2023 Load Impact Evaluation of Pacific Gas and Electric Company's Automated Response Technology (ART) Program: Ex Ante Report

CALMAC Study ID PGE0499.01

April 1, 2024

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1. ART Program Description

Beginning in 2024, PG&E's Automated Response Technology (ART) program will incentivize third parties to recruit customers with smart home technologies, also known as distributed energy resources (DERs), to participate in Demand Response (DR) events and load shifting (for participants on time-varying rates). When aggregated together, DERs have the potential to serve as a virtual power plant (VPP) and provide valuable grid services. Further, the ART program provides a mechanism for the Pacific Gas and Electric Company (PG&E) to leverage existing technology incentive program recipients and bring them into the DR portfolio under one tariff. Third parties can participate in the ART program as "Providers" who will primarily interface with customers in recruitment, customer management, and event management activities. Initial technologies include smart thermostats, heat pump water heaters (HPWH), electric vehicle (EV) chargers, and batteries. The first technology to be enrolled in 2024 under the ART tariff will be the over 100,000 smart thermostats that will migrate from PG&E's Summer Reliability Smart Thermostat Control Pilot.[1]

Background

On December 20, 2023, the Commission issued D.23-12-005, approved PG&E's ART program, and authorized PG&E to recover $23.8 million for ART in 2024-2027. PG&E is authorized to recover an additional $20 million for its ART program following the submittal of a Tier 3 advice letter justifying additional budget for the ART program during the mid-cycle review process in 2025.[2]

On February 28, 2024, PG&E submitted Advice Letter (AL) 7193-E detailing the program design before proceeding with the ART program. In the interim, PG&E is also authorized to utilize up to $1.6 million of its allotted 2024 ART budget to transition customers from the Summer Reliability Smart Thermostat Control Pilot to the ART program. This initial $1.6 million in funding was made available from January 1, 2024 to June 30, 2024, or until the ART program design is approved by the Commission.[3]

Program Parameters

The ART tariff parameters detailed in AL 7193-E are summarized as follows:

APPLICABILITY: The ART program is integrated into the California Independent System Operators (CAISO) wholesale market as a Proxy Demand Resource (PDR), and PG&E will bid the program resources at its sole discretion. The PDR models the physical characteristics of a resource supplied to the CAISO and is the basis for bidding, awards, dispatch, outages, and settlements. ART is available throughout PG&E's electric service area.

PROVIDER: A Provider is a PG&E-contracted entity that can be chosen by a customer to act on its behalf concerning all aspects of ART including, but not limited to (1) enrollment and disenrollment communications, (2) event notifications, (3) incentive payments, and (4) updates to ART which

[1] D.23-12-005, p. 65, 189, and OP 25.

[2] D.23-12-005, OP 25.

[3] Ibid.

may impact the customer. Customers with smart technologies can enroll under ART through a PG&E-contracted Provider.

Providers may use multiple types of smart technologies in their portfolios to reduce load when dispatched. Providers will integrate into PG&E's system via a bi-directional Application Programming Interface (API) to determine customer eligibility and update the enrollment status. If a customer is on a time-varying rate, the Provider must implement a daily load-shifting strategy during the hours at time-varying rates using smart technologies. The customer can opt out of the daily load-shifting strategy. Currently, this applies to TOU rates and, in the future, could apply to real-time pricing (RTP).

CUSTOMER ELIGIBILITY: ART is available to PG&E residential customers receiving bundled or Community Choice Aggregation (CCA) service and being billed on a PG&E residential rate schedule. Customers cannot simultaneously be enrolled in another supply-side demand response pilot or program offered by PG&E, third-party DR provider (DRP), CCA, or an event-based load modifying program offered by PG&E. Customer enrollment is limited to one Provider per eligible customer service agreement. Multiple Providers are not able to enroll the same customer service agreement.

AVAILABILITY, TRIGGERS, & NOTIFICATION: ART is available twelve months a year and 24 hours/day, seven days a week. Triggers shall be Day-Ahead, based on the CAISO market award dispatch, or Day-Of for PG&E system emergencies or near-emergencies for distribution service. Total demand response event hours per service agreement can be up to six hours daily. For Day-Ahead events, PG&E will notify the Providers by 5:00 p.m. or as soon as reasonably possible. For Day-Of emergency and near-emergency events, PG&E will notify Providers as soon as possible after being informed of dispatch.

2. ART Ex Ante Methodology

The primary goal of the ex ante analysis is to produce an annual 11-year forecast of the load impacts expected from the ART program. A formal evaluation was not executed because the ART program has not officially launched. The ART program's 11-year forecast is primarily based on two components:

- 2022-2023 Load Impact Evaluation of PG&E's SmartAC Bring Your Own Thermostat (BYOT) Pilot, aka PG&E's Summer Reliability Smart Thermostat Control Pilot, and
- An updated enrollment forecast based on current enrollment as of January 2024.

The ex ante analysis produced a set of load impacts created under each of the required weather scenarios (monthly peak day and typical event day for both PG&E's and CAISO's 1-in-2 and 1-in-10 weather conditions), presented at the program level, for each LCA and Sub-LAP, for both an average participant and all participants in the aggregate, for all program operating hours and the resource adequacy[4] (RA) window. A portfolio forecast that excludes load impacts of dually enrolled customers is also provided.

[4] The RA window is defined as 5:00 to 10:00 pm for March, April, and May, and 4:00 to 9:00 pm for all other months.

Enrollment Forecast Assumptions

The enrollment forecast assumptions are summarized as follows:

- The initial enrollment adopts the current customers (as of January 2024) of the Summer Reliability Smart Thermostat Control Pilot.
- From 2024-2027, the ART program expects an enrollment ramp-up through marketing, education, and outreach included in the 2024-2027 DR Application. The program will be promoted through PG&E's Energy Action Guide,[5] residential newsletters, website, as well as digital and email campaigns.
    - Assume an annual enrollment growth of 50,000 customers[6] and
    - Assume 10% annual attrition.
- From 2028-2034, assume a flat enrollment forecast.

Load Impact Assumptions

The per-participant load impact assumptions are summarized below:

- Utilize per-participant load impacts estimated in the 2022-2023 Load Impact Evaluation of PG&E's SmartAC BYOT Pilot.
- Assume a 4-hour event window from 4:00 to 8:00 pm, based on SmartAC BYOT Pilot findings wherein demand reductions decay with longer event durations.
- Assume a cooling response threshold of 70 degrees Fahrenheit, i.e., estimate zero load impacts when the average daily temperature is forecasted below 70 degrees Fahrenheit.

Note that this analysis assumes zero dually enrolled customers. Thus, the program-specific and portfolio-adjusted forecasts are equal.

[5] PG&E Energy Action Guide. https://guide.pge.com (accessed February 22, 2024).

[6] At the time of filing this ex ante forecast, the ART program Tier 3 Advice Letter 7193-E has not been approved which would allow the enrollment of additional DER technologies. Therefore, the forecast of 50,000 new customers assumes only smart thermostats.

3. ART Ex Ante Load Impacts

The figures below present PG&E's annual enrollment and load impact forecasts for the PG&E 1-in-2 weather scenario on an August Peak Weekday. PG&E forecasts aggregate load impacts of 43.2 MW in 2024 and 70.2 MW in 2028.

Figure 1: Enrollment Forecast: PG&E 1-in-2, August Peak Day, 2024 – 2034

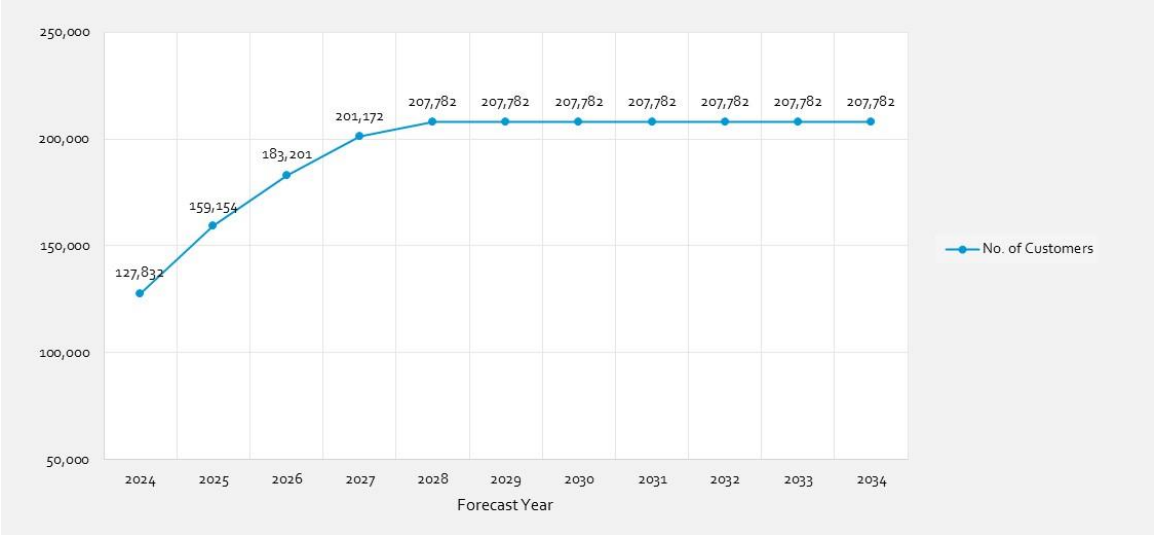
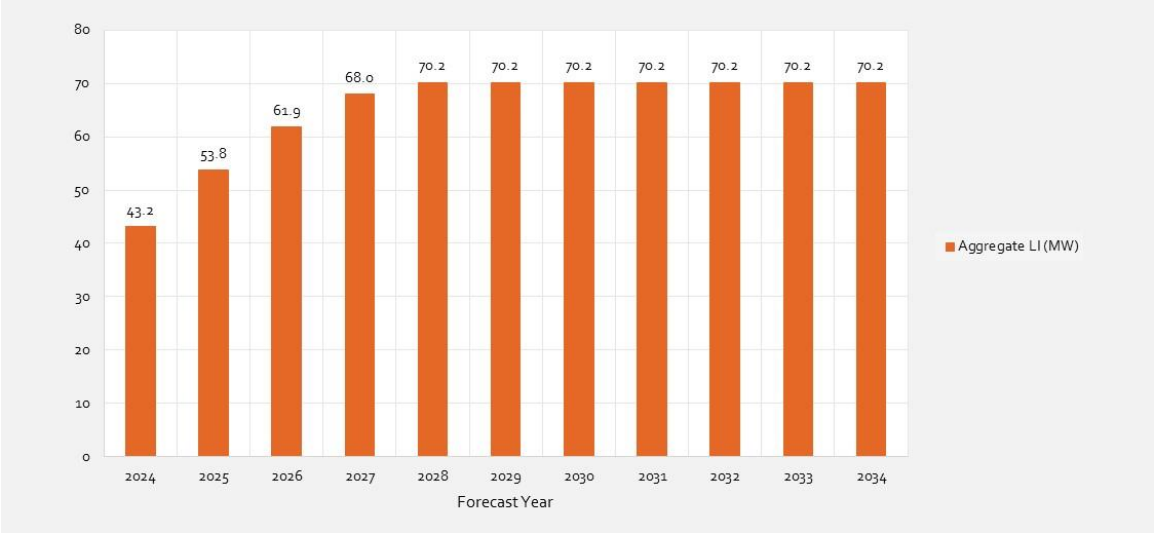


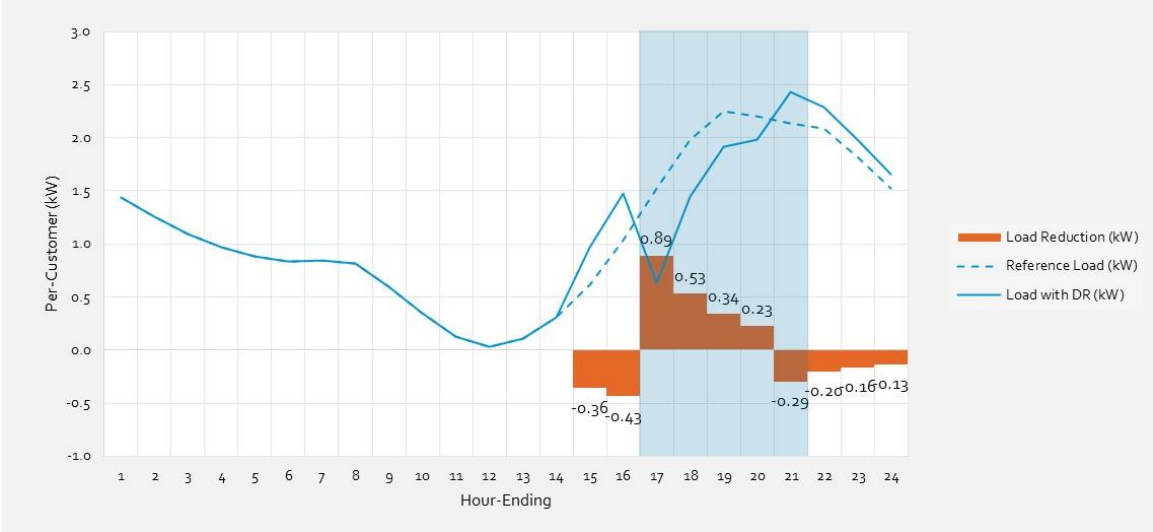
Figure 2: Aggregate Load Impact Forecast: PG&E 1-in-2, August Peak Weekday, 2024 – 2034



As mentioned above, the forecast is based on a 4-hour event duration from 4:00 to 8:00 pm. The figure below shows an average customer's estimated hourly load profile during a PG&E 1-in-2 August Peak Weekday. The blue highlighted region represents the RA window from 4:00 to 9:00 pm. The hourly load profile shows a 2-hour pre-cooling window, a 4-hour event duration, and a 4-hour snapback window. As mentioned above, SmartAC BYOT Pilot findings indicate that demand

reductions decay with longer event durations. Similar load profiles are estimated during Peak Weekend days.

Figure 3: Average Customer Hourly Load Profile, PG&E 1-in-2, August Peak Weekday, 2024



ART is a year-round program; however, given that the first technology available for implementation is smart thermostats, the estimated load impacts are expected to be weather-driven, mostly from cooling loads. As mentioned above, we assumed a cooling response threshold of 70 degrees Fahrenheit. In other words, zero load impacts are expected on days with forecasted temperatures below 70 degrees Fahrenheit. The table below shows the estimated monthly peak weekday RA load impacts for PG&E 1-in-2 weather.

Table 1: Monthly Peak Weekday, PG&E 1-in-2, 2024

Monthly Peak Weekday	No. of Customers	Agg LI (MW)	Per-Customer LI (kW)	% Impacts	Average Temp (F)
January	108,539	0.0	0.00	0%	45
February	111,104	0.0	0.00	0%	50
March	113,734	0.0	0.00	0%	51
April	116,424	9.5	0.08	12%	70
May	119,177	20.9	0.17	16%	78
June	121,995	41.0	0.34	24%	88
July	124,878	44.0	0.35	20%	90
August	127,832	43.2	0.34	19%	88
September	130,855	42.0	0.32	20%	87
October	133,950	13.4	0.10	11%	77
November	137,116	0.0	0.00	0%	54
December	140,358	0.0	0.00	0%	49

*Estimates shown in red font are statistically insignificant at the 90% confidence level.

Recommendations

While the program has not been launched, PG&E anticipates that most or all participation in the SmartAC BYOT Pilot will transition onto ART. The following recommendations are based on the SmartAC BYOT Pilot:

- **Avoid areas in the service territory with little to no air conditioner load.** The pay-for-performance structure of ART should incentivize vendors to focus on higher-value areas.

4. Appendices

Ex Ante Load Impact Tables: 9a. PGE_2023_ART_Ex_Ante_PUBLIC