Person: Stuart Rubio

Phone #: (415) 973-4587

E-mail: PGETariffs@pge.com

E-mail Disposition Notice to: SHR8@pge.com

EXPLANATION OF UTILITY TYPE

ELC = Electric GAS = Gas WATER = Water
 PLC = Pipeline HEAT = Heat

(Date Submitted / Received Stamp by CPUC)

Advice Letter (AL) #: 6587-E-A

Tier Designation: 2

Subject of AL: Supplemental Filing for 6587-E Advice Letter PG&E's DAHRTP CEV M&E Plan Includes Updated Overall DAHRTP CEV Budget

Keywords (choose from CPUC listing): Compliance

AL Type: Monthly Quarterly Annual One-Time Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #: D.21-11-017

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL: No

Summarize differences between the AL and the prior withdrawn or rejected AL: N/A

Confidential treatment requested? Yes No

If yes, specification of confidential information:

Confidential information will be made available to appropriate parties who execute a nondisclosure agreement. Name and contact information to request nondisclosure agreement/ access to confidential information:

Resolution required? Yes No

Requested effective date: 6/5/22

No. of tariff sheets: 0

Estimated system annual revenue effect (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: N/A

Service affected and changes proposed¹: N/A

Pending advice letters that revise the same tariff sheets: N/A

¹Discuss in AL if more space is needed.

Protests and correspondence regarding this AL are to be sent via email and are due no later than 20 days after the date of this submittal, unless otherwise authorized by the Commission, and shall be sent to:

California Public Utilities Commission
Energy Division Tariff Unit Email:
EDTariffUnit@cpuc.ca.gov

Contact Name: Sidnev Bob Dietz II. c/o Megan Lawson
Title: Director, Regulatory Relations
Utility/Entity Name: Pacific Gas and Electric Company

Telephone (xxx) xxx-xxxx: (415)973-2093
Facsimile (xxx) xxx-xxxx:
Email: PGETariffs@pge.com

Contact Name:
Title:
Utility/Entity Name:

Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email:

CPUC
Energy Division Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Clear Form

Attachment 1

M&E Research Plan as Presented in Advice Letter 6587-E



Sidney Bob Dietz II
Director
Regulatory Relations

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San Francisco, CA 94177

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May 6, 2022

Advice 6587-E

(Pacific Gas and Electric Company U 39 E)

Public Utilities Commission of the State of California

Subject: PG&E's DAHRTP CEV M&E Plan

Purpose:

The purpose of this advice letter is to describe the Measurement and Evaluation (M&E) plan for Pacific Gas and Electric (PG&E)'s commercial electric vehicle day-ahead, hourly real-time pricing (DAHRTP CEV) rate. The M&E research activities will inform rate design, impacts to the electric grid, as well as insights to customer cost and experience. In response to the public M&E workshop conducted on March 24, 2022, this advice letter discusses comments received and how they may be integrated into the DAHRTP CEV rate evaluation strategy. This advice letter also explains budget estimates and considerations to support the defined M&E activities.

Background:

In November of 2021, California Public Utilities Commission (CPUC) issued a Decision 21-11-017 (Decision)¹ that requires Pacific Gas and Electric Company (PG&E) to offer an optional day-ahead, hourly real-time rate to customers that have enrolled, or are eligible to enroll, in its existing Business Electric Vehicle (BEV) Rate. As required by Decision, PG&E conducted a public workshop on March 24, 2022 (Workshop) to discuss and solicitate feedback on the proposed CEV DAHRTP M&E plan. The Decision further requires PG&E file a Tier 2 Advice Letter within 45 days from the workshop describing the workshop participants, key discussion points, and the list of evaluation metrics and data reporting it proposes to provide in annual reports after it has fully implemented the optional DAHRTP rate.

¹ California Public Utility Commission. (2021). Decision 21-11-017: DECISION AUTHORIZING PACIFIC GAS AND ELECTRIC COMPANY TO IMPLEMENT AN OPTIONAL DAY-AHEAD REAL TIME RATE FOR COMMERCIAL ELECTRIC VEHICLE CUSTOMERS
<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M424/K557/424557371.PDF>

Per Section 8 in the Decision, the evaluation strategy should include, at a minimum:

1. Metrics on the cost differences different customers experience on the day-ahead, real-time pricing rate authorized in this decision relative to PG&E's existing BEV rate schedules;
2. The cost associated with upgrading customers' EV charging infrastructure to automate the reception of and reaction to real-time pricing signals;
3. The system benefits of more dynamically reactive loads conveyed through the real-time price deployed in this rate schedule, relative to PG&E's existing BEV rate schedules;
4. An evaluation of the impacts of any negative generation rates resulting from the TOU revenue-neutral adder;
5. An evaluation of the load response from customers enrolled on the DAHRTP rate relative to those enrolled in the BEV tariff and other demand response programs;
6. An evaluation of the DAHRTP signals' overlap with other demand response programs, to determine the potential for double compensation if customers participate in both a dynamic rate and a demand response program.

To the extent feasible, PG&E will incorporate the metrics and requirements identified above into the evaluation plan. PG&E also proposes additional research topics aimed to inform customer satisfaction, drivers and barriers for adoption, and motivation for future investment. Lastly, PG&E includes research proposed by the Workshop participants.

The Decision authorized PG&E to spend up to \$150,000 on DAHRTP CEV M&E. However, PG&E notes the M&E scope and timeline has changed significantly from the testimony² scope where this budget was initially proposed. With the expanded scope and the requirement for 3 years of annual reports, PG&E now estimates \$665,000 in total costs across the multi-year M&E plan. Per OP 12 in the Decision, "PG&E is authorized to recover up to \$6 million to implement its optional DAHRTP rate. If, 24 months after the issuance of this Decision, the \$6 million budget cannot support additional customer enrollment in the DAHRTP rate, PG&E may file a Tier 2 advice letter seeking authorization to recover up to an additional \$3.6 million to continue enrolling and evaluating customers' responses to the DAHRTP rate."³ PG&E requests Energy Division's approval to record the additional \$515,000 M&E related costs to any outstanding budget from the \$6 million after implementation costs. If after 24 months, total costs (including M&E) exceeds 6 million, PG&E requests to record any outstanding M&E cost to the additional \$3.6 million noted above, including projected costs for M&E for the third year, which will be more than 24 months after issuance of the Decision (and therefore may need to be estimated in the

² California Public Utility Commission. (2021). Application A2010011: PACIFIC GAS AND ELECTRIC COMPANY COMMERCIAL ELECTRIC VEHICLE DAY-AHEAD HOURLY REAL TIME PRICING PILOT PREPARED TESTIMONY
<https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M349/K267/349267730.PDF>

³ OP 12. Also, in OP 6, the Commission authorized PG&E to request an additional \$1.7 million to finish the tools if the \$2.4 million authorized in the decision is exhausted within 12 months.

above-mentioned Tier 2 advice letter) due to the longer evaluation period. This is discussed in detail in the Budget section of this advice letter.

Proposed Measurement and Evaluation (M&E) Plan:

The following section discusses the research objectives outlined above as well as additional research objectives proposed by PG&E to inform customer experience and operational design. PG&E expects to conduct most of these M&E activities through a third-party evaluator, though some analysis will be conducted internally to reduce costs while leveraging existing tools and expertise. While PG&E outlines potential approaches to conducting these M&E activities, the actual approach and metrics may be adjusted subject to third-party evaluator recommendations and data availability.

Research Objective 1: Load impacts analysis.

This objective evaluates the load response from customers enrolled on the DAHRTP CEV rate relative to those enrolled in the BEV tariff and other demand response (DR) programs.

- a) Research Questions:
 - i. What is the load response (reduction, shift or increase) to the DAHRTP CEV rate compared to customers on OAT (otherwise applicable tariffs, which are standard BEV tariffs)?
 - ii. Is there a correlation between dynamic rate prices and load responses?
 - iii. If applicable, how do dynamic pricing load impacts compare to DR program impacts?
- b) Metrics:
 - i. Hourly load impacts across seasons or months;
 - ii. Hourly impacts under use cases (i.e., Direct-current fast charger (DCFC), Multifamily Dwelling (MUD), Workspace, Fleet, or Transit) defined in Research Objective #3 and #5, if sufficient data are available to be statistically significant.
 - iii. Hourly impacts for specific outlier conditions (highest energy price day or top 10 days; highest temperature-adjusted net load day or top 10 days (if different); lowest net load day or bottom 10 days), if sufficient data are available to be statistically significant.
- c) Data Collection: Data elements collected for the load impact analysis may include, but are not limited to, the following:
 - i. Customer characteristics
 - ii. Weather data
 - iii. Hourly meter interval data
 - iv. Dynamic rate prices
- d) Data Collection Timeline: Year's worth of data, with possible extension to ensure representative sample size.

- e) Approach: Regression analysis, control groups with difference-in-difference, or other statistical modeling as appropriate.
- f) Additional Considerations:
 - i. Demand Response programs are typically dispatched situationally in response to CAISO wholesale market price triggers or to emergency grid needs while customers in CEV DAHRTP are expected to respond to daily dynamic price fluctuations. Due to differing customer composition, program/rate design, weather conditions, and load response triggers, DAHRTP load responses may not be directly comparable to demand response load responses. When applicable, PG&E may provide a comparison of DR load responses to DAHRTP CEV load responses, but limited to load responses under comparable considerations (i.e., non-residential EV customers only under similar weather conditions). Additionally, well-established DR programs from third party demand response providers with clear financial incentives and clarity around timing are direct competitors to the DAHRTP CEV rate. PG&E recognizes this as a potential hurdle to rate adoption.
 - ii. Load impacts are typically calculated by hour of an average day and by month to reduce noise and facilitate inter-year comparisons. However, Research Objectives #2, #5, and potentially #3 require calculating load impacts for every hour of the year because the load impacts and marginal costs (or DAHRTP prices) need to synch up by hour. Potential methodologies to analyze load impacts include: a) compare loads in the treatment group to loads in a control group during the same time period, or b) compare loads of the treatment group at different stages of rate adoption (when they were or will be on a different rate). Under option a), the hour of the year comparison will be more difficult because of challenges in identifying control candidates that closely match to the treatment customers (i.e., by hourly load patterns, day type etc.), especially for CEV customer segment. Under option b), the hourly comparison will be more difficult because loads in the comparative timeframe will need to be adjusted more precisely for temperature and other factors, than is required when considering only month-hour statistics. Regressions may be utilized to estimate the relationship between load and price/temperature. In any case, estimates produced at this level of granularity may be subject to a high degree of noise. These issues imply that evaluation of Research Objectives #2, 3 and 5 may be subject to high uncertainty and provide only limited insight if the number of customers in the target or comparator groups are insufficiently robust.

Research Objective 2: Load impacts under negative prices.

This objective seeks to evaluate the impacts of any negative generation rates resulting from negative CAISO prices and a small TOU revenue-neutral adder. This will be a sub-analysis of research objective #1, where data will be analyzed in higher granularity by targeting negative price events.

- a) Research Questions:
 - i. Do customers exhibit unusual/unexpected behavior before, during, and after negative price events?
- b) Metrics: Load shift into negative price hours compared to expected load shift from adjacent hours with positive prices.
- c) Data Collection: Load shift and price data, similar to Objective 1.
- d) Data Collection Timeline: Data covering a full Spring season.
- e) Approach: Sub-analysis of Topic # 1 or other statistical modeling as appropriate.
- f) Additional Considerations: Price signal that customers see will be an all-in price including distribution, transmission, and non-bypassable charges. This all-in rate will not be negative, so PG&E does not expect to see any issues related to this topic.

Research Objective 3: Cost differences to customers in bill impacts.

This objective defines metrics on the cost differences different customers experience on the day-ahead, real-time pricing rate authorized in this decision relative to PG&E's existing BEV rate schedules.

- a) Research Questions:
 - i. Do customers benefit financially from being on DAHRTP CEV compared to BEV rate(s)?
 - ii. Which customer use cases (i.e., DCFC, MUD, Workspace, Fleet or Transit) are most likely to benefit from being on the rate?
 - iii. Do storage and solar customers benefit more than others?
 - iv. How much does customer benefit depend on load shifting evaluated in Research Objective #1?
- b) Metrics:
 - i. Annual bill impacts of CEV DAHRTP participants compared to BEV rates, if applicable, delineated by customer use or customer segments.
 - ii. Cost benefit from load impacts measured in Research Objective #1
- c) Data Collection: Billing data, load impacts data from Research Objective #1
- g) Data Collection Timeline: Year's worth of data, with possible extension to ensure representative sample size
- d) Approach: Rate analysis for customers with 1 year of billing data on CEV DAHRTP rate. If there is a limited sample of customer with 1 full year of data,

PG&E may consider 9 months of billing data. PG&E may leverage the rate comparison tool to be developed for BEV customers to support this analysis.

- e) Additional Considerations:
 - i. PG&E would also like to understand if BEV customers are enrolled in the optimized rate prior to enrollment in DAHRTP CEV rate. Where applicable, PG&E plans to leverage the rate comparison tool (to be developed to support rate implementation) to support the analysis.
 - ii. The cost benefits analysis based on load shift (metric ii) will be contingent on load impacts data from Research #1.

Research Objective 4: Infrastructure and Automation Costs

This objective aims to quantify the costs associated with upgrading customers' EV charging infrastructure to automate the reception of and reaction to real-time pricing signals.

- a) Research Questions:
 - i. What is the cost associated with upgrading customers' EV charging infrastructure to receive and react to real-time pricing signals – both Electric Vehicle Service Providers (EVSPs) and PG&E customers?
 - ii. Do costs vary by customer use case (i.e., DCFC, MUD, Workspace, Fleet or Transit)?
- b) Metrics:
 - i. Implementation cost per EVSP
 - ii. Operational cost per EVSP
 - iii. Implementation cost per PG&E customer
 - iv. Operational cost per PG&E customer
- c) Data Collection:
 - i. Self-reported EVSP cost data
 - ii. Self-report PG&E customer cost data
- d) Data Collection Timeline:
 - i. Collect cost estimates a year prior to rate adoption and actual costs a year after rate adoption, or adjust data collection based on the implementation schedule (year two or year three)
- e) Approach:
 - i. Survey and/or Interviews
 - ii. Participation requirement for rebate
 - iii. Leverage rebate program for data collection
- f) Additional Considerations:
 - i. Understanding the costs associated with EV charging infrastructure upgrades will require gathering information directly from EVSP and PG&E customers. However, due to market sensitivity and confidentiality concerns, PG&E recognizes there may be challenges in requesting both cost estimates and actual costs from EVSPs. Where appropriate, data

- will be aggregated or averaged. PG&E may consider collecting this information as part of the rebate program enrollment and participation process. If funds are available, PG&E may also consider an incentive to EVSPs and customers of record to participate in surveys and interviews.
- ii. Consider feedback from workshop participants, where applicable, look at separate costs for new installations vs. upgrades to existing infrastructure.

Research Objective 5: System Benefits of Loads on DAH RTP Rate compared to OAT

This objective considers the system benefits of dynamically reactive loads conveyed through the real-time price deployed in this rate schedule, relative to PG&E's existing BEV rate schedules. Here, system benefits equal the negative of marginal system cost. Benefits are calculated by multiplying, by hour, the load impact from Research Objective 1 times the negative of the marginal cost for that hour, for three types of marginal cost.

a) Research Questions

- i. How much do customers on DARTHP CEV reduce system costs (marginal energy costs, marginal capacity costs and marginal greenhouse gas (GHG) emissions), compared to customers on standard BEV tariffs?

b) Metrics:

- i. \$ per kWh of load by hour of the year for each class of system benefits
- ii. Output metrics compared to customers on standard BEV tariffs by hour-month on a class basis, and if statistically justifiable, by use case.
- iii. Similar output data to be shown by hour for specific outlier conditions (highest energy price day or top 10 days; highest temperature-adjusted net load day or top 10 days (if different); lowest net load day or bottom 10 days)

c) Data Collection:

- i. Hourly load impacts from Research Objective #1
- ii. Day-ahead energy prices at PG&E Default Load Aggregation Point (DLAP)
- iii. Capacity costs from hourly price signals based on temperature-adjusted net load
- iv. Historical GHG emissions rates in ton/MWh from Avoided Cost Calculator (ACC) (Emissions tab, based on heat rate in Btu/kWh times Natural Gas Carbon Content (NGCC) of 0.0531 tonnes/MMBtu times 0.001)⁴

⁴ ACC Model and documentation are available at <https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/energy-efficiency/idsm>. If not available directly in ACC model for historical period, use formula implemented in ACC model:

- d) Data Collection Timeline: Using first year of data with potential to extend, per Research Objective #1
- e) Approach: Hourly metric for each class of benefits = load impact (Data Collection a.) times hourly marginal impact (Data Collection b. through d.)
- f) Additional Considerations:
 - i. Results will depend on detailed data from Research Objective #1. May not be able to drill down to use case level, and may have high uncertainty. (See Additional Considerations under Research Objective #1.)

Research Objective 6: Demand Response Signal Overlap and Dual Participation

This objective seeks to identify the DAHRTP CEV signals' overlap with other demand response programs. Findings will inform the potential for double compensation if customers participate in both a dynamic rate and a demand response program.

- a) Research Questions:
 - i. What is the overlap between DAHRTP CEV signals and DR event triggers?
 - ii. Is there sufficient data to measure the potential incremental impact of DR in addition to the dynamic rate response?
- b) Metrics: Comparison of DAHRTP CEV and demand response (DR) signals and overlap
- c) Data Collection:
 - i. Dynamic rate prices
 - ii. DR event triggers (CAISO wholesale market price triggers)
- d) Data Collection Timeline: At least 1 demand response season (May-Oct), with possible extension to ensure representative sample size
- e) Approach:
 - i. Assess if DR event triggers (based on CAISO Day Of and Day Ahead market prices) overlap with DAHRTP CEV price peaks
 - ii. Assess level of statistical significance/noise in load impact data from Research Objective #1, and determine the feasibility of identifying potential incremental DR impacts should dual participation be allowed.
- f) Additional Considerations: While Section 4.4 of the Decision states that customers in CAISO's ancillary services market may participate in the CEV DAHRTP rate, non-residential EV customers in PG&E's demand response programs do not currently provide ancillary services. Thus, PG&E expects that there will not be sufficient data to measure dual participation load impacts with

Heat Rate = (Day-Ahead Hourly price at PG&E DLAP minus Variable Operations and Maintenance) / (daily gas price at PG&E Citygate + transportation rate + daily GHG price from CAISO OASIS * NGCC)

Constrained Heat Rate = max(0, min(Heat rate, 12500))

Marginal GHG emissions rate = Constrained Heat Rate*NGCC/1000

DR programs. The potential for dual compensation cannot be accurately determined due to the absence of empirical data. Furthermore, evaluating customers' load response to a dynamic rate already involves a high degree of complexity. Combined with potential sample size limitations during the initial years of rate adoption, there may be a high level of uncertainty in load impact results. PG&E will assess the level of statistical noise in CEV DAHRTP customer load responses and determine whether it's viable to additionally quantify and isolate incremental DR-driven impacts from dual participation.

Additional Research Objectives: Customer satisfaction, drivers/barriers for adoption, and motivation for future investment.

- a) Research Questions:
 - i. What is the customer satisfaction with the rate?
 - ii. What are the drivers & barriers for adoption of the rate from both EVSP and PG&E customers?
 - iii. Does DAHRTP rate make investment in EV Infrastructure or on-site storage more appealing?
 - iv. How impactful is rebate offering on customer rate adoption?
 - v. How impactful is the higher rebate offering for AB 841 PC and/or small business customers on rate adoption?
- b) Metrics:
 - i. Customer satisfaction rating per use case and per EVSP
 - ii. Rate Adoption
 - iii. Qualitative findings on drivers, barriers, and rebate impacts
- c) Data Collection:
 - i. Surveys
 - ii. Internal Rate Adoption Reports
- d) Data Collection Timeline:
 - i. Leverage rebate program participation requirements to establish a baseline with information before and after at least one year of customers being on the rate to gauge customer satisfaction and learn about drivers and barriers
 - ii. Report on rate adoption per year
- e) Approach:
 - i. Survey
 - ii. Compare adoption by rebate recipients and non-recipients
- f) Additional Considerations:
 - i. Consider comparing the billing analysis with customer non-anonymous survey to align customer satisfaction with direct impact on rate savings potential
 - ii. Consider inquiring with non-participants to discover barriers to adoption
 - iii. Consider feedback from workshop to understand how maximum process and price volatility affects customer perception of rate.

Feedback from M&E Workshop:

Here is the list of the Workshop participants and their self-reported affiliation:

John Wilson, Resource Insight for SBUA
Zach Woogen, Vehicle Grid Integration Council
Alan Bach, Public Advocates Office
Ben Gutierrez, Public Advocates Office
Vanessa Martinez, Public Advocates Office
Ryan Saraie, Public Advocates Office
Paul Chernick, Resource Insight for SBUA
Ryan Mann, Enel North America - USA
Masoud Foudeh, CPUC - Energy Division
Bob Sweetin, Attorney, Davison Van Cleve
Jigar Shah, Electrify America
Oriana Tiell, Pacific Gas & Electric (PG&E)
Katrina Wu, Pacific Gas & Electric (PG&E)
Jan Grygier, Pacific Gas & Electric (PG&E)
Tysen Streib, Pacific Gas & Electric (PG&E)
Anh Dong, Pacific Gas & Electric (PG&E)

Parties suggested additional research questions that could be addressed during the DAHRTP CEV M&E activities. These suggestions are addressed below. The additional research topics addressed here would each have an impact on the budget, as they are not incorporated in the original scope.

- a) A number of parties suggested evaluating the marginal distribution cost impact as an extension of Research Objective 5. PG&E believes that it may be possible to evaluate distribution cost impacts based on a few circuits with sufficient DAHRTP-CEV customers / charging points (e.g., at least 10 locations, each with multiple charging points). Such distribution cost analysis will likely be illustrative rather than definitive, due to geographic variability. For example, marginal distribution costs depend on individual circuit characteristics, including load/customer characteristics, transformer capability, and ability to shift load to other circuits in real time. The diversity in circuit characteristics means that distribution cost impacts calculated for the few circuits with sufficient DAHRTP CEV customers would represent a small fraction of the circuit landscape.
- b) One party also suggested evaluating the marginal transmission cost impact as an extension of Research Objective 5. PG&E believes this evaluation is likely possible based on transmission marginal costs, e.g., from the ACC model or based on data developed for the Time-Differentiated Transmission Rate Study ordered in D.21-11-016.
- c) One participant proposed examining the concordance between the MGCC signal in the rate and indicators of grid stress such as CAISO Restricted Maintenance Operations events, Alerts, and Warnings and Emergencies (the last two of which

are only called day-of). This research question does not relate to customer response to the DAHRTP CEV rate per se. PG&E believes this topic should be addressed as part of the “MGCC refresh” proposed in the MGCC Study.

- d) Several workshop participants expressed interest in evaluating how maximum prices, or volatility/“peakiness” affected customer perception of the rate (both from participants and non-participants). For non-participants, PG&E believes that it may be possible to examine this topic via surveys, e.g., “would you be interested in a rate that would likely save you 5% over time but could have price spikes up to \$XX per kWh on extreme grid stress days, such as occurred during 2020 heat waves”. For participants, CEV customers could be asked to evaluate the actual realized DAHRTP rate's highest prices, seasonal bill volatility, and whether the price variability is within their range of “tolerable” volatility. Customers who leave the rate after or during the summer peak times would be an important source of survey data. Where applicable, PG&E will incorporate this into customer surveys as discussed in the Additional Research Topic section.
- e) One participant suggested to separate costs for new installations vs. upgrades to existing infrastructure (e.g., customer makes an investment into EVSE due to availability of the DAHRTP CEV rate). PG&E anticipates that the majority of costs associated with upgrading customers’ EV charging infrastructure to automate the reception of and reaction to real-time pricing signals will be carried by the EVSPs, not by the PG&E customer who installs the EV infrastructure. PG&E will look into separating these costs if those prove to be material as a part of the Research Objective 4. Learnings from this potential use case may be incorporated in the ME&O materials.

Budget:

The Decision authorized PG&E to spend up to \$150,000 on DAHRTP CEV M&E. In the testimony⁵, PG&E originally estimated M&E budget between \$125,000 (low estimate) and \$150,000 (high estimate) based on the proposed pilot for up to 50 PG&E customers, up to two Community Choice Aggregator (CCA) partners and a single EVSP. The original estimate was based on a limited pilot scope compared to the approved DAHRTP CEV rate available to all eligible customers. For the original limited scope, defined M&E activities focused on framework design, customer research, and load impacts analysis while considering the following elements:

- Statistical precision and sample size;
- Modeling methodologies (e.g., Ex-post and Ex-ante, day-matching vs. regression, pre-post and case-control, etc.);
- Impact persistence;

⁵ California Public Utility Commission. (2021). Application A2010011: PACIFIC GAS AND ELECTRIC COMPANY COMMERCIAL ELECTRIC VEHICLE DAY-AHEAD HOURLY REAL TIME PRICING PILOT PREPARED TESTIMONY
<https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M349/K267/349267730.PDF>

- Geographic segmentation; and PG&E also expects to collect and analyze qualitative data (e.g., surveys) to understand impacts and associated implications.

Per the Decision, the scope of PG&E DAHRTP CEV rate offering changed from a limited pilot to be available to all eligible customers. In addition to load impacts, the scope now includes an extended list of research questions (i.e., bill impacts, infrastructure costs, electric systems benefits, dual participation). The pilot scope also envisioned a one-time evaluation whereas the Decision now requires annual reports for three consecutive years following rate implementation. As a result, the \$150,000 approved M&E budget will be insufficient to cover all research activities.

The table below outlines the detailed cost estimates for M&E activities as required by the Decision. Budget estimations are broken down by research topics and years and include additional considerations proposed by the Workshop participants and PG&E. The budget outlined below serves as estimates and should not be considered final as costs will depend on retention of a 3rd party evaluation consultant. PG&E highlights cost savings measures such as leveraging in-house tools and expertise in the “Additional Considerations” column in the Table 1 below. To accommodate these additional M&E activities, the total estimated M&E budget would increase from \$150,000 to \$665,000.

Research Objective #	Research Topic	Estimated Budget (First year)	Estimated Budget (Year 2 & 3 combined)	Additional Considerations
1	Load Impacts	\$110,000	\$200,000	
2	Negative Generation Rate Impacts	\$10,000	-	Most likely not needed after first year
3	Bill Impacts	\$40,000	\$60,000	PG&E suggests leveraging Rate Comparison tool for at least part of this analysis to reduce costs. Estimates include internal labor plus consultant costs.
4	Infrastructure and Automation Costs	\$20,000	\$30,000	PG&E proposes to conduct some of this work internally to reduce costs. Estimates include internal labor plus consultant costs.
5	System Benefits	\$35,000	\$40,000	PG&E proposes to conduct some of this internally to reduce costs. Estimates include internal labor plus consultant costs.

				Estimates also includes additional research in consideration of workshop comments.
6	DR Dual Participation	\$15,000	\$15,000	
7	Additional Research proposed by PG&E: Customer satisfaction, drivers/barriers for adoption, and motivation for future investment.	\$30,000	\$60,000	PG&E proposes to conduct some of this work internally to reduce costs. Estimates include internal labor plus consultant costs.
	Total	\$260,000	\$405,000	Total estimated budget for 3 years of M&E reporting adds up to \$665,000 .

Table 1 M&V Budget Estimate

Per OP 12 in the Decision, “PG&E is authorized to recover up to \$6 million to implement its optional DAHRTP rate. If, 24 months after the issuance of this Decision, the \$6 million budget cannot support additional customer enrollment in the DAHRTP rate, PG&E may file a Tier 2 advice letter seeking authorization to recover up to an additional \$3.6 million to continue enrolling and **evaluating** [emphasis added] customers’ responses to the DAHRTP rate.” PG&E requests Energy Division’s approval to record the additional \$515,000 M&E related costs (due to the increased scope of the decision and workshop) in PG&E’s Electric Preliminary Statement Part JI – Dynamic and Real-Time Pricing Memorandum Account in connection to any outstanding budget after implementation costs from the \$6 million defined above. If after 24 months, total costs (including M&E) exceeds 6 million, PG&E requests to record any outstanding M&E cost to the additional \$3.6 million noted above. PG&E will also include these additional amounts when it files the Tier 2 advice letter to recover actual M&E costs above the authorized \$150,000, in addition to any other costs above the authorized \$6 million budget.

Timeline and Deliverables:

Following full implementation of the optional DAHRTP CEV rate, PG&E will submit annual reports to the Commission’s Energy Division and service list to this proceeding. Per Ordering Paragraph 13 of the Decision, annual reports are required for the first three years of the optional rate’s availability. PG&E expects data collection activities to occur 12 months after rate implementation and subsequent years thereafter. M&E activities and reporting shall be completed 6 months following data collection. Thus, PG&E expects to submit annual reports 18, 30, 42 months after full rate implementation. Deliverables will include qualitative and quantitative reports on research objectives and metrics defined in this advice letter.

**PG&E Gas and Electric
Advice Submittal List
General Order 96-B, Section IV**

AT&T
Albion Power Company

Alta Power Group, LLC
Anderson & Poole

Atlas ReFuel
BART

Barkovich & Yap, Inc.
Braun Blasing Smith Wynne, P.C.
California Cotton Ginners & Growers Assn
California Energy Commission

California Hub for Energy Efficiency
Financing

California Alternative Energy and
Advanced Transportation Financing
Authority
California Public Utilities Commission
Calpine

Cameron-Daniel, P.C.
Casner, Steve
Center for Biological Diversity

Chevron Pipeline and Power
City of Palo Alto

City of San Jose
Clean Power Research
Coast Economic Consulting
Commercial Energy
Crossborder Energy
Crown Road Energy, LLC
Davis Wright Tremaine LLP
Day Carter Murphy

Dept of General Services
Don Pickett & Associates, Inc.
Douglass & Liddell

East Bay Community Energy Ellison
Schneider & Harris LLP
Engineers and Scientists of California

GenOn Energy, Inc.
Goodin, MacBride, Squeri, Schlotz &
Ritchie
Green Power Institute
Hanna & Morton
ICF
International Power Technology

Intertie

Intestate Gas Services, Inc.
Kelly Group
Ken Bohn Consulting
Keyes & Fox LLP
Leviton Manufacturing Co., Inc.

Los Angeles County Integrated
Waste Management Task Force
MRW & Associates
Manatt Phelps Phillips
Marin Energy Authority
McClintock IP
McKenzie & Associates

Modesto Irrigation District
NLine Energy, Inc.
NRG Solar

OnGrid Solar
Pacific Gas and Electric Company
Peninsula Clean Energy

Pioneer Community Energy

Public Advocates Office

Redwood Coast Energy Authority
Regulatory & Cogeneration Service, Inc.

Resource Innovations

SCD Energy Solutions
San Diego Gas & Electric Company

SPURR

San Francisco Water Power and Sewer
Sempra Utilities

Sierra Telephone Company, Inc.
Southern California Edison Company
Southern California Gas Company
Spark Energy
Sun Light & Power
Sunshine Design
Stoel Rives LLP

Tecogen, Inc.
TerraVerde Renewable Partners
Tiger Natural Gas, Inc.

TransCanada
Utility Cost Management
Utility Power Solutions
Water and Energy Consulting Wellhead
Electric Company
Western Manufactured Housing
Communities Association (WMA)
Yep Energy