

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans Discovery 2022
Data Response

PG&E Data Request No.:	OEIS_002-Q05		
PG&E File Name:	WMP-Discovery2022_DR_OEIS_002-Q05		
Request Date:	February 22, 2022	Requester DR No.:	Data Request OEIS-PG&E-22-002
Date Sent:	March 4, 2020	Requesting Party:	Office of Energy Infrastructure Safety
PG&E Witness:		Requester:	Kevin Miller

C. Grid Design and System Hardening

QUESTION 05

Regarding PG&E's response to Maturity Survey question C.III.a (*What level of redundancy does the utility's transmission architecture have?*):

- a. Provide the percentage of circuits that have n-1 redundancy.
- b. Provide PG&E's plan to increase level of redundancy for transmission circuits.

ANSWER 05

- a. Customer impact after a single line outage event (N-1) is typically dependent on the transmission system operating configuration, which is subject to change (for example, some customer loads may have two transmission line connections, with one being the primary source of power.) Loss of the primary source may result in a momentary interruption to the customer while switching to the secondary or back-up source. This, however, would still be considered more redundant than having only a single line that serves the customer with no secondary or back-up source. Approximately 38% of PG&E's electric transmission lines have full redundancy (meaning under normal operating configuration, loss of the line should not have a direct impact to the customer). Additional lines may have partial redundancy, like in the example above where there is a back-up or secondary transmission line. Use of any secondary lines is contingent on the capacity and voltage needs of the system at the time of the outage event.
- b. While it is not always practical or economical to avoid radial system conditions which result in load loss for N-1 events, PG&E makes our best effort to provide reliable electric service to customers. To do that, PG&E follows the CAISO planning standards which require all single substations with 100 MW or more of load to be served through a loop system (two transmission lines). In addition, even if the 100 MW threshold is not met, the CAISO allows investment to increase the level of redundancy to reduce load loss exposure as long as the investment can be justified through a benefit to cost ratio (BCR) above 1.0. PG&E has justified projects to add N-1 redundancy using the CAISO planning standards in the past, and future projects typically are considered based on transmission line performance history and resulting customer impact and/or expected changes in load growth.