

Southern California Edison
2025-WMPs – 2025-WMPs

DATA REQUEST SET Cal Advocates - SCE - 2025 WMP - 04

To: Cal Advocates
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Response Date: 4/10/2024

Question 03:

SCE states on p. 27 of its 2025 WMP update regarding its Rapid Earth Fault Current Limiter (REFCL) Ground Fault Neutralizer (GFN) Program that:

SCE seeks to reduce the compliance target to complete construction of GFN at four substations to two substations, and to add a strive target to complete construction of GFN at four substations. In other words, SCE will strive to perform the same level of work as originally forecasted in the 2023-2025 WMP. This proposed change is based on lessons learned and other challenges expected in 2025. Specifically, SCE anticipates material and supply challenges in 2025 for REFCL GFN work, in addition to engineering complications at the substations in scope for 2025.

- a) Please state the basis for reducing SCE's compliance target from 4 substations to 2 substations.
- b) Please state which two substations are in scope for the abovementioned compliance target.
- c) Please state which two substations are in scope for the abovementioned strive target.
- d) Please explain why, in spite of the abovementioned target changes, SCE states that it "will strive to perform the same level of work as originally forecasted in the 2023-2025 WMP".
- e) Please list and explain each of the abovementioned "lessons learned and other challenges expected in 2025," including explaining how SCE expects these to impact its REFCL GFN installation work.
- f) Please list and explain each of the abovementioned "material and supply challenges," including explaining how SCE expects these to impact its REFCL GFN installation work.
- g) Please list and explain each of the abovementioned "engineering complications at the substations in scope for 2025," including explaining how SCE expects these to impact its REFCL GFN installation work.
- h) If SCE does not complete the proposed strive target of 4 substations in 2025, please state when SCE intends to complete said substations.

Response to Question 03:

- a) Please state the basis for reducing SCE's compliance target from 4 substations to 2 substations.*

Based on SCE's current information on REFCL project status and remaining elements necessary for completion, SCE determined it was prudent to modify the SH-17 target.

Since the time in early 2023 when SCE initially set the year-end 2025 target, SCE's REFCL projects have required additional efforts related to integration of the technology into the existing grid and unique configurations at REFCL substations. This has led to design updates and improvements that have added engineering scope.

SCE continues to be the leading utility in North America with the deployment of REFCL technologies, and further notes that all of its 2025 WMP targets, including for SH-17, were developed in early 2023 based on SCE's best available information at the time. Forecasting a target three years in advance is inherently uncertain, especially for complex and technologically innovative work such as REFCL.

b) Please state which two substations are in scope for the abovementioned compliance target.

SCE is actively working to advance REFCL projects at all four substations (i.e. Del Sur, Ritter Ranch, Weldon, and Monolith) originally intended for the 2025 target. Each substation is unique, and SCE intentionally did not define the 2025 goal, or the proposed modification to the goal, based on specific substations.

c) Please state which two substations are in scope for the abovementioned strive target.

Please see above response to part b).

d) Please explain why, in spite of the abovementioned target changes, SCE states that it "will strive to perform the same level of work as originally forecasted in the 2023-2025 WMP".

As with other targets that contain both a compliance goal and a strive goal, SCE is moving forward with a sense of urgency to advance REFCL as much as possible. The strive target represents a level of achievement that is possible, while being less certain than the compliance goal.

e) Please list and explain each of the abovementioned "lessons learned and other challenges expected in 2025," including explaining how SCE expects these to impact its REFCL GFN installation work.

At the Del Sur substation, SCE is working to resolve details around how to run a Ground Fault Neutralizer with a Double Operating Transfer Bus arrangement. This is a more complicated line and bus arrangement than has been used in previous REFCL applications. The added flexibility results in many contingency scenarios which must be designed around, some for which no clear technical solutions have yet been identified. Finding these solutions is likely to require installation and onsite testing of the equipment, and it may be necessary to rebuild the switchrack into a simpler configuration if no workable solutions are identified.

Del Sur substation also faces challenges around the incorporation of a second equipment supplier, which is a necessary component for a the larger REFCL rollout, but requires additional vetting of equipment.

At the Ritter Ranch substation, a section of phase-to-neutral load was installed in conduit, as opposed to the more typical approach of being installed in a duct format. This older design of cable is more challenging to replace, which adds scope and makes completion in 2025 more difficult.

f) Please list and explain each of the abovementioned "material and supply challenges," including explaining how SCE expects these to impact its REFCL GFN installation work.

SCE's projects at Acton, Phelan and Banducci substations encountered delays in material in 2024 such as relay racks and grounding transformers, which had a cascading effort pushing REFCL work further out generally, creating more uncertainty regarding SCE's original 2025 goal.

g) Please list and explain each of the abovementioned "engineering complications at the substations in scope for 2025," including explaining how SCE expects these to impact its REFCL GFN installation work.

- Moving to current transformers internal to the circuit breakers, instead of free-standing current transformers. This removes the need for line outages on future projects and reduces chances of failure.
- Using a Real Time Automation Controller instead of a relay to interface between the Ground Fault Neutralizer and the substation relays. This opens up capabilities for automation and removes some of the problems with scaling that occurred with the previous design.
- Moving to voltage transformers located on transformer positions rather than the main bus. This eliminates the need for bus outages during construction but required updated designs for mounting.
- Simplification of the neutral bus, which reduces the possibility of switching errors.
- Using three phase capacitive balancing units, which will allow for greater flexibility to adapt to changing circuit configurations and more standardized deployment.
- Moving more of the on-site wiring of the Ground Fault Neutralizer into the factory since factory wiring is generally more efficient than wiring in a remote substation.
- The addition of a neutral earthing resistor which allows the Ground Fault Neutralizers to be de-sensitized enough to ride through normal circuit switching. This should substantially increase the time they are in service and hopefully long term remove the need for bypassing altogether.

h) If SCE does not complete the proposed strive target of 4 substations in 2025, please state when SCE intends to complete said substations.

To the extent that SCE does not complete the work in 2025, it would extend into 2026. Generally, SCE would continue to work with a sense of urgency to complete the work in 2026, but the exact completion timing will depend on work completed in 2024 and 2025, and on SCE's learning over that time in terms of what might be remaining for 2026.