

**PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans Discovery 2023
Data Response**

PG&E Data Request No.:	CalAdvocates_011-Q014		
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Request Date:	April 5, 2023	Requester DR No.:	CalAdvocates-PGE-2023WMP-11
Date Sent:	April 10, 2023	Requesting Party:	Public Advocates Office
DRU Index #:		Requester:	Pui-Wa LI

The following questions relate to your 2023-2025 WMP submission and also the following documents:

- PG&E's 2022 WMP, Section 7.1.E, Attachment 1 (Attch_Q3.pdf),
- PG&E's presentation during the 2021 EPIC Symposium (Attch_Q6_EPIC_Presentation.pdf),
- PG&E's Electric Preliminary Statement Part FY (Tariff Sheet No. 52259-E), and
- PG&E's Test Year 2023 GRC, Application 21-06-021, Exhibit PG&E-04 and Exhibit PG&E-17.

TOPIC: RAPID EARTH FAULT CURRENT LIMITER (REFCL)

QUESTION 014

Based on PG&E's evaluation of REFCLs:

- a) Please describe the significant changes to the grid required to implement REFCL technology,
- b) State PG&E's cost estimates for such changes,
- c) Describe the equipment installations required for such changes, and
- d) Describe the likely operational impacts resulting from the implementation of REFCLs on PG&E's system.

ANSWER 014

- a) The significant changes to the grid required to implement REFCL are identified below:
 - Replacing voltage regulators in closed delta;
 - Installing new, matched sets of feeder breaker current transformers (CTs);
 - Replacing bus potential transformers (PTs);
 - Replacing substation service transformers with line-line connections;
 - Isolating the bank neutral bus and installing a neutral bus grounding recloser;
 - Modifying the 12 kV bus structure for new switches and recloser;
 - Installing Ground Fault Neutralizers;
 - Upgrading the station battery capacity;

- Upgrading the feeder breaker protection and automation package to the current standard;
 - Grounding grid improvements based on grounding study;
 - The replacement of auto boosters with closed delta voltage regulator banks;
 - The replacement of open delta voltage regulators with closed delta;
 - The replacement of line reclosers and controllers for sensitive earth fault detection;
 - The isolation transformer for primary connected customers;
 - Replacing three-phase fuse arrangements with FuseSavers;
 - Phase connection swaps for capacitive current balancing; and
 - The replacement of old, direct bury underground cable.
- b) The total cost estimate for these changes varies but is in the range of \$10,000,000 to \$20,000,000.
- c) Please see the response to subpart (a) for the requested information.
- d) PG&E is still gaining operational experience with REFCL on its system through the demonstration project. One impact that has been identified at this time is that the known that fault location can be a challenge for such a system.