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Safety and Enforcement Division



Rulemaking 15-05-006

SED-CAL FIRE Joint Assessment and Recommendation Report

September 19, 2018

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I. EXECUTIVE SUMMARY

In this report, the California Public Utilities Commission's (hereafter, Commission or CPUC) Safety and Enforcement Division (SED), in consultation with the California Department of Forestry and Fire Protection (CAL FIRE), provide their joint-recommendations regarding the feasibility and merits of: (1) developing a fire-wind map for the purpose of scoping potential fire-wind-load standards and associated regulations, and (2) the adoption of a six-month timeframe for correcting Priority Level 2 fire-safety risks in Tier 2 of the High Fire-Threat District (HFTD) (collectively, Matters for Consideration). This report was ordered by the Commission in Ordering Paragraphs (OPs) 10 and 11 of Decision (D.)17-12-024.

During the early stages of deliberation, SED and CAL FIRE concluded that to conduct a valid assessment of merit and allow for reasonable recommendations, consideration and comparison to at least one alternative solution meeting the spirit and intent of the Matters for Consideration, was necessary. Accordingly, as a Proposed Alternative¹, SED and CAL FIRE consider that instead of spending the time and resources to develop a statewide fire-wind map and adopt associated regulatory changes as contemplated in the Matters for Consideration, if that effort would be better spent on: (1) deployment of weather stations throughout the HFTD to collect high-quality weather data and (2) evaluating potential development of associated situational awareness tools and predictive capabilities. Based on review of existing information, SED and CAL FIRE do not recommend developing a fire-wind map or associated enhanced fire-wind-load standards at this time. Instead, SED and CAL FIRE recommend that the Commission proceed in a manner consistent with the Proposed Alternative and as suggested in Section IV.C of this report.

A primary driver of this recommendation is the expansive range of uses of and exponential public benefit provided by high-quality weather data, collected and stored in a consistent manner, on a statewide scale, and in areas previously examined and determined to

¹ See section IV.B.5 of this report.

present an “Elevated” or “Extreme” fire-threat.² SED and CAL FIRE believe that the Proposed Alternative would have broader tangible benefits than the creation of another static wind map, albeit filtered for fire-weather conditions, as postulated in the Matters for Consideration. Wind data is indeed critical for wildfire mitigation and response. However, the main current limitation is the absence of consistent granular data of actual wind conditions at localized level. Without making significant strides in the area of data collection, any efforts to model or map wind conditions in California are going to be limited in value.

SED and CAL FIRE have evaluated the benefits achieved by San Diego Gas & Electric (SDG&E) through the use and implementation of information learned from its network of weather stations and concluded that it provides substantial benefit to wildfire risk mitigation, system planning and hardening, operational awareness and emergency response. The high- quality weather data collected from the proposed weather stations can also be used to more efficiently, accurately, and precisely assess the adequacy of current GO 95 wind loading requirements.

To the extent that the Commission believes existing GO 95 wind loading requirements should be revised to enhance public safety, SED and CAL FIRE recommend that the Commission formally adopt and recognize enhanced wind load standards developed from investor owned utility (IOU)-led wind studies as “known local conditions”³ in accordance with the mandates for that provision in GO 95, Rule 31.1. However, we caution the Commission to consider the ramifications of such changes and the ancillary effects on existing regulations, as discussed in Section IV.B.1 of this report. Furthermore, based on a review of existing data and information,

² SED and CAL FIRE’s Proposed Alternative recommends deployment of weather stations throughout the HFTD. Beyond Tier 2 (“Elevated” fire-threat) and Tier 3 (“Extreme” fire-threat) areas, the HFTD includes “Zone 1” areas, which are areas with known tree mortality issues and are in direct proximity to communities, roads, and utility lines, and represent a direct threat to public safety, as defined by the United States Forest Service (USFS) and CAL FIRE’s joint-map of Tree Mortality High Hazard Zones (HHZs).

³ GO 95, Rule 31.1, *Design, Construction, and Maintenance*, states in part, “Electrical supply and communication systems shall be designed, constructed, and maintained for their intended use, **regard being given to the conditions under which they are to be operated, to enable the furnishing of safe, proper, and adequate service.** For all particulars not specified in these rules, design, construction, and maintenance should be done in accordance with accepted good practice **for the given local conditions known at the time by those responsible for the design, construction, or maintenance of communication or supply lines and equipment...**” (emphasis added).

SED and CAL FIRE have concluded that most utility-caused fire ignitions are due to (1) contact with vegetation and (2) failure of conductors. SED and CAL FIRE do not find a compelling case for making the types of wind loading and associated regulatory changes proposed in the Matters for Consideration, as those changes likely won't provide substantive mitigation of vegetation-contact-caused utility fire ignition risk. We also believe that there is not enough evidence indicating changes to wind loading standards would offer a superior control mechanism to conductor-failure-caused ignitions than other control mechanisms, such as, installation of covered conductors or employment of sensitive relay settings.

Additionally, in light of the great potential public benefit of and the current expenditures already underway for deployment of weather stations throughout the HFTD and other high-risk fire areas, SED and CAL FIRE recommend that, to the extent reasonable, the Commission encourage and support utility efforts to install weather stations and gather high-quality weather data. Furthermore, we also recommend the Commission, to the extent reasonable, encourage studies for potential uses of such high-quality weather data to develop and implement operational and predictive tools that enhance utility situational awareness and allow for improved detection and response, thus increasing system resiliency and further growing mitigating wildfire risk.⁴

Concerning the matter of adopting an abbreviated timeframe for correcting Priority Level 2 "fire-safety risks" in Tier 2 of the HFTD, SED and CAL FIRE contend that there is insufficient information available at the issuance of this report to conduct a proper assessment of the merits of such a change for the purpose of making a recommendation on how to proceed. SED and CAL FIRE do not believe there is sufficient understanding of, or agreement on, which "safety hazards⁵" or potential GO 95 violations could be characterized as posing a fire-safety risk that would be needed to gauge the potential scope of implementing such a change. This information would also be necessary to evaluate whether making such a change would

⁴ SED has not reviewed or examined any utility expenditures or requests for cost recovery consistent with the recommendations in this report, and as such, SED takes no position regarding the reasonableness of any utility proposals or the associated costs.

⁵ GO 95, Rule 18 defines the term "safety hazard" as "a condition that poses a significant threat to human life or property."

provide any tangible fire mitigation benefit that could outweigh potential costs. Accordingly, SED and CAL FIRE cannot provide a recommendation whether reducing the correction timeframe for Priority Level 2 fire-safety risks in Tier 2 of the HFTD from 12 to six (6) months is just or reasonable. As a matter of note, SED and CAL FIRE remind the Commission that the timeframe for corrective action contemplated in this report are *maximum* correction timeframes and do not preclude a utility's obligations to maintain its system in such a manner to furnish the delivery of safe, proper, and adequate service in compliance with California Public Utilities Code (Pub. Util. Code) Section (§) 451 and GO 95, Rule 31.1.

II. BACKGROUND INFORMATION

Rulemaking (R.) 15-05-006 is the successor to R.08-11-005. In R.08-11-005 the Commission adopted dozens of new fire-safety regulations in response to devastating Southern California wildfires in 2007 that were reportedly ignited by powerlines. These included the Grass Valley Fire (1,247 acres), the Malibu Canyon Fire (4,521 acres), the Rice Fire (9,472 acres), the Sedgewick Fire (710 acres), and the Witch Fire (197,990 acres). The total area burned by these powerline fires exceeded 334 square miles.

Several of the fire-safety regulations adopted in R.08-11-005 apply only to areas, referred to as "high fire-threat areas" at the time, where there is an elevated likelihood of powerline fires igniting and spreading rapidly. The Commission adopted several interim maps in R.08-11-005 to designate the "high fire-threat areas" where the adopted fire-safety regulations applied. Each of the interim maps covered a different part of the State and used its own methodology to identify "high fire-threat areas."

In May 2015, the CPUC closed R.08-11-005 and initiated its successor rulemaking, R.15-05-006, to complete the outstanding tasks from R.08-11-005. Among other things, the scope of R.15-05-006 included: (1) development and adoption of a statewide fire-threat map that delineates the boundaries of a new HFTD, where the fire-safety regulations adopted in R.08-11-005 will apply and (2) determining the need for additional fire-safety regulations in the HFTD. The HFTD developed in R.15-05-006 was intended to replace the "high fire-threat areas" designated by the interim maps, where the previously-adopted regulations applied, with a single statewide map (developed using a consistent methodology) and associated regulatory

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changes. The scope of R.15-05-006 was divided into two (2) parallel tracks. The first track focused on the development and adoption of a single statewide fire-threat map delineating the boundaries of the HFTD. The second track focused on the identification, evaluation, and adoption of fire-safety regulations for the HFTD.

The effort to identify and evaluate potential fire-safety regulations for the HFTD was led by an *ad hoc* group known as the Fire Safety Technical Panel (FSTP). The FSTP was co-chaired by SED and Southern California Edison Company (SCE) and was open to all parties. The FSTP held 12 days of workshops during the five-month period of February – June 2017. The second track of R.15-05-006 culminated with the filing of the *Joint Parties Workshop Report on Fire Safety Regulations* (hereafter, *Workshop Report*). The *Workshop Report*, containing a total of 31 proposed fire-safety regulations for the HFTD, was filed on July 10, 2017. In issuing D.17-12-024 titled, *Decision Adopting Regulations to Enhance Fire Safety in the High Fire-Threat District*, the Commission evaluated the merits of each proposed regulation (PR), many of which were competing proposals, to decide whether to adopt, reject, or modify then adopt them.

Ultimately, the Commission adopted changes to 10 rules in General Orders (GOs) 95, 165, 166, and Electric Tariff Rules. However, the Commission did not issue a final ruling on all PRs, electing instead to allow further consideration of several competing PRs following additional evaluation and recommendations from SED and CAL FIRE. Two such proposals were PR 10 (SDG&E) and PR 11 (sponsored by Mussey Grade Road Alliance (MGRA)), both of which proposed changes to current GO 95 loading requirements in the HFTD but used varying implementation strategies. Additionally, two other PRs (PR 3, sponsored by SDG&E and PR 4/AP-1, sponsored by the Communication Infrastructure Provider (CIP) Coalition) concerning GO 95, Rule 18 initiated a discussion over the appropriate timeframe (six (6)-months versus 12-months) for correction of Priority Level 2 fire-safety risks in Tier 2 of the HFTD. These competing proposals prompted the Commission to direct SED to confer with CAL FIRE to produce a recommendations report regarding the feasibility and merit of developing and adopting a “fire-wind map” and associated fire-safety regulations, and the appropriate timeframe for corrective action of Level 2 fire-safety risks in Tier 2 of the HFTD. The directions and instructions in OPs 10 and 11 of D.17-12-024 memorialized this assignment.

OP 11 established a deadline of June 21, 2018 for SED to submit a written report providing recommendations on whether and how to proceed with: (1) the development and adoption of a statewide fire-wind map, (2) the development and adoption of fire-wind-load standards and possibly other fire-safety regulations tied to the fire-wind map, and (3) the adoption of a six-month timeframe for correcting Priority Level 2 fire-safety risks in Tier 2 of the HFTD. On June 12, 2018, SED sent a letter to the Commission's Executive Director requesting a 90-day extension to comply with the requirements of OPs 10 and 11. On June 22, 2018 the Executive Director granted SED's request, extending the deadline for the report to September 19, 2018.

This report contains SED's recommendations, after consultation with CAL FIRE, regarding the matters identified in OPs 10i, 10ii, and 11.

III. INTRODUCTION & PURPOSE

As directed by D.17-12-024, SED and CAL FIRE assessed the feasibility and merit of developing and adopting a fire-wind map, associated fire-wind-load standards, and condensing the timeframe for correction of Priority Level 2 fire-safety risks in Tier 2 of the HFTD to align with the correction timeframe in Tier 3 of the HFTD (collectively, "Matters for Consideration"). Evaluating the feasibility of the Matters for Consideration is a relatively straightforward assessment of whether it is possible to produce or implement such a product or requirement. Assessing the merits of the Matters for Consideration, which inform the basis of SED's and CAL FIRE's recommendations, is a far more nuanced effort. First, an evaluation must be made for the time, effort, complexity, and resources required to develop, produce, and implement the Matters for Consideration. Next, to make a well-informed recommendation, the opportunity costs associated with the Matters for Consideration must be evaluated and the resultant costs-benefits compared to potential alternatives to determine the best use of time and limited resources. The cost-benefit comparison contemplated herein is not a cost-benefit analysis in the traditional sense of the term (i.e. an assessment of tangible and perceived costs and benefits quantified to compare on an equivalent monetary scale), but rather an evaluation of the time, resources, and potential benefits and uses for completing/implementing the Matters for Consideration against the time, resources, and the benefits and uses for potential

alternatives. To that end, in consideration of the fire-wind map recommendation, SED and CAL FIRE present a proposed alternative solution that is consistent with the spirit and intent of the fire-wind map and associated regulations addressed in the Matters for Consideration. With respect to the assessment and recommendation for an abbreviated timeframe for corrective action in Tier 2 of the HFTD, the alternative considered is the status quo.

The intended purpose of this report is to discuss the logic and framework employed by SED and CAL FIRE to assess the feasibility of the Matters for Consideration and to present the joint-recommendations established following the merit evaluation. As such, SED and CAL FIRE have structured this report to discuss the Matters for Consideration individually, to first assess feasibility, then evaluate the merits of doing so with respect to the potential opportunity costs and alternative uses for the time and resources that would be required to complete or implement the Matters for Consideration. SED and CAL FIRE then utilize this structural framework as the basis for informing the joint-recommendations contained in this report.

IV. Fire-wind Map & Associated Loading Regulations

A. Feasibility Evaluation

1. Available Data

SED and CAL FIRE know of two available datasets that have comprehensive statewide weather reconstructions. The first is the North American Regional Reanalysis (NARR) dataset, created and available from the Earth Systems Research Laboratory at NOAA.⁶ These datasets cover the period from 1979 to present, with a nominal grid resolution of 32 km. SED and CAL FIRE are not aware of any specific data validation process applied to the wind estimates in these data and given existing knowledge referenced from fine-scale mesonets, and other available data as explained below, that sub-grid spatial variability in these data would likely be very high and unreliable, especially over much of the mountainous terrain in California. We are also aware that climatologists have run the Weather Research and Forecasting (WRF) model at finer resolutions using NARR as initializing inputs, but are not aware of any efforts where the entire domain of the state was reconstructed.

⁶ <https://www.esrl.noaa.gov/psd/data/gridded/data.narr.html>

The other dataset available is a 2 km WRF reconstruction for the period 2004-2013 that was conducted for CPUC rulemaking R.08-11-005 and R.15-05-006 by the Independent Expert Team (IET) for the development of Fire Threat Map 1, and was utilized in the development of the final CPUC Fire-Threat Map, Tiers 2 and 3 as used in the HFTD Map, and forms the basis for application of enhanced fire safety regulations found in D.17-12-024. This data was developed expressly to inform assessment of utility fire hazard and risk and has a major focus on the use of wind for much of its parameterization. While the period of record in the NARR dataset is considerably longer, SED and CAL FIRE feel that the capacity to model and validate winds using emerging processes, like those used in the IET climatology data stack, provides a more robust, spatially resolved process to explore.

CAL FIRE is actively pursuing an extension of the 2 km reconstruction from 10 to 15 years (though 2018), enhancing the reliability of the wind data through a comprehensive bias correction process known as quantile mapping, as well as making more accurate assessments of fuel dryness through the use of post-processing calculations of the National Fire Danger Ratings System indices, where the use of the timelag moistures and the Energy Release Component (ERC) coupled with a fuel model that has no live fuels, provides an excellent index of fuel dryness, thus providing a better fire potential filter than the Fosberg Fire Weather Index (FFWI) used in the IET report. These data are currently under contract for development by Dr. Tim Brown at the Western Region Climate Center/Desert Research Institute, who also did the original climate modeling. These data are expected to be available for assessment and application sometime in the Spring of 2019.

2. Feasibility for a New Statewide Wind Map for CPUC Use

Given the above narrative and plans, it is obvious that creation of a statewide wind data climatology, and derived products like 50-year peak gust intervals is possible. However, translating such data into a product that would be uniformly agreed upon by parties for general use with GO 95 appears to be more problematic. In light of findings given in this report regarding existing internal wind data development by three investor owned utilities (IOUs), and in light of existing collaboration between CPUC and CAL FIRE, and the explicit requirements of that collaboration to review and evaluate the effectiveness of wildfire mitigation plans as

prescribed to all power companies, we feel that the CAL FIRE data will provide an independent product with which to compare individual, service-area wind data reconstructions provided by utility companies. As part of the internal data collection process to fulfill the intent of the wildfire mitigation plans, including operational decisions to de-energize circuits or disable reclosers, which requires fine-scale, real time weather data collection, we envision a synergistic partnership where both wind data reconstructions (power company's and CAL FIRE's) utilize the expanded station network for highly resolved calibration. In this strategy, instead of vesting an independent party with creating from whole cloth a new static wind map, we develop an iterative process whereby data is enhanced systematically year by year, and performance measures directly related to utility infrastructure failures and ignitions can be addressed within the specific operational guidelines and data being used.

B. Merit Evaluation

To provide a recommendation on whether to proceed with the development of a fire-wind map and associated loading regulations, SED and CAL FIRE weighed a multitude of factors including the time and resources required, impediments to the implementation of, value added by, potential uses for, and opportunity costs involved with developing and adopting a fire-wind map and associated loading requirements. To evaluate the opportunity costs, SED and CAL FIRE offer a potential alternative solution believed to meet the intent of the fire-wind map proposal – to reduce the likelihood of catastrophic utility-ignited wildfires – for which to weigh resource requirements and value added against.

1. Interrelation of Loading, Strength, and Safety Factor Requirements

The presumptive use for a fire-wind map, as contemplated in the Matters for Consideration, would be to engage in a rulemaking to revise GO 95, Rule 43 loading requirements. This is evidenced by the Commission's stated purpose for the proposed fire-wind map in OP 10-i of D.17-12-024, where it states, "The development of a statewide fire-wind map by CAL FIRE (or under CAL FIRE's oversight) **for the purpose of establishing fire-wind-load standards and possibly other fire-safety regulations tied to the map.**"² (emphasis added) Further insight into the intent of a fire-wind map can be inferred from the fact that both PRs

² Decision (D.) 17-12-024 at page (p.) 157.

(PRs 10 and 11), which spurred the Commission to instruct SED and CAL FIRE to confer on the feasibility and merit of developing such a map, were proposals to augment existing wind loading requirements in GO 95, Rule 43. It is important to note that Rule 43 and its requirements are also referenced in the text of GO 95, Rule 44 and Rule 48. Furthermore, changes to safety factor requirements (i.e. Rule 44) would portend upgrades and remediation to all existing infrastructure, in accordance with GO 95, Rules 12.2 and 12.3, to meet the new safety standards. Thus, considering the number of overhead utility poles in existence throughout the state, the potential cost implications related to such a change could be substantial.

Given the discussion above, it is imperative to this report that a careful discussion regarding the potential effects of amending or supplementing existing GO 95 loading requirements are also presented to provide proper context and ensure public safety is not compromised. As has been explained repeatedly by SED in R.15-05-006 and its predecessor R.08-11-005, loading requirements cannot be evaluated in a vacuum.⁸ Modifications to loading requirements have ancillary ramifications on related strength and safety factor requirements as well. Furthermore, given the interrelation of strength, loading, and safety factor requirements in overhead line design, making a potential change to loading requirements, as contemplated by a potential fire-wind map and associated fire-wind-load standards, would have to be evaluated for related changes to much of GO 95, Section IV, *Strength Requirements for All Classes of Lines*. This interrelation is extensively expressed in party comments, either directly in the Workshop Report or Opening Comments. AT&T, Frontier, Consolidated and Small ILECs, qualify their support for PR 11 by stating, “While the wind loading proposal may be reasonable, depending on the other associated parameters (e.g., corresponding safety factors), its effectiveness and economic impact on consumers is dependent upon the Commission’s review and revisions of existing GO 95 loading rules.”⁹ The Commission even acknowledges that this is the position of numerous parties when it states, “SCE and SDG&E assert that any new fire-wind

⁸ See *Comments of the Safety and Enforcement Division on the Joint Parties’ Workshop Report on Fire Safety Regulations*, filed on July 31, 2017 at pages (pp.) 11-14.

⁹ Workshop Report at p. B-111

loading standards must include a comprehensive reform of all existing GO 95 wind-load standards.”¹⁰ In other words, a discussion of fire-wind-load maps and associated standards alone, without evaluating the resultant ramifications, would be incomplete. As such, any map developed with the intent of informing and scoping development of additional or supplemental loading requirements (i.e. Rule 43) must be contextualized within the framework of the strength and loading section (i.e. Section IV) as a whole. This distinction is extremely important as it relates to the creation of a dataset that would be needed to facilitate map development. That dataset and resultant mapping product could then be scoped for regulatory changes tied to the dataset and resultant map, much the same way the regulations adopted in D.17-12-024 tied to the HFTD. Said another way, wind data development (specifications, models, estimate confidence, etc.) all need to be considered within the actual regulatory framework where the map would be used.

Further complicating this matter is that while there may be general agreement that changes to wind loading requirements have ramifications on other GO 95 rules, and consequently must be assessed holistically, there is no agreement upon methodology, if changes to the existing GO 95 methodology are deemed necessary. SCE and SDG&E call for potential comprehensive reform of GO 95, Section IV altogether, while PacifiCorp offers that structural loading requirements developed and adopted by the American Society of Civil Engineers (ASCE) and memorialized in ASCE 7-10 wind maps can be utilized by utilities to assess the need for using elevated winds for structural loading purposes throughout their service territories.¹¹ Resolving fundamental disagreements that may arise regarding appropriate methodology and associated changes that need to be made would likely require extensive evidentiary hearings and discovery.

Through the arduous trial and error process toward map development in R.08-11-005 and R.15-05-006, SED and CAL FIRE learned that the intersection of scientifically developed data for scoping of safety regulations can quickly become distorted and convoluted during the rulemaking process. Without specific knowledge of what revisions to what rules were going to

¹⁰ D.17-12-024 at p. 70.

¹¹ Workshop Report at pp. B-116 – B-117

be adopted, the best the mapping effort could do was to concentrate simply on defining utility fire potential and damage in the broadest sense, such that areas identified would be appropriate for presumed regulations that decreased ignition potential from overhead equipment. This problem emanates from a scope that is either too broad and allows for a myriad of potential approaches, which must eventually be assessed and resolved causing significant delays, or a scope that is too narrow and doesn't provide sufficient flexibility to accommodate unanticipated results or challenges that often occur during the type of modeling and statistical analysis required for such an effort. Given the number of parties and stakeholders with competing interests in modified strength and loading requirements, developing a narrow scope in a rulemaking that would sufficiently address all the various technical and methodological differences would be challenging and timely. This fundamental issue must be recognized as part of any mapping effort completed within the parameters of Commission authority, utilizing existing Commission protocols and procedural vehicles.

2. Issues with Modifying GO 95 Wind Load Requirements Relative to Fire-Weather Conditions

To ignite a fire, four (4) elements are needed: (1) oxygen, (2) fuel (i.e. flammable material), (3) heat, and (4) a chemical reaction resulting in rapid oxidation of the fuel. Oxygen exists in the air we breathe, in a concentration that is more than sufficient to ignite a fire. Due to the effects of climate change (i.e. incidence of extreme weather conditions, prolonged periods of drought, etc.), there is an abundant fuel supply throughout many areas of California which heightens the need to better control potential ignition sources. Inherently, energized overhead conductors present a potential ignition source because they provide an ample amount of heat energy necessary to increase the temperature of a fuel to a point where sufficient vapors are given off (i.e. chemical reaction) for an ignition to occur. As such, if the intended goal is to mitigate the risk of utility-caused ignitions, the control measure in place should be aimed at preventing ignitions in general, not only when transient "fire-weather" conditions may be present. To focus only on conditions believed to support fire for such safety measures increases the likelihood that fire potential dynamics could create a situation where low potential was originally estimated but subsequently changed to a higher potential. Once a

fire does start, it will be subject to changing environmental conditions for the entire duration of the fire, which can sometimes be months.

As discussed in Section IV.B.1 above, the presumptive use for a fire-wind map is to scope modified loading requirements for overhead line design. These modified loading requirements are characterized as “fire-wind-load standards” by the Commission in D.17-12-024,¹² the implication being that “fire-wind-load standards” would augment existing GO 95 wind load requirements with more stringent requirements intended to mitigate utility-caused wildfire ignitions. However, this entire premise is built on flawed logic, as there is no basis for claiming that wind load standards filtered for fire-weather conditions (i.e. fire-wind-load standards) would have an appreciable impact towards abating utility-caused ignitions or be appropriate for use as structural design loads. There exists an underlying presumption in the proposed approach that potential utility-caused wildfire ignitions occur due to utility infrastructure or equipment failures resulting from designs utilizing inadequate wind load standards. This presumption is contrary to the findings resulting from utility-reported ignition data that is received annually by SED in compliance with D.14-02-015.¹³ Since utilities began reporting fire incident data to SED in April 2015 (containing partial 2014 data), SED has amassed data on over 2,000 individual utility-caused fire ignitions. A review of the available data reveals that the two (2) primary causes for utility ignitions, by a substantial margin, are contact from objects and equipment/facility failures.¹⁴

The leading cause of utility-ignited wildfires, based on the best data available to SED and CAL FIRE, is vegetation contact and should accordingly be evaluated for additional control measures through regulatory expansion, but that discussion is beyond the scope of this report. Nevertheless, SED and CAL FIRE note that enhanced “fire-wind-load standards” will provide no appreciable mitigation of vegetation-contact-caused utility fire ignition risk. In evaluating the “Equipment/Facility Failure” cause category, SED notes that “Conductor” and

¹² See D.17-12-024 at pp. 4-5, 68-71, 136-137, and 157-158.

¹³ OP 7 of D.14-02-015 adopted a “Fire Incident Data Collection Plan” that requires certain electric utilities to provide annual reports detailing utility-caused ignitions.

¹⁴ “Contact from Object” (53.5%) and “Equipment/Facility Failure” (36.5%) combined represent approximately 90 percent of all reported ignition causes.

“Splice/Clamp/Connector” combined represent over 50 percent of the equipment/facility types for all reported ignitions caused by equipment/facility failure. Considering that a splice, clamp, or connector is part of the overall conductor assembly, the data reveals that over 50 percent of utility-caused ignitions attributable to “Equipment/Facility Failure” are due to failed conductors or parts thereof. In comparison, the same data shows that pole failures represent less than five (5) percent of equipment/facility types for all reported ignitions resulting from equipment/facility failure. While enhanced “fire-wind-load standards” may have an impact on the design and sizing of conductors used in overhead utility designs, there is no available data to attribute conductor failures to inadequate design wind load requirements. Based on previous conductor failure incidents investigated, maintenance records reviewed, and audits performed, SED believes that inadequate maintenance and lack of proactive conductor replacement practices for distribution conductors are greater contributors to conductor failures than failures related to inadequate design wind loads. More typically, the potential inadequacy of wind load standards is argued with respect to its impact on the efficacy of pole design and pole loading calculations conducted to determine compliance with GO 95 safety factor requirements for wood poles. However, as noted above, less than five (5) percent of utility-caused ignitions attributable to “Equipment/Facility Failure” are caused by pole failures.

Additionally, because conductor failures are the predominant cause of utility ignitions attributed to equipment/facility failure based on the best data available to SED and CAL FIRE, it stands to reason that the ideal mitigating solution should aim to abate the risk of conductor failures or alternatively prevent the risk of failed conductors from becoming a potential ignition source. While modifying wind load standards in the HFTD may potentially mitigate the risk of conductor failures, although SED is unaware of existing data or studies indicating as such, the latter risk can potentially be directly abated with more straightforward solutions. For example, certain electric utilities have begun experimenting with modified relay settings and equipment that may be able to de-energize a failed conductor prior to it contacting the ground and the installation of covered conductors (i.e. insulated wires) to protect a failed conductor from

becoming a potential ignition source in the first place.¹⁵ These alternative controls directly eliminate one element necessary for an ignition – a heat source – and would likely provide more impactful and quantifiable utility wildfire risk mitigation value.

If minimizing the risk of utility-caused ignitions is the intended goal, assessing the adequacy of current wind load requirements in GO 95 provides a practical starting point, as wind can be a primary driver of utility outages and failures (i.e. potential ignition sources) and is also a key factor to fire spread once an ignition has occurred. However, the proposed methodology for doing so, as contemplated in the Matters for Consideration, is to identify “fire-wind” by presumably taking a comprehensive wind dataset and filtering it for specific “fire-weather” conditions (e.g. high temperatures, low humidity, etc.). While on the surface it may make sense to filter out cold, wet winter conditions, as they are not commensurate with fire ignition and spread, the fact of the matter remains that in some parts of California, wind conditions associated with winter storms present the most severe wind conditions. There is an important distinction, often overlooked when assessing the adequacy of loading conditions with respect to mitigation of utility fire ignitions, that the effect of wind on fire propagation must be separated from the structural impacts on utility infrastructure from wind. The concern with filtering wind load requirements for fire-weather, and then implementing that load as a design standard is captured in PacifiCorp’s comments provided in opposition to PR 11, as it states “... existing wind loading tools and principles should apply universally as a matter of ensuring structural integrity, irrespective of fire threat tiers...”¹⁶

Although the scope of this report and R.15-05-006 is centered around fire-safety, SED notes that the intent of GO 95 is to supplement the mandates in California Public Utilities Code (Pub. Util. Code) Section (§) 451, which states in part, “Every public utility shall furnish and maintain such adequate, efficient, just, and reasonable service, instrumentalities, equipment, and facilities, including telephone facilities, as defined in Section 54.1 of the Civil Code, as are necessary to promote the safety, health, comfort, and convenience of its patrons, employees,

¹⁵ Historically, the electric distribution conductors installed throughout large parts of California have been unprotected, meaning they are not covered by a protective insulated covering.

¹⁶ Workshop Report, at p. B-116.

and the public.” This intent is reaffirmed in GO 95, Rule 11, *Purpose of Rules*, which states, “The purpose of these rules is to formulate, for the State of California, requirements for overhead line design, construction, and maintenance, the application of which will ensure adequate service and secure safety to persons engaged in the construction, maintenance, operation or use of overhead lines and to the public in general.”¹⁷ While wildfires present one type of safety risk involved with utility facilities that because of recent events has become a primary topic of concern and should be considered, the broader responsibility of the Commission is to promote safety and reliability in general. Risks posed by felled utility poles or downed energized conductors present a significant safety hazard to the public and should not be disregarded, regardless of seasonal or fire-spread risk posed by the prevailing weather conditions. As such, it would be myopic to consider changing loading requirements only within the framework of simultaneous fire-weather and fire risk, when it is conceivable that higher wind conditions could be prevalent during non-fire-weather events and data collected on utility-caused fire ignitions to-date provides no evidence that ignitions resulting from inadequate design wind loads is an issue. Therefore, consistent with sound design and engineering principles, if the Commission determines that existing GO 95 wind loads require modification, the “worst case” wind loads (i.e. highest peak wind loads, regardless of weather filtering, foreseeable within the life expectancy of the designed element) should form the basis of minimum wind loading requirements used for design purposes, and not loads only associated with “fire-wind” derived from the currently undefined parameters of “fire-weather,” in order to ensure the structural integrity of the system as a whole. This is especially the case because no widely-accepted definition or agreement on the term “fire-weather,” which forms the basis for identifying “fire-wind,” or the thresholds of the parameters that define “fire-weather” currently exist.¹⁸

¹⁷ GO 95, Rule 11.

¹⁸ Liberty CalPeco’s comments in opposition to PR 11 state, “The Commission should not adopt a PR that is based on a Fire Wind Map that may not ever exist (**and has not even been conceptually vetted by stakeholders**) but will have significant costs implications.” (emphasis added) The emphasized parenthetical language alludes to a need for vetting of conceptual matters (i.e. “fire-weather” indicators, parameters, and thresholds) concerning a fire-wind map that would require extensive scoping and likely evidentiary hearings. See Workshop Report, at p. B-116.

3. Existing Requirement for Knowledge of Local Conditions

GO 95, Rule 31.1, *Design, Construction, and Maintenance*, states in part, “Electrical supply and communication systems shall be designed, constructed, and maintained for their intended use, **regard being given to the conditions under which they are to be operated, to enable the furnishing of safe, proper, and adequate service**. For all particulars not specified in these rules, design, construction, and maintenance should be done in accordance with accepted good practice **for the given local conditions known at the time by those responsible for the design, construction, or maintenance of communication or supply lines and equipment...**¹⁹” (emphasis added) SED maintains that the mandates emphasized in the quoted language implicitly require each electrical supply or communication utility to evaluate the adequacy of its infrastructure relative to the conditions they are operating in and reflected in the design, construction, and maintenance of its system. While design and construction activities occur prior to the infrastructure being exposed to the elements or aging, maintenance activities are required to be conducted frequently and thoroughly.²⁰

As part of the utility obligation to furnish safe, proper, and adequate service, SED contends that Rule 31.1 requires that each electrical supply or communication utility continue to monitor the conditions under which its system is operated to ensure that its design, construction, and maintenance practices are adequate. The Commission has provided guidance regarding utility obligations to design, construct, and maintain to withstand foreseeable conditions and acknowledged that existing baseline wind load standards in GO 95 are insufficient. The Commission reaffirmed this position in its discussion on various proposals to modify existing wind load requirements, when it states, “Going forward, utilities must design, build, and maintain their overhead facilities to withstand foreseeable fire-wind conditions in their service territories.”²¹ In its discussion concerning PR 10, one of the PRs that prompted the

¹⁹ GO 95, Rule 31.1.

²⁰ GO 95, Rule 31.2, *Inspection of Lines*, states in part, “Lines shall be inspected frequently and thoroughly for the purpose of insuring that they are in good condition so as to conform with these rules...” Additionally, GO 95, Rule 80.1 mandates regular inspection cycles for communication facilities and GO 165 requires regular inspections of electrical facilities.

²¹ D.17-12-024, at p. 67.

instruction to SED and CAL FIRE to produce this report, the Commission states, “In our judgement, these baseline wind-load standards [56 mph and 59 mph as identified in Rule 43 or modified by PR 10, respectively] are not sufficient to adequately protect public safety and system reliability throughout the Light Loading District.”²² SED and CAL FIRE support the Commission’s finding that baseline GO 95 wind-load requirements may be insufficient to protect public safety and system reliability in parts of the state, and encourage the Commission to consider clarifying the extent of utility obligations to seek and obtain knowledge of the conditions in its service territory, and then to use that information in the design, construction, and maintenance of its system.

In the aftermath of the devastating 2017 fire sieges of October and December, and in light of the recognition that risks are heightened due to the environmental extremes attributable to climate change, SED and CAL FIRE believe it is imperative that there be a greater understanding of local conditions where overhead utility lines operate. Several utilities have taken heed to the issue of increasing wildfire risk and preemptively began dedicating resources to implement systems and programs to better understand local conditions throughout the service territory and the potential impacts on the system. In recent meetings with PG&E and SCE, SED has learned that both utilities have begun taking preemptive actions to abate wildfire risk from their facilities and equipment. To that end, on September 10, 2018 SCE filed an application for approval of its “Grid Safety and Resiliency Program” (GS&RP) requesting funding for numerous programs directed at addressing increasing wildfire risk.²³ SCE claims its GS&RP focuses on three key mitigation measures, one of which is bolstering its situational awareness capabilities.²⁴ SCE indicates that part of these efforts to bolster situational awareness will be through the installation of weather stations along circuits in SCE’s high fire risk areas (HRFAs).²⁵ It should be noted that SCE’s HRFAs include some areas that exceed the Commission’s HFTD boundaries. The proposed expenditures by SCE between 2018-2020 for deployment of weather

²² D.17-12-024, at p. 66.

²³ SED takes no position regarding the reasonableness of SCE’s proposal or the associated costs.

²⁴ Application of Southern California Edison Company for Approval of its Grid Safety and Resiliency Program (SCE GS&RP Application), filed on September 10, 2018, at p. 5

²⁵ SCE GS&RP Application, at p. 6.

stations and advanced modeling computer hardware to analyze the weather data collected by those weather stations is nearly \$25 million.²⁶ In a presentation to various Commission staff on September 5, 2018, PG&E indicated that it has installed over 100 weather stations since 2017 and plans to install 100 more weather stations by the end of 2018. Additionally, SED and CAL FIRE note that SDG&E provides a model for other utilities regarding its dedication and pursuit for enhancing its knowledge of weather conditions throughout its service territory in the aftermath of the catastrophic power-line fires of October 2007. SDG&E has deployed a network of weather stations, used that data in conjunction with advanced computer modeling hardware to develop a high resolution wind map that informs enhanced wind load standards where warranted among other tools used internally and by other stakeholders to bolster situational awareness and operational practices to more accurately assess and respond to wildfire conditions, and greatly contributed to the advancement of studies dependent upon high-quality weather data within their service territory.

4. Assessing Existing Utility-initiated Wind Studies and Associated Efforts

In the rationale for PR 11, proposing the creation of a fire-wind map, MGRA noted that “utilities themselves have apparently been putting resources into obtaining their own wind maps.”²⁷ During the conference between SED and CAL FIRE regarding the Matters for Consideration, it became evident that a review of the maps and information already developed by the utilities would be needed, to consider wind mapping work that has already been completed to-date. Accordingly, SED sent data requests to PG&E, SDG&E, and SCE requesting various data and information from wind studies that have already been completed.²⁸ Each of the identified IOUs indicated that it has completed at least one wind study within the past 20 years. As part of that request, each IOU was asked if it had implemented any wind load requirements based on the results of those studies. Additionally, each IOU was asked whether it filtered or modified any wind loading standards that may have been adopted following those

²⁶ As presented by SCE to SED staff on September 6, 2018 at the Commission’s Los Angeles office.

²⁷ July 10, 2017 Workshop Report, at p. B-107.

²⁸ PG&E, SCE, and SDG&E were specifically identified in MGRA’s rationale for PR 11 as utilities having already developed or in the process of developing wind maps and associated loading standards.

studies for fire-weather conditions. Every respondent indicated that its wind loading standards or practices are not filtered for fire-weather conditions but were developed from a comprehensive study of all wind loads irrespective of concurrent weather conditions. This reaffirmed SED's and CAL FIRE's position that it does not make logical sense to alter broadly applied general design requirements (i.e. minimum required wind loads) for transient conditions such as fire-weather when scoping structural loading requirements.

Each IOU confirmed that wind data studies for the purposes of understanding system threats and for use as local knowledge in design and construction of facilities have been conducted. The following summaries of these data development efforts are given below. These summaries are not intended to be comprehensive assessments of the utility's methodology or a commentary on the reasonableness of the utility's approach and results.

a) **PG&E Wind Study Summary**

In 1990, PG&E developed an internal wind map dataset in response to two large storms in 1982 and 1993. Additional storms in the winter of 1995 precipitated a review and refresh of the 1990 maps in 1999, using the same fundamental process. Current data and maps used for design and operations date to 2015. This report outlines the development of extreme wind maps using 394 internal and external surface weather stations from throughout its service territory to compile wind climatology and develop estimates of standard wind design metrics using Generalized Extreme Value statistical models consistent with general best practices. The resultant analysis estimated 50-year peak 3-second gust winds at 10 m above ground level, compiled as isotachs (i.e., lines defining areas of homogeneous values) thereby stratifying the PG&E service territory into zones defined by 55, 60, 70, 80, 90, 100, 110, 120, 130, and 140 mph winds. The data and process used appear sound but rely on spot measurement data that is variable, and the spatial interpolation by contouring results in some spatial averaging that should be tested via other data development methods (e.g., fine-scale gridded downscaling using numerical simulation methods). Preliminary comparisons of PG&E data to other wind climate data (e.g., 2km 50-year wind interval data developed as part of Fire Map 1 report) showed reasonable correspondence, albeit direct comparisons are difficult owing to the difference in data resolution between the two products. However, SED and CAL FIRE are

confident that the process and resultant data are a very good dataset from which to initiate formal assessment of extreme winds for the purposes of design and operations, both within and outside the specific focus on fire safety (no fire weather filtering was provided).

b) SCE Wind Study Summary

SCE provided a report outlining the development of similar peak wind data (namely 50-year peak wind intervals, filtered and unfiltered for fire potential using the Modified Fosberg Fire Weather Index (MFFWI -- which uses additional data describing air temperatures and relative humidity that correspond to fire potential) conducted by REAX Engineering in 2013.²⁹ In contrast to PG&E, these data were developed using the commonly used numerical weather prediction model called Weather Research and Forecasting (WRF) that generates modeled weather variables for a 3-dimensional gridded area. The process used developed only a selected wind reconstruction based on a temporal filter provided by another dataset reconstruction (North American Regional Reanalysis – NARR) to select specific periods of very high winds, both under fire conducive and more generalized (i.e., wet) conditions. A total of 34 extreme wind events were identified from NARR over the period of 1979 – 2012, for both filtered and unfiltered conditions, and were then run through WRF at a final nested resolution of 1.2 km. Similar statistical models were used and conversions to standard metrics utilized to create data consistent with use in powerline design and operation: the final data provided in the report reflect estimated 50-year 3-second peak winds at 20 feet above ground level (AGL) for unfiltered and MMWI filtered conditions.³⁰ Modeled data outputs were validated based on comparisons to the Integrated Surface Database (ISD) from the National Climatic Data Center for wind speed, wind direction, relative humidity and temperature and visually assessed for fidelity through graphical means.³¹ Our assessment of the wind data compared to IET Map 1 data shows reasonable correspondence for the unfiltered dataset (the only comparison available). Again, these data are relatively consistent with weather and wind data reconstruction conducted by the IET, albeit lacking full temporal reconstruction and with no

²⁹ Reax Engineering, 2013. High Resolution Wind Loading Study. Report prepared for Southern California Edison. Rev. 0, March 26, 2013. Job 12-0222.

³⁰ Reax Engineering High Resolution Wind Loading Study, Figures 3 and 4 at pp. 11-12.

³¹ Reax Engineering High Resolution Wind Loading Study, Figure 5 at p. 14.

bias correction applied to model data based on field-station measured data. Both of these shortcomings can be addressed in the future as comprehensive climate reconstruction for California is improved over time.

c) **SDG&E Wind Study Summary**

SDG&E provided reports and data outlining its wind data development process which utilizes a combination of high resolution weather stations configured on its equipment and distributed throughout its service territory, in conjunction with a 3 km reconstruction for the period of 1984-2013 (30 years) using WRF. No fire potential filtering was used. In contrast to the study by SCE, wind data was subject to a bias correction process utilizing the data from SDG&E's local mesonet. As with both cases above, a Generalized Extreme Value (GEV) statistical model using annual maximal winds fitted to the Type 1 (Gumbel) distribution was used. This model process has been the standard GEV approach used for estimating wind intervals, but is certainly not the only, nor necessarily the best approach, especially when estimating intervals much longer than the data duration from which they are based on. Furthermore, detailed statistical testing is likely to result in higher quality estimates. The final data is delivered in polygons of equal wind peak ranges similar to that provided by PG&E, where isotachs were developed by comparing the known local data from the mesonet with the WRF outputs;³² the exact process utilized for contouring was not identified but presumed to be manual-visual. As with the two above cases, preliminary visual comparisons to IET 50-year interval data appear reasonable, and the data represent an acceptable starting point for utility planning and operations.

In summary, all three IOU's are developing spatially resolved data for peak winds that is generally consistent with state-of-science methods and provides a sound basis for initial assessment within service territories and comparisons to other ongoing fire-climate reconstructions. Particularly, an expanded set of surface weather stations to provide high resolution open-wind data for bias correction and potential very fine scale resolution wind modeling using gridded reconstruction data as inputs into high-resolution computational fluid

³² SDG&E, 2014. 50-year Wind Map Polygons – Version 2. Metadata. Credits: B. D'Agostino and S. Vanderburg.

dynamics models pose a bright future on improving wind estimates as they relate to both fire and general conditions that impact utilities. SED and CAL FIRE intend to continue to evaluate these individual datasets (and any new ones provided) and compare them to ongoing statewide climate reconstructions through working groups and collaborative efforts established by the CPUC-CAL FIRE Memorandum of Understanding (MOU) signed in August 2017.

5. SED & CAL FIRE-Proposed Alternative

To adequately assess the merits of developing and adopting a fire-wind map and associated loading requirements and provide recommendations, it is imperative to consider alternative uses for the time and resources that would be required and compare the value added by the different approaches to make an informed recommendation. For the purposes of evaluating the fire-wind map and associated loading requirements, SED and CAL FIRE propose the following alternative (herein, “Proposed Alternative”):

Require installation of weather stations on circuits throughout the HFTD. Require that the weather stations minimally collect standardized data and make that data publicly available. Require that the data be used to develop or supplement existing utility situational awareness tools and feed into operational decision-making processes (i.e. Fire Potential Index, de-energization policies, recloser disabling policies, etc.). Requirements for density of installations could be scaled in accordance with HFTD Tier classification (e.g. more weather stations in Tier 3 circuits versus Tier 2 circuits) to limit costs, if deemed necessary.

Nuances and particulars of the Proposed Alternative are provided in more detail in the sections to follow, as appropriate.

6. Cost-Benefit Analysis

As explained in Section III of this report, the cost-benefit analysis conducted is not a traditional cost-benefit analysis with respect to an evaluation based on an equivalent monetary scale. There are a multitude of reasons why a traditional cost-benefit analysis is not feasible, primarily because there is no agreed upon or widely accepted cost-avoidance model that could be applied to catastrophic utility-cause wildfires. A cost-avoidance model for catastrophic wildfire would need to be scoped and developed to adequately quantify and assess the monetary benefit gained by reducing the likelihood of failure or ignition associated to any

regulatory changes.³³ Additionally, neither SED nor CAL FIRE is equipped to evaluate implementation costs associated with changes to construction, maintenance, or design requirements. Further complicating the execution of a traditional cost-benefit analysis is that without insight into the extent of where enhanced fire-wind-loads may apply, the quantity by which any new loads will exceed existing loading requirements, or whether the requirements would apply retroactively, it is not possible to calculate an accurate cost assessment. Alternatively, SED and CAL FIRE have decided to provide a narrative of the perceived costs, whether tangible or intangible, and assumed benefits of developing a fire-wind map and adopting associated fire-wind-load requirements versus the Proposed Alternative.

a) **Perceived Costs**

Without insight into the scope of and preferred methodology for mapping fire-wind and adopting associated fire-wind-load standards, SED and CAL FIRE provide general insight into the perceived costs of such an effort based on available information and experience. The nearest analogous Commission-led mapping product upon which to infer potential cost implications can be found in the development of the Commission's Fire-Threat Map used to delineate the boundaries of the HFTD.³⁴ While the map products would be different, many similar complications and disagreements about scope, methodology, and process can be expected if the Commission is to oversee the development of a fire-wind map. Regarding tangible costs, SED notes that nearly \$900,000 and four (4) years of staff time and resources from various stakeholders were required to develop the Commission's Fire-Threat Map, which forms the basis for delineating the boundaries of the HFTD. Although SED and CAL FIRE do not anticipate the time required for developing a fire-wind map to be equal to the previous mapping effort, SED notes that the interrelation of loading requirements to other strength and safety factor requirements in GO 95, the necessity for evaluating potential wind load requirement changes holistically, the likely disagreement on the appropriate strength and loading methodology to be used, the expected outcome of that disagreement being extensive scoping and evidentiary

³³ SED notes that no sponsor or a PR or alternative PR rationale provided a traditional cost-benefit analysis as part of its supporting rationale.

³⁴ A brief summary of the Commission's mapping efforts is provided in Section II of this report.

hearings, and the time needed to evaluate potential cost implications once the previously identified disagreements are resolved and new fire-wind-load standards implemented would probably result in a proceeding and process that takes as much, if not significantly more, time and resources to accomplish.

The costs associated with SED and CAL FIRE's Proposed Alternative can be considered through existing Commission cost recovery mechanisms. The Commission needs to develop high-level requirements for weather stations and establish parameters for data distribution and use, including a mechanism for making this data publicly accessible. Once the requirements have been established, utility applications can be evaluated, and associated costs evaluated as appropriate through ratesetting proceedings. It should also be noted that SED and CAL FIRE anticipate the costs associated with pole replacements that would likely result from modifications to existing GO 95 wind load standards would likely be significant and much higher than deployment of weather stations and associated situational awareness tools.³⁵

While not covered in the scope of this report, SED advises that careful evaluation of mitigation strategies and costs associated with currently proposed utility programs directed at addressing increasing utility wildfire risk must be performed to ensure cost effectiveness and affordability.

b) Assumed Benefits

Developing the proposed fire-wind map and associated fire-wind-load standards could add value to the existing regulations, as it would be a step towards rectifying potential discrepancies that may exist between current GO 95 minimum wind load requirements and actual wind load conditions experienced throughout utility service territories. However, detracting from that value, as discussed in Section IV.B.3, is the fact that certain utilities have already completed comprehensive wind studies of their service territories and have developed their own enhanced wind load standards used for the design and construction of their systems.

³⁵ SCE's recently filed Application requests approximately \$25 million for deployment of nearly 800 weather stations. On the other hand, MGRA's rationale for PR 11 estimates a cost of \$1.7 billion just for implementing the proposed changes in SDG&E's service territory. See *Workshop Report* at p. B-108. SED and CAL FIRE anticipate that the costs of making similar changes in PG&E and SCE service territories could be substantially higher, potentially by order of magnitude.

SED and CAL FIRE believe that the IOU-provided wind data offers an acceptable starting point for continued assessment of severe winds both within the context of impacts on fire risks and more generally on system reliability and will utilize the Wildfire Mitigation Plan review and approval process to continue to explore wind data improvement through independent and collaborative means. To the extent that the Commission determines it is necessary and reasonable to modify existing GO 95 wind load standards, SED notes that while the studies completed by PG&E, SCE, and SDG&E do not cover the entire state, the combined service territories of these utilities comprise over 75 percent of the land area of California.³⁶ Moreover, if the Commission determines additional coverage beyond the areas studied in the utility-initiated wind studies is needed, SED and CAL FIRE note that ASCE 7-10 wind maps can be utilized for further augmentation of existing wind load standards in those areas. However, SED and CAL FIRE find that there is insufficient data or information available to conclude that inadequate wind loads used for utility design are a driver for utility-caused ignitions or that modifying existing wind load standards and associated strength and loading methodologies is an appropriate control mechanism for such a risk. As such, SED and CAL FIRE question the benefit of modifying GO 95 wind load requirements with respect to fire-wind-loads, as contemplated in the Matters for Consideration.

Conversely, SED and CAL FIRE have identified a myriad of potential benefits achieved by implementing the Proposed Alternative. Possibly most noteworthy is the immeasurable value gained from the geospatially precise, high resolution data collected by the proposed weather stations. The potential uses for such data are endless and the public benefit provided by its implementation and potential scientific advancement towards better understanding the effects of climate change on California's landscape is immense. Also, the high-quality weather data collected from weather stations implemented with the Proposed Alternative is opportunely located where existing overhead utility infrastructure (and in turn, people and potential ignition sources from utility infrastructure) exist. SED and CAL FIRE believe the accuracy, efficiency, and quality of any future wind mapping product developed for scoping utility regulations would

³⁶ PG&E, SCE, and SDG&E service territories combined cover approximately 124,000 square miles. The State of California spans 163,696 square miles.

profoundly benefit from the existence of this data. MGRA acknowledges the potential benefit gained from high-quality weather data in its rationale for PR 11 when it states, “However, it would be greatly beneficial if high-quality data (such as the SDG&E mesonet data) and analysis could be incorporated to improve the quality of the maps and the speed with which they could be provided.”³⁷ This benefit is further amplified when considering that California’s wildfire risk has increased in recent years due to climate change and drought, plus other factors like the growing wildland-urban interface and significant buildup of fuel on federal and state forest lands.³⁸ As of September 12, 2018, California’s 2018 wildfires have burned over 1,485,531 acres,³⁹ damaged or destroyed over 2,500 structures,⁴⁰ and resulted in six fatalities.⁴¹

Another substantial benefit of the Proposed Alternative is that, if orchestrated and executed in a homogenous and logical manner, the data provided from the weather stations, after sufficient time to allow accrual of enough data for a valid and useful sample size, can lend valuable insight into resolving longstanding questions about the adequacy of existing GO 95 wind load requirements for protecting public safety and ensuring system reliability. SED and CAL FIRE contend that while it is feasible to create a fire-wind map with existing products and resources, any such product would undoubtedly be inferior to one created with the benefit of higher-quality, more accurate, and spatially precise data that would be provided by the Proposed Alternative. As such, considering the astounding cost implications associated with

³⁷ Workshop Report, at pp. B-107 – B-108.

³⁸ To date, 2017 was the costliest and deadliest year of wildfires on record, with California experiencing five (5) of the 20 most destructive fires in its history. More recently, 15 large wildfires burned across the state during August 2018. Two of these wildfires were among the largest in California history: the July 2018 Mendocino Complex Fire is the largest fire in state history, and the July 2018 Carr Fire is the seventh largest according to information provided by CAL FIRE.

³⁹ National Interagency Fire Center (“NIFC”), *National Year-to-Date Report on Fires and Acres Burned by State and Agency* (August 29, 2018), available at <https://gacc.nifc.gov/sacc/predictive/intelligence/NationalYTDbyStateandAgency.pdf>. (Note that this website is updated daily, and the numbers may have increased since September 12, 2018.)

⁴⁰ NIFC, *National Large Incident Year-to-Date Report* (August 29, 2018), available at <https://gacc.nifc.gov/sacc/predictive/intelligence/NationalLargeIncidentYTDReport.pdf>. (Note that this website is updated daily, and the numbers may have increased since September 12, 2018.)

⁴¹ Lauren Hernandez and Sarah Ravani, *California Wildfires: Firefighter’s death the 6th of 2018; Yosemite Reopens*, S.F. CHRONICLE (August 14, 2018), available at <https://www.sfchronicle.com/california-wildfires/article/Mendocino-Complex-fires-claim-first-life-5-000-13154845.php#photo-15986939>.

potential changes to wind load standards and the small percentage of utility-caused ignitions attributable to pole failure, SED and CAL FIRE believe the benefit of higher-quality wind maps provided from the data collected with the Proposed Alternative outweighs the benefit gained from presently developing a fire-wind map and associated fire-wind-load standards.

Additionally, SED and CAL FIRE note that MGRA's proposal for a fire-wind map and associated fire-wind-load standards wouldn't be implemented for a considerable amount of time to allow for proper vetting of cost implications and the extent to which existing infrastructure would have to be retrofitted or replaced. Following the development and adoption of a fire-wind map and associated fire-wind-load standards, which would likely take a couple of years at least, the MGRA proposal envisions needing an additional GRC cycle plus 12 months (potentially four years) to conduct a cost estimate for upgrading existing facilities. Additionally, the proposal provides an undetermined timeframe for phased completion of potential remediation or replacement work, in accordance with risk exposure based upon the findings from analyses performed during RAMP and GRC proceedings, before actually implementing the proposed changes.⁴² Therefore, it could conceivably take over six (6) years before any perceived benefit from the creation of a fire-wind map and associated fire-wind-load standards is realized. In contrast, an additional six (6) years of high-quality weather data could dramatically improve the extrapolation and creation of a robust climatological dataset that could be refined and filtered for a multitude of uses.

An additional benefit of the Proposed Alternative includes substantial improvements of utility situational awareness capabilities through the availability of real-time weather data. These enhanced capabilities will allow utilities to more accurately assess and respond to wildfire conditions. The information gained from the Proposed Alternative can also be used to further strengthen operational practices regarding fire safety and system resiliency. This data would also be useful for informing utility de-energization practices and policies through enhanced system knowledge and real-time data. The Proposed Alternative benefits other key stakeholders as well. For example, the information provided from the Proposed Alternative can improve fire agencies' ability to prepare for emerging fires and improve identification and

⁴² Workshop Report, at p. B-110.

response times. Due to its public availability, the information could be utilized by universities, academic institutions, or other agencies with aligned interests in studying the weather effects of climate change. Lastly, the data and information provided by the Proposed Alternative can be used to develop various tools to bolster utilities' predictive fire potential capabilities, such as SDG&E's Fire Potential Index (FPI) or Santa Ana Wildfire Threat Index (SAWTI). The benefit of a tool such as FPI is remarkable.⁴³ The FPI is a comprehensive fire risk assessment tool used to make operational and maintenance decisions related to fire prevention. Customarily, utilities rely on the issuance of Red Flag Warnings from the National Weather Service as a precursor to set various fire mitigation policies (e.g. disabling of automatic reclosers, limitation on certain construction/maintenance activities, etc.) into action. While Red Flag Warnings can be a useful indicator or fire threat potential in general, tools like the FPI are specifically applicable to informing the fire potential from utility infrastructure and thus provide far greater operational value. Coincidentally, a study of SDG&E's FPI data compared to Red Flag Warning issuances and fire ignition data reveals that, since its inception on October 11, 2012 through August 9, 2018, there have been a total of 794 days where SDG&E's FPI provided a rating of "Elevated" or "Extreme" in at least one SDG&E operational district, but there were no Red Flag Warnings issued. During the course of those 794 days, a total of 100 individual fire ignitions took place, illustrating the usefulness of and operational value of having high-quality weather data and using that data to develop and implement tools to guide operational and maintenance decisions related to fire prevention. If SDG&E had solely relied on the issuance of Red Flag Warnings, it would have been far less prepared to mitigate or respond to any of those 100 ignitions.⁴⁴

Finally, SED and CAL FIRE point to ongoing development of map data (including wind) currently undertaken by CAL FIRE and its direct overlap and likelihood to supersede in both accuracy and precision any fire-wind mapping efforts the Commission may engage in.

⁴³ SDG&E's FPI is a fire potential rating system that has three categories ranging from least to most severe, as follows: (1) Normal, (2) Elevated, and (3) Extreme.

⁴⁴ SED and CAL FIRE note that only five (5) percent of the 100 ignitions resulted in fires of over 10 acres and only two (2) percent resulted in fires over 100 acres, illustrating the usefulness of situational awareness tools in abating large, catastrophic fires.

Furthermore, considering recent legislative actions, SED and CAL FIRE contend that the explicit requirements for inter-agency collaboration in the review and evaluation of utility Wildfire Mitigation Plans provides a clear means and mechanism for continued evaluation of utility system vulnerabilities as they relate to fire risk. Wind events are fundamental to many of these vulnerabilities. SED and CAL FIRE plan to work with all utility companies to assure that internal data and analysis makes sense in a quantitative risk assessment process and will continue to hone in on improving fire safety and, in the process, hopefully assist in improved local knowledge used for augmenting design load standards.

C. Recommendations

1. Do Not Commence a Proceeding to Develop a Fire-Wind Map and Associated Changes

SED and CAL FIRE's joint-recommendation is to not commence a rulemaking to develop a fire-wind map and associated fire-wind load standards. There is a plethora of reasons, as described throughout this report, which lead SED and CAL FIRE to make this recommendation. Primarily, it is nonsensical to create fire-wind data independent of full-seasonal reconstructions because: (1) applying fire potential to a full season climate reconstruction allows for assessing anomalous off-season events that appear to be occurring more frequently – fire days now occur mid-winter in some years – and must also be understood, and (2) design standards for reliability should be based on peak winds independent of fire hazards. Other factors contributing to this recommendation include the corresponding evaluation this type of change would impute on the entirety of GO 95's strength and loading section and methodology, the amount of time it would likely take before the benefits of any adopted changes in accordance with a fire-wind map or associated fire-wind-load standards are realized, the potential delays associated with disagreements on scope and methodology among various stakeholders should a rulemaking be initiated, the fact that utility-led wind studies covering three-quarters of the state have already been performed and seem reasonable, and the potential costs involved compared to the marginal benefits gained. Additionally, while not directly in the scope of this report, SED believes it is highly probable that ratepayer funding has already been appropriated or is currently being considered for expenditures related to programs and operational or design changes implemented by IOUs that rely on the results of the utility-led wind studies. As such,

any ratepayer funds appropriated to developing a fire-wind map and associated fire-wind-load standards would have to be evaluated against the reasonableness and justification of costs associated with monies already approved by the Commission and currently being expended by utilities.

SED and CAL FIRE acknowledge that more accurate and resolved wind data would provide a basis for evaluating the adequacy of existing GO 95 loading requirements but believe there are far greater opportunities for efficiently and precisely developing such data through alternative means. Accordingly, SED and CAL FIRE provide a set of recommendations associated with the Proposed Alternative and related matters below.

2. Broad Deployment of Weather Stations & Use of Data

SED and CAL FIRE recommend the required installation of weather stations throughout the HFTD. SED and CAL FIRE believe the value provided by the high-quality weather data that would be afforded by this recommendation far outweigh any potential value gained by developing a fire-wind map and associated fire-wind-load standards. In fact, SED and CAL FIRE assert that the availability of such high-quality weather data will greatly improve the accuracy and precision of any future wind map products the Commission deems necessary. Moreover, SED and CAL FIRE note that both electric utilities and the state are working on state-of-science process for weather reconstruction, with a focus on wind. Those efforts would benefit more from careful deliberation and coordination that could be achieved through inter-agency collaborative efforts, than isolated mapping initiatives that would likely result in duplicative effort and squandering of valuable time and resources. Considering the immense benefits provided from the high-quality data collected by the proposed weather stations as described in Section IV.B.6 and other parts of this report, the cost involved with widespread deployment throughout the HFTD, and the fact that utilities have already completed or have begun implementing similar programs, SED and CAL FIRE find it prudent to recommend the Commission adopt requirements for the installation of weather stations on utility infrastructure throughout the HFTD.

From a process perspective, there are several matters that would have to be addressed to ensure data consistency and usefulness. Given that different utilities meteorology

capabilities and maturity vary, SED and CAL FIRE recommend a careful assessment of existing weather station deployment practices and strategies, followed by a narrowly-scoped rulemaking to: (1) evaluate and adopt best practices, (2) consider potential installation, siting/density, data collection, data storage/availability, and implementation requirements, (3) and consider associated changes to existing GO 95 requirements. Additionally, SED and CAL FIRE recommend the study of existing modeling techniques, lessons learned, and operational and predictive tools developed by SDG&E utilizing its weather data to evaluate the potential for developing statewide tools and applications. However, SED and CAL FIRE are confident there is sufficient means and mechanism established through the CPUC-CAL FIRE MOU to perform the necessary assessment and vetting of potential implementation opportunities of various models and operational or situational awareness tools.

3. The Commission Should Clarify the Intent and Extent of Utility Obligations to Know Local Conditions in its Service Territory

MGRA's rationale for PR 11 provides several reasonable arguments as to the shortcomings of the requirement for design, construction, and maintenance with regard to "known local conditions"⁴⁵ as mandated by GO 95, Rule 31.1.⁴⁶ These arguments include a lack of clarity/direction from the Commission detailing the extent of utility responsibility to know local conditions, a concern that the language of Rule 31.1 is written such that it incentivizes ignorance of local conditions, and ambiguity around when a utility claims it became knowledgeable of such local conditions. SED and CAL FIRE acknowledge the arguments against augmenting loading requirements based on utilities' local knowledge in lieu of prescribed wind loading standards adopted directly into GO 95 but believe that these issues can be resolved via additional Commission guidance. As such, SED and CAL FIRE recommend that the Commission

⁴⁵ GO 95, Rule 31.1, *Design, Construction, and Maintenance*, states in part, "Electrical supply and communication systems shall be designed, constructed, and maintained for their intended use, **regard being given to the conditions under which they are to be operated, to enable the furnishing of safe, proper, and adequate service.** For all particulars not specified in these rules, design, construction, and maintenance should be done in accordance with accepted good practice **for the given local conditions known at the time by those responsible for the design, construction, or maintenance of communication or supply lines and equipment...**" (emphasis added).

⁴⁶ Workshop Report, at pp. B-105 – B-106.

provide guidance to clarify the extent of utility responsibility to know local conditions and reinforce that the language of Rule 31.1 must not be interpreted in a manner that encourages ignorance of local conditions. Rather, the Commission should clarify the intent of the rule as encouraging utilities to continually seek knowledge of local conditions and design, construct, and maintain its system in accordance with that knowledge.

SED and CALFIRE also note that there may be opportunities to further vet utility-developed wind studies (i.e., local knowledge) through the collaborative review and evaluation of utility Wildfire Mitigation Plans, as required by legislation.

V. GO 95, Rule 18-A Level 2 Fire-Safety Risk Correction Timeframe

A. Feasibility Evaluation

The purpose of GO 95 is to “ensure adequate service and secure safety to persons engaged in the construction, maintenance, operation or use of overhead lines and to the public in general.”⁴⁷ Rule 18 of GO 95 requires the correction of overhead utility facilities that pose a risk to safety or reliability, or otherwise do not comply with GO 95. These requirements include:

1. Every communications utility and electric utility must have an auditable maintenance program for its overhead facilities that (A) includes a timeline for correction of identified safety hazards⁴⁸ and potential GO 95 violations, and (B) prioritizes and completes corrective actions as follows:
 - a. **Priority Level 1** is an immediate risk to safety or reliability with a high probability for significant impact. The utility must take corrective action immediately, either by fully repairing the risk or by temporarily repairing and reclassifying the risk to a lower priority.
 - b. **Priority Level 2** is any other risk of at least moderate potential impact to safety or reliability. The utility must take corrective action, either by fully repairing the risk or temporarily repairing the risk and re-classifying the risk to a lower priority. The repair period must be commensurate with the level of risk and cannot exceed (A) six months for fire risks located in Tier 3 of the HFTD; (B) 12 months for fire risks located in Tier 2 of the

⁴⁷ GO 95, Rule 11.

⁴⁸ Rule 18 defines the term “safety hazard” as “a condition that poses a significant threat to human life or property.”

HFTD; (C) 12 months for risks that compromise worker safety; and (D) 59 months for all other Priority Level 2 risks.

- c. **Priority Level 3** is any risk of low potential impact to safety or reliability. The utility must take corrective action within 60 months, with certain exceptions.⁴⁹
2. Upon completion of a corrective action, the utility's records must show the nature of the work performed, the date(s) the work was performed, and the identity of the persons who did the work.

The matter before SED and CAL FIRE for consideration is strictly limited to potentially modifying (from 12-months to 6-months) the maximum allowable timeframe for repair of Priority Level 2 fire risks in Tier 2 of the HFTD. Given the fact that utilities must already correct safety hazards and potential GO 95 violations in accordance with Pub. Util. Code §451 and GO 95, Rule 31.1, assessing the feasibility of doing so is a trivial exercise, and consequently is not discussed in detail. The substantive matter to consider pertains to the costs and benefits of cutting the allowable timeframe for corrective action of Priority Level 2 fire-safety risks in Tier 2 of the HFTD in half. As such, these matters are discussed in further detail in the sections below.

B. Merit Evaluation

To determine whether shortening the timeframe for corrective action by half, as contemplated in the Matters for Consideration, was reasonable, SED and CAL FIRE first considered the scope and ensuing impacts of implementing such a change. Gauging the potential scope of condensing the corrective action timeframe by half turned out to be quite difficult for various reasons. First, Tier 2 covers nearly 58,000 square miles, representing approximately 36.5 percent of California's total land area.⁵⁰ Accordingly, any sweeping changes made to the requirements in Tier 2 would impact over one-third of the state and carry potentially substantial cost implications. Moreover, determining potential cost implications is conflated by several issues, the primary one being the ambiguous nature of the term "fire risk," as used in the context of Rule 18, and how different utilities define this term. The proposed

⁴⁹ This requirement was implemented following the issuance of D.17-12-024.

⁵⁰ Information sourced from *Response of the Peer Development Panel to Administrative Law Judges' October 6, 2017 Ruling – Additional Shape B Map Information* filed on November 20, 2017, at Appendix A, page A-10.

6-month corrective action timeframe in Tier 2 of the HFTD is limited to those safety hazards or potential GO 95 violations that present “fire-safety risks.”⁵¹ However, the term “fire-safety risk” is not defined anywhere in GO 95, D.17-12-024, or D.18-05-042. As such, this introduces an inherent ambiguity, as there is no basis for consistency among how utilities determine which safety hazards or potential GO 95 violations present a “fire-safety risk.” Consequently, there may conceivably be a myriad of safety hazards or potential GO 95 violations that could potentially be characterized as presenting a “fire-safety risk,” and any attempt to quantify the volume of or cost implications associated with such issues would be an exercise in futility.⁵²

It is important to note that while R.15-05-006 was ongoing, another proceeding, R.16-12-001, was initiated to consider revisions to Rule 18.⁵³ After issuing D.17-12-024, and the instructions to SED and CAL FIRE to confer and produce a report regarding the Matters for Consideration, the Commission issued D.18-05-042 in R.16-12-001 – approving a settlement agreement that amended Rule 18.⁵⁴ Until the Commission’s issuance of D.18-05-042 on May 31, 2018, there was no specified timeframe for corrective action of Priority Level 3 safety hazards or potential GO 95 violations. D.18-05-042 set a maximum corrective action timeframe for Priority Level 3 risks at 60 months. However, due to the contention by numerous parties that certain Priority Level 3 risks were of such low risk and potential impact that the effort associated with correction of those safety hazards or potential GO 95 violations presents more of a risk to safety and reliability than is gained by remediating the issue, the Settlement approved by D.18-05-042 allows for certain exceptions from the 60-month maximum allowable correction timeframe. Primarily, these exceptions are identified in a new Appendix J to GO 95,

⁵¹ See D.17-12-024, OP 10-ii.

⁵² For example, “fire-safety risks” can be as specific as a broken lashing wire in the HFTD only, or as broad as the entirety of a utility’s pole loading program.

⁵³ On April 12, 2017, a ruling was issued in R.15-05-006 that notified the parties that “the matters being considered in R.16-12-001 may supersede the revisions to Rule 18 being considered in... R.15-05-006.”

⁵⁴ On October 6, 2017, most parties to R.16-12-001 jointly filed and served the *Joint Motion for Commission Adoption of Settlement Agreement* (Joint Motion). Attached to the Joint Motion was the *Settlement Agreement Between the Safety and Enforcement Division of the California Public Utilities Commission and Undersigned Participants on Issues Identified in R.16-12-001* (hereafter, “the Settlement Agreement” or “Settlement”).

which provides a list of specific exceptions and the rationale for each exception.⁵⁵ The Settlement also allows for utilities to request additional exceptions for Priority Level 3 risks through existing Commission processes, such as a Tier 2 Advice Letter, subject to staff disposition.

The Commission's finding that additional clarifying information, via Appendices I and J, or procedural vehicles to obtain such clarifying information, such as Tier 2 Advice Letters, was necessary to offer the foundational support needed to comply with and enforce Rule 18, highlights the need to address the matter of what constitutes a "fire-safety risk" with respect to its proximity to Tier 2 of the HFTD and subsequent condensed timeframe for corrective action. Without the context provided by the additional clarifying information, it is impossible for SED and CAL FIRE to provide an informed recommendation on whether to reduce the timeframe for corrective action of Priority Level 2 fire-safety risks in Tier 2 of the HFTD from 12 months to six (6) months. Moreover, because of these various ambiguities and their inherent impact on the ability to accurately quantify related costs or benefits, this Report does not attempt to provide a cost-benefit analysis related to the matter of condensing the timeframe for corrective action for repair of Priority Level 2 fire-safety risks in Tier 2 of the HFTD.

C. Recommendations

SED's and CAL FIRE's joint-recommendation is to retain the current maximum corrective action timeframe of 12 months for Priority Level 2 "fire-safety risks" in Tier 2 of the HFTD. Due to the vastness of the land area covered by Tier 2, ambiguity on what utilities will define and characterize as safety hazards or potential GO 95 violations that present a "fire-safety risk," and the unknown volume of repair work that may be generated as a result of applying those non-uniform definitions of "fire-safety risk," SED and CAL FIRE do not believe there is sufficient justification for making this change universally throughout Tier 2 as of the submittal of this report. However, SED and CAL FIRE note that the timeframes for corrective action provided in Rule 18 are *maximum* timeframes and that utilities have an overarching obligation to furnish

⁵⁵ D.18-05-042 also includes the adoption of a different new Appendix I, which provides non-exhaustive lists of sample Priority Level 1, Level 2, and Level 3 risks and safety hazards.

and maintain proper, adequate, and safe service, as mandated by Pub. Util. Code §451.⁵⁶ As such, utilities need to carefully assess and understand the nature and extent of all safety hazards or potential GO 95 violations and correct them prior to those safety hazards or potential GO 95 violations infringing upon the utilities ability to furnish and maintain proper, adequate, and safe service.

Lastly, SED and CAL FIRE will continue to reevaluate the merits of shortening the maximum timeframe for corrective action in Tier 2 of the HFTD, should new information be discovered that allows more rigorous evaluation of the potential scope and ramifications of making such a change to take place. Through the partnership and collaborative working groups established by the CPUC and CAL FIRE Memorandum of Understanding (MOU) and subsequent efforts, SED and CAL FIRE maintain that there may be opportunities to review this potential change to Rule 18 in the course of other work, as more information about how the utilities perceive and define “fire-safety risks” becomes known.

⁵⁶ Pub. Util. Code § 451 states, in part, ““Every public utility shall furnish and maintain such adequate, efficient, just, and reasonable service, instrumentalities, equipment, and facilities, including telephone facilities, as defined in Section 54.1 of the Civil Code, as are necessary to promote the safety, health, comfort, and convenience of its patrons, employees, and the public.”