California Wildfire Safety Advisory Board

DRAFT POLICY PAPER ON UPDATING UTILITY REGULATIONS IN LIGHT OF CLIMATE CHANGE AND WILDFIRE RISKS

Executive Summary

The Wildfire Safety Advisory Board (Board) recommends several updates to the existing electric utility regulations to enhance safety in relation to dynamic risks from climate change and wildfires. The regulations as they currently exist do not completely reduce the risk of catastrophic wildfires. Despite having some of the strictest requirements for electric grid design and operation, wildfire ignition risk still remains on the grid. To address this issue, many electrical corporations have already gone beyond the requirements set in the California Public Utilities Commission's (CPUC) General Orders (GOs) to achieve deeper wildfire risk reduction. This Policy Paper on Updating Utility Regulations in Light of Climate Change and Wildfire Risks (Policy Paper) highlights some of the gaps in the existing regulations and offers recommendations aligning with or exceeding current industry practices. Furthermore, it compliments additional Board Policy Papers focused on above-grade distribution systems and utility vegetation management to provide Energy Safety with a comprehensive scope of regulatory recommendations which will drive further risk reduction in CPUC-jurisdictional electrical corporations and beyond.

Background

In 2019, the State Legislature passed Assembly Bill (AB) 111 which added Section 326(a)(7) to the Public Utilities Code (P.U.C.). P.U.C. section 326(a)(7) requires the Office of Energy Infrastructure Safety (Energy Safety) to review, as necessary, utility safety regulations in coordination with the Board and provide recommendations to the CPUC to address the dynamic risk of climate change and mitigate wildfire risk.[i] As part of its effort to coordinate with Energy Safety and inform the review of the CPUC's utility safety regulations and to recommend improvements to the regulations, the Board offers this policy paper and the recommendations herein.

Discussion

The WSAB recognizes and appreciates the efforts that many investor-owned and publicly owned electrical corporations have made to date to exceed the GOs where they

have not yet clarified certain requirements and engage in mitigation efforts not covered by the GOs to minimize their wildfire risk. The WSAB believes that any revision effort to the GOs should not only mirror the current industry practices where they exceed current regulations, but that this reform effort should aim to develop regulations that drive geographically optimal and data-informed levels of implementation for any given technology, practice, or procedure. The following sub-sections illustrate some of the issues with the current recommendations and offer some solutions.

Limitations of the current regulations on equipment design and construction

The current regulations concerning the design and construction of equipment, including GO 95 for overhead facilities and GO 128 for underground facilities, largely pre-date the catastrophic wildfires of the past two decades and are behind the current grid hardening efforts that the electrical corporations have made. . There are issues ranging from equipment and construction that pre-date GO 95 and are on the system, such as tree attachments, to equipment such as expulsion fuses which are known to spark or issue molten materials in normal operation. Additionally, there are instances where some poles and wires, though compliant with the GOs, still carry risks due to vegetation contact, high wind events or storms. For instance, bare wires can arc when vegetation comes into contact with them, and some poles may topple over if they are not constructed to withstand the high winds that can occur during Santa Ana Wind or Diablo Wind events or during winter storms. To address these issues, many electrical corporations have already been phasing out flawed and outdated equipment such as c-hooks for suspending transmission equipment and Public Resources Code (PRC) Section 4292 non-exempt equipment such as lightning arrestors and expulsion fuses that are known to pose wildfire risk. Furthermore, many are using more robust system construction with covered conductors and steel, composite, or concrete poles to reduce the likelihood of fire ignitions or damage from high winds or wildfires.

Limitations of the current regulations on inspections, operations, and maintenance

The current inspection cycles for utility distribution systems are set by GO 165 at 2-year intervals for patrol inspections, 3- to 5-year intervals for detailed inspections, and up to 10 years for first time intrusive inspections of wood poles 15 years or older and 20 years thereafter if they pass the inspections.[ii] These inspections are limited to the utility facilities and do not set requirements for vegetation inspections. During these time frames, a lot of issues can emerge on the system that could pose risks such as failing equipment or dying trees. Furthermore, there are no requirements for when in the year these inspections are carried out, which could mean that issues may not be identified in time for the electrical corporations can resolve them in advance of peak wildfire season. Many electrical corporations have proactively accelerated these inspection cycles and have conducted additional vegetation inspections at regular time intervals. Some have also set guidelines for their own intrusive inspections of poles.

In terms of operations and maintenance, the GOs do not specify requirements or protocols for activities that can have significant impacts in terms of reducing short- and long-term wildfire risk. These include adhering to tight timeframes for resolving maintenance tags, maintaining databases for the equipment to better track details such as their location, age, condition and maintenance history, and operational measures such as fast-curve settings (also known as fast-trip settings for causing the lines to trip faster, or enhanced powerline safety settings or EPSS) and pro-active de-energizations (i.e., public safety power shutoffs, or PSPS) to reduce wildfire risk. While the CPUC has issued guidelines on de-energization, they have not done so for fast-curve settings, nor have they formally considered the benefits of including such guidelines in the GOs.

Remote Sensing and Situational Awareness:

Currently, there are no existing requirements in the GOs that relate to the use of remote sensing and situational awareness technologies. The current GOs predate creation and deployment of the remote technologies in use today and there are no minimum requirements concerning how they are to be deployed and used by the utilities. Nevertheless, electrical corporations have been leveraging these technologies to reduce wildfire risk on their systems. For instance, electrical corporations in California have installed thousands of weather stations across the state, making them among the largest private operators of weather stations in the US.[iii] Additionally, they have installed many mountaintop cameras and line sensors, and have been analyzing data collected from lidar scans and satellite imagery of their system. These technologies collectively can help the system operators to detect early issues such as, failing equipment or dying trees. Furthermore, they can identify issues in real time, such as wildfires breaking out near the power lines and take appropriate measures.

Recommendations

For the following recommendations, the Board has considered, and the electrical corporations should be mindful that, the characteristics of a given area's climate, geography, vegetation, and existing infrastructure will inform the most appropriate technologies and equipment to deploy and practices to conduct for that area.

Procedural Recommendations:

- Regular, Scheduled Review of GOs – As an overarching recommendation, all the GOs related to electrical infrastructure safety should be subject to a regular, scheduled review process to ensure that they are adequate to meet current and future dynamic natural, man-made and digital risks. This will help ensure that electrical infrastructure will always serve a critical role in allowing society to

thrive and not pose a threat to public safety. This could occur every five to ten years.

- Continual Engagement as Part of P.U.C. 326(a)(7) – Additionally, Energy Safety should continue to engage with the Board as part of the PUC 326(a)(7) process and to provide iterative recommendations to the CPUC on a five-to-ten-year basis. Since the nature of climate and wildfire risks are evolving, new information will become available. Though P.U.C. 326(a)(7) does not include an end date for its process, the Board strongly recommends that these efforts occur at regular intervals to provide recommendations on GOs that incorporate appropriate responses to changing risks.
- HFTD Map Updates – The HFTD maps, which the electrical corporations use to prioritize their wildfire mitigation work, should be modified to reflect new information since 2018 (in addition to minor edits in the 2021 update) and fix boundary issues that have been identified.[iv,v] Additionally, the HFTD revision process should be accelerated from a 10-year process to a three to five year process to reflect new information and due to the dynamic risk of climate change. Energy Safety should host a workshop or scoping meeting to discuss the need for updating the HFTD map and begin informing that process. Any revised maps should be applicable for statewide and regional planners not only for utility wildfire mitigation, but for general land use planning and wildfire risk mitigation.
- Engineering Studies on Pre-GO 95 Equipment, PRC 4292 Non-Exempt Equipment – An engineering study should be commissioned across various utility service territories to review the equipment that predates GO 95 to determine how safe the equipment is and if replacement programs should be initiated. GO 165 should include an inspection cycle specific to this equipment should be developed following this engineering study. Similarly, an engineering study should be conducted for PRC 4292 non-exempt equipment to determine the safety of the equipment, if replacement programs should be initiated, and if special inspection requirements would be needed going forward.

Regulatory Recommendations – Grid Design and Construction:

- New Experimental Design Rule in GO 95 – Similar to GO 128 Rule 15.2, which allows the electrical corporations to carry out pilot projects for innovative design of underground electrical systems, GO 95 should be revised to allow the electrical corporations to engage in pilots of innovative above-ground systems including design and equipment used. Such pilots should be subject to CPUC reporting and an application or advice letter process with the CPUC to initiate the pilots needs to be clarified. Additionally, there should be a process specified in any revised rule for GO 95 that would allow for successful innovations to be scaled up and used across the state.

- Revised Experimental Design Rule in GO 128 – GO 128 Rule 15.2 should specify that pilots under this rule should be subject to CPUC reporting and an application or advice letter process with the CPUC to initiate the pilots needs to be clarified. Additionally, Rule 15.2 should include a process that would allow for successful innovations to be scaled up and used across the state.
- System Hardening for Pad Mounted Equipment – Since undergrounding does not erase fire threat if there is damage to pad mounted equipment by vehicle or other foreign objects, the requirements concerning the design, construction and safety of pad-mounted equipment may need to be reevaluated.
- Fire, Wind-Resistant Poles – GO 95 should be revised to provide guidance to the electrical corporations on the conditions where it is necessary to utilize alternative pole materials such as composite, steel and/or concrete for both new installations and replacements in the Tier 2 and Tier 3 areas in the HFTD. For instance, alternative pole materials may be necessary in areas in the HFTD that are subject to wind gusts more than 50 mph. In areas that have lower wind exposure, GO 95 should specify rules concerning the wrapping of wooden poles with fire retardant wrapping or equivalent technologies to reduce the risk of damage of the poles due to a fire.
- Increase Pole Loading – GO 95 should be revised to increase pole load calculations in the HFTD and areas exposed to heavy winter storms or Easterly winds. For instance, pole loading could be increased from 8-pounds of wind pressure (which can withstand up to 56 mph) to 16-pounds of wind pressure (which can withstand up to 80 mph). This would enable poles to sustain higher wind pressure. In certain areas, this may necessitate replacing guy wires with structural bracing or alternative pole materials such as metal or concrete. Additionally, GO 95 may need to require new standards for storm and multi-directional guying techniques in the HFTD and high wind-exposed areas.
- Cross Arm Construction – GO 95 should be updated to provide guidance to the electrical corporations on the appropriate use of metal, fiberglass or concrete crossarms in the HFTD. Additionally, GO 95 should provide guidance on increased conductor spacing from the state-minimum of 11.5 inches from each phase in the HFTD to avoid line slapping and phase-to-phase faults. Increased conductor spacing will necessitate longer crossarms to accommodate.
- Pole Height – A revised GO 95 should provide guidance to electrical corporations on the appropriate construction of distribution circuits, clarifying when the height of the circuits to should be well above the tree canopies when there are geographic limitations or certain tree species present to minimize vegetation-powerline interactions.

- PRC 4292 Non-Exempt Equipment – GO 95 should provide guidance on the appropriate use of PRC 4292 non-exempt equipment in the HFTD. Current pole brushing practices do not eliminate all the wildfire risk of non-exempt equipment such as expulsion fuses and certain lightning arrestors, particularly in areas where it is impossible to keep out all duff, debris, leaves and pine needles from the base of the poles.
- GO 95-Exempt Equipment – GO 95 should provide guidance on the appropriate use of equipment predating Pre-GO 95 that currently operate on the system and the conditions under which they should be replaced.
- Covered Conductors – GO 95 should be updated to provide guidance to the electrical corporations on when covered conductors should be required in the HFTD. For instance, covered conductors may be needed in Tier 3 conifer forests for line segments that are not identified for undergrounding or where undergrounding would not occur within the next five years. Covered conductor guying standards and techniques, such as multidirectional guying, need to be determined and specified.
- Conductor Splices – GO 95 should be revised to set standards for splices along conductors and clarify how many splices on a circuit are excessive.
- Animal Control – GO 95 should be revised to specify standards for protecting animals and reducing hazards that occur when they contact the lines. These would include devices, such as raptor guards.
- Temperature and Loading Standards – Temperature and loading standards need to be reevaluated to better safeguard the equipment against temperature and weather extremes that could cause failures and in turn outages and sparks.
- Equipment Rated Capacities – GO 95 should state that the equipment used on the system should not exceed the capacity that it is rated for. For instance, using a 400 Amp switch to carry 600 Amps on a circuit could create wildfire risk. Protection equipment should be regularly inspected to verify that it has the rated capacity to interrupt the expected fault duty.

Regulatory Recommendations – Inspections, Operations and Maintenance:

- Distribution Patrol Inspections in the HFTD – GO 165 patrol inspection cycles for distribution should be reevaluated to consider carrying them out on a more frequent basis than every two years. For instance, patrol inspections could be carried out on an annual or biannual basis. One of which should occur prior to peak wildfire season for the geographic area in question, leaving enough time to close out needed maintenance work orders. An additional patrol inspection may be warranted for areas in the HFTD subject to high winds and/or heavy winter storms. Guidance should be provided on the frequency, timing, and thoroughness of aerial inspections, such as with drones or piloted aircraft. For instance, an aerial inspection could occur prior to peak wildfire season.

- Detailed and Intrusive inspections – GO 165 should be updated to increase the frequency of their detailed inspection cycles. For instance, this could be reduced from every 5 years to every 3 years in the HFTD. GO 165 may also need to be updated to increase the frequency of follow-up inspections after a pole passes an initial intrusive inspection. For instance, this could be scheduled every 10 years after passing the initial 10-year inspection.
- Consideration of Tower/Pole "Walking" Issue – Equipment failures and ignitions may be caused by the "walking" of transmission towers and poles. This refers to the risk in a given location of one tower or pole to another and shifting due to soil instability, landslides, and/or liquefaction. A revised GO 165 should provide guidance to the electrical corporations as to how to address this issue in their inspections.
- Operation of Switches – A revised GO 95 should provide guidance on safe closing and opening of switches because they can become spark sources and because their operation can lead to the ionization of the air.
- Prioritization of Maintenance Tag Resolution – A new GO should provide guidance to the electrical corporations on the appropriate prioritization of utility maintenance tag resolution to ensure that highest maintenance-related risks in terms of ignition and consequence risk do not remain for too long on the system. Additionally, the new GO should clarify the appropriate circumstances in which electrical corporations may be able to reclassify their maintenance tags and adjust their repair timelines to ensure that they are re-prioritized correctly.
- Hardware Database – A new GO should provide guidance to the electrical corporations on the creation and maintenance of geospatial, hardware databases. Consideration should be given to the generation of searchable records on the location, age, maintenance history and condition of equipment on their networks at least within the HFTD.
- De-Energization – It may be warranted to include the most prudent protocols for proactive de-energization to reduce the risk of wildfires in a dedicated GO.
- Fast-Curve Settings – Similar to the recommendation for de-energization, an effort to incorporate the most prudent protocols for fast-curve settings in the GOs may be warranted.

Regulatory Recommendations – Remote Sensing and Situational Awareness:

- Cameras – A new GO should specify the necessary technical specifications for cameras and supporting software, data sharing and government access and the appropriate level of penetration of cameras in the utilities' service territories. For instance, the GO should include details such as the location, electricity source, viewshed, the ability to be remotely adjusted, heat sensing capabilities for nighttime use, and the number of cameras per circuit mile or per square mile.

- Lidar – A new GO should provide guidance on the appropriate number of Lidar flies along the utilities' distribution and transmission corridors over a certain timescale and during what season(s) they should take place. For instance, this could occur every two to three years and take place at least two months prior to peak fire season for a given area. Additionally, the new GO should provide guidance on the use of non-aerial Lidar, such as during patrol inspections. For instance, ground Lidar scans could occur every one to two years.
- Sensors – A new GO should provide guidance on the appropriate technical specifications and deployment of sensors and supportive technologies throughout their service territories.
- Satellite imagery – A new GO should provide guidance to the electrical corporations on the collection of satellite imagery and the use of in-house or third-party AI software to analyze it to help inform operational and maintenance decisions and vegetation management.
- Weather Stations – A new GO should specify minimum specifications needed for weather stations and associated software technologies and the appropriate penetration levels throughout the utilities' service territories. This GO should address the use of the latest artificial intelligence/machine learning capabilities for advanced weather forecasting.
- Communication Networks – A new GO should be considered that would ensure that electrical corporations have adequate channels of communication, particularly in remote areas, that would allow them to report issues such as ignitions and other hazards quickly to appropriate decisionmakers and public safety partners.

References

[i] P.U.C. §326(a)(7) requires energy Safety to "Review, as necessary, in coordination with the California Wildfire Safety Advisory Board and necessary commission staff, safety requirements for electrical transmission and distribution infrastructure and infrastructure and equipment attached to that electrical infrastructure, and provide recommendations to the commission to address the dynamic risk of climate change and to mitigate wildfire risk." https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=326&lawCode=PUC.

[ii] California Public Utilities Commission, "Table 1: Distribution Inspection Cycles (Maximum Intervals in Years)," General Order 165, accessed November 15, 2023, https://ia.cpuc.ca.gov/gos/GO165/GO_165_table.html.

[iii] For instance, the large investor-owned electrical corporations PG&E, SCE and SDG&E own and operate 1300, 1620, and 222 weather stations, respectively. See PG&E 2023-2025 WMP original version filed March 27, 2023 p.894, SCE 2023-2025 WMP original version filed March 27, 2023 p.2, SDG&E 2023-2025 WMP original version filed March 27, 2023 p.297, https://efiling.energysafety.ca.gov/Search.aspx?docket=2023-2025-WMPs.

[iv] The revision to the HFTD map in 2021 was limited to adding 1,960 acres to the Tier 2 HFTD in the City of Healdsburg. See: California Public Utilities Commission (2021), "Resolution SED-4," August 26, p.1, https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M401/K324/401324803.PDF.

[v] For instance, the Ventura County city of Simi Valley, including all its urban areas, are shown in the HFTD map to be entirely within the Tier 3 HFTD. See: California Public Utilities Commission, "HFTD Map - GIS web app viewer," accessed August 7, 2023, https://capuc.maps.arcgis.com/apps/webappviewer/index.html?id=5bdb921d747a46929d9f00dbdb6d0fa2.