

The Harmful Effects of PG&E's Tree Removal Practices and Recommended Alternatives to Prevent Utility Wildfires

By Sierra Club California's Utility Wildfire Prevention Taskforce

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EXECUTIVE SUMMARY

Power utility safety must be a top priority for PG&E. The science is available through technical advancements that would render wildfires from utility lines a thing of the past. Multi-function protection relays (computerized circuit breakers) that remotely shut down feeder circuits and steel core insulated conductor cables lasting up to 40 years are available. Capable of detecting electrical faults, they shut down instead of breaking wires that spark and create wildfires. Instead of updating its antiquated infrastructure, PG&E has chosen to down trees within its right-of-way (ROW) that are healthy, as well as trees on private properties adjoining the ROW. Through regulations, property owners have the right to privacy and should receive a Notice and Consent, and compensation for damaged property; however, there is no process for requesting an inspection, owner oversight, alternative suggestions, payment for damages, descriptions of proposed work, or right to refuse. This needs to change. In addition, there are multiple definitions for "Hazard/Damage" trees by different agencies that need to be replaced with one definition. Also, there are no California tree species education and experience requirements for arborists who mark and take down the Hazard/Damage trees, resulting in destruction of healthy trees. Finally, PG&E has lobbied for and influenced legislation and public opinion toward tree removal rather than upgrade its infrastructure. The problem is not the trees—it is the need for PG&E to upgrade its outdated utility infrastructure.

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ACRONYMS

BOF	Board of Forestry
CPUC	CA Public Utilities Commission
EVM	Enhanced Vegetation Management (program)
FPR	Forest Practice Rules
HFTD	High Fire Threat District
ISA	International Society of Arboriculture
LTO	Licensed Timber Operator
NOV	Notice of Violation
PG&E	Pacific Gas and Electric Company
RPF	Registered Professional Forester
ROW	Rights of Way
WMP	Wildfire Mitigation Plan
WSD	Wildfire Safety Division
WUI	Wildland-Urban Interface

INTRODUCTION

What started with carrier pigeons delivering brief and lightweight messages, to lanterns in Boston's Old North Church in 1775 signaling the British Army's direction of march, to carriers, and the pony express, led to the first telegraph wire demonstration in 1843 by Samuel Morse. Morse Code proved faster and more efficient and brought about the first telegraph wires on utility poles from Washington D.C. to Baltimore and back on May 24, 1844 (CPUC 2017). Since that time the US has been strung up from coast to coast, north to south, and messages are sent around the globe via electronics. There are three large private investor-owned utility companies in California: PG&E has 16 million people in its service area, Southern California Edison has 15 million, and San Diego Gas and Electric supplies power to about 3.6 million customers in San Diego County. There are numerous small private electricity companies, and the rest are publicly owned. All of these companies are under the umbrella of the California Public Utilities Commission (CPUC) which, among other duties, is responsible for regulating electricity rates. PUC.

Since the early days of stringing electrical wires in California, the technology has evolved. Yet utilities have not been consistently required to adopt technological improvements that could prevent wildfires and improve safety.

In California, single-strand copper wires were first strung on wooden poles in 1916 (First Electricity in Los Angeles). As per a CPUC 2017 General Rate Case reference to a Liberty Consulting Report [Liberty, 2013] there remain 22,000 circuit miles of single strand copper wires throughout PG&E's High Fire Threat Districts (HFTD). In the 1950's aluminum cable came into use. Like the copper wires, the aluminum cable was uninsulated and made in various sizes.

Small diameter cable is considered dangerous in coastal areas due to corrosion from salt and moisture. Nevertheless, it is the standard for utility cable and is used widely everywhere, including along California's coastlines. Near some state parks "tree wire" with a single layer of insulation has been installed. Wire insulation that is resistant to UV light and to conductive heating has improved dramatically in the last two decades. The current standard in the United States for insulated conductor cables is aluminum cable steel reinforced (ACSR) that is triple insulated with hydronic tubing made from polyethylene plastic (XLPE) and other modern materials and lasts for a minimum of 40 years of service.

Computerized circuit breakers, called circuit protection relays, are available on the electrical engineering market. These devices automatically detect numerous different types of electrical faults and then rapidly interrupt (switch off) electrical current. This relatively recent form of circuit safety offers a dramatic improvement against wildfire ignition. However, this safety improvement has been essentially ignored by the CPUC. The CPUC and its Wildfire Safety Division (WSD) incorrectly refer to this gear as "pre-commercial." Other very rapid

reacting circuit safety systems are currently under testing and development. But again, there is no pressure coming from the CPUC for utilities to use this new class of safety equipment.

In the past 20 years, climate change has also begun to manifest with consecutive drought-ridden years interspersed with occasional high-rain years. California faces severe drying of grasslands and forests with occasional large rain events that lead to floods and slumping of hillsides on fragile slopes. Anthropogenic-caused fires and unusual lightning storms are wreaking havoc in forested areas, grasslands, and chaparral in wildland-urban-interface (WUI) areas and even decimating whole or portions of towns. This problem is exacerbated by private utility companies not utilizing the latest wires for protection of public and private landscapes, causing further sparking and extended wildfires. In addition, while these same utility companies are sued for wrongful deaths and loss of homes and habitat, they have chosen to pay their stakeholders instead of updating their infrastructure. Instead of updating and protecting forests and other natural landscapes, they now seek to have exemptions beyond their rights of way (ROW) to cut down private property trees, including Old and Heritage Trees, they deem "Hazard/Danger trees" that may fall on their wires. Thus, private landowners lose land equity, scenic vistas, and are in many circumstances made to pay for the cleanup following the loss of their trees.

I. CIRCUIT SAFETY

Pacific Gas and Electric (PG&E) has 125,147 electric circuit miles in California. Electrical distribution circuits, those connected directly through transformers to homes and small businesses, are the most abundant of all utility overhead wiring. Transmission circuits have much higher voltages, from 60,000 to 500,000 volts. These massive transmission lines cross natural landscapes, including forests, independent of streets and roads. They run to substations where the voltage is converted to distribution power levels. PG&E has 106,681 miles of overhead distribution lines and 18,466 transmission line miles. For decades, it has neglected to update this equipment.

Use of bare uninsulated wire is inherently dangerous for wildfires, especially in forests, chaparral, and grasslands. Any type of debris that falls across two of the standard three conductors (wire or cable) will cause a hot, possibly explosive, arc fault. This fault is a very hot bright flash of high voltage electricity similar to a welder's arc. At high voltages, electricity can travel across any material, both conductive and non-conductive, more easily than electricity can arc through the air. When this happens, a fault current is sent between two out-of-phase conductors. This type of fault regularly occurs during windstorms when power conductors swing close together in the wind. They can create a lightning bolt between them without touching, or actually touch. The problem also results from animals on power poles, from mylar party balloons landing on uninsulated jumper connections and main conductor cable/wire at power poles, and from general equipment failures. Small diameter uninsulated wires can burn through and either fall to earth hot energized, or drop fire igniting molten metal onto grasses and dry vegetation.

The fire safety of overhead power circuits can be divided into two issues. One is the tensile strength and insulation of the conductors. This includes the short sections of wire, cable, or conductive metal that bridge between main conductors, transformers and fuses at power poles. In this sense the issue of the primary conductors and the general design of power poles are directly linked. A Report [Liberty, 2013] commissioned by the CPUC indicated that PG&E retained in service about 22,000 circuit miles of obsolete 6-gauge (#6 AWG) bare copper wire (0.14 inches in diameter) as primary overhead conductor. This obsolete wire also sets the tensile strength standard for all distribution conductors in CPUC code. If one of these wires is going to break, the weaker the wire the more likely it will break in a storm and may fall to the ground.

The second issue is circuit protection. "Protection" refers to devices that interrupt or shut down current flow in the event of electrical faults. A fault is defined as any problem that arises in an electric circuit. Common faults are over-current (or overload), conduction between phases due to equipment failures, lightning strikes, debris and tree branches that make contact and bridge between uninsulated conductors, and animals that get onto power poles with uninsulated connections. There are also less-common faults such as phase imbalance, failures of cable splices, circuit grounding faults, and others not as statistically important that don't occur as frequently.

The common types of circuit protection, long in use, are limited to overcurrent "burnout" fuses and reclosers. A recloser is an electromechanical thermal circuit breaker designed to automatically reclose or re-energize a circuit to test if the fault that caused the recloser to open has cleared or resolved. An example of this situation is a line slap where uninsulated cables swing together in high wind causing a transient fault. Reclosers are inherently dangerous devices that were adopted for convenience and not for safety. Their re-energizing exacerbated wildfire spread in the 2018 wildfires. Reclosers are now required to be disabled from reclosing during fire seasons. Like fuses, reclosers can only react to overcurrent faults.

The advent of small robust computers has made possible an entire new class of circuit protection based upon the ability of computers to automatically detect and react to faults at very high speeds. Computers "watch" the circuit for specific waveform signatures that distinguish various electrical faults. Computers are necessary because power circuits are filled with complex wave form noise from all the activity occurring at every connection point in the circuit, such as motors turning on and off, small arc welders, electrical heaters, and other equipment in use at every location. Protection speed is a crucial safety issue for fire ignition and electrocutions. This dramatic safety improvement is the ability to detect and react to previously undetectable faults, as explained in the following paragraph.

When a single conductor (wire/cable) breaks and falls to earth without making contact with another conductor, this causes a "high impedance arc fault." This is a common occurrence with small, weak strength wire. This is also called the "wires down" hazard. The earth is a poor conductor of electricity, so these downed conductors do not trip (burn out or activate) utility

fuses or reclosers. Consequently, these deadly electrocution hazards and fire igniting downed wires remain hot and energized. This is a problem that no legacy, old design, equipment can protect against. These high impedance arc faults can continue arcing for hours, or even days, until the circuit is manually de-energized by a lineman who pulls open a fuse on the circuit after a 911 call.

Outside of its substations, PG&E has no remote control. It cannot shut down a branch circuit without driving to that location and turning it off by hand. The utility's workers presumably are able to remotely shut down feeder circuits at substations. Schweitzer Engineering [SEL-751] and General Electric [Multilin F60] both manufacture multi-function protection relays to guard against this and additional circuit safety problems. These automatic devices have been available for at least 15 years and can be installed in substations or on power poles depending on their design. No California utility, that we know of, has begun a full installation of this readily available safety equipment because there is no direction from regulators to use it.

Utility engineering, or how electric power systems work, is a mystery to most people. This fact has resulted in a situation where safety innovation is delayed for purely financial reasons. To add to this mystery, PG&E is not forthcoming in providing access to the circuit maps showing where the different types of wire exist in California. Neither do they provide a timeframe for upgrading circuits—where and with what kinds of equipment. Transparency, along with updates on accomplishments were conditions put into PG&E's Wildfire Mitigation Plan (WMP) by the WSD. After declaring bankruptcy, PG&E is also seeking a \$1 billion rate increase, putting future tree removal costs on the backs of rate payers.

For a power utility to operate safely it must have the ability to rapidly shut down an electrical circuit experiencing any type of electrical fault. There is no technical reason why these improvements cannot be made to transmission circuits in addition to distribution circuits. California can accept no more delays to these technical advancements in utility wildfire safety.

II. INCURSION ONTO PRIVATE LANDS

Notice and outreach to owners of intended PG&E vegetation management onto the owner's property is lax at best. Often generic door hanger signs are left at the property owner's residence making reference to upcoming maintenance or safety work, and sometimes a brochure is mailed. It is common for owners to learn about PG&E planned tree work on their properties only after the work has been completed and their trees have been removed.

Misrepresentations and scare tactics are often used. PG&E commonly tells property owners that PG&E has the right to remove any tree tall enough to strike a power line, that the property owner has to give Consent and if the owner refuses, they could be held liable for damages resulting from an equipment-related fire. If the property owner doesn't immediately consent, a supervisor will typically inspect the trees. It is not uncommon for the majority of trees that had been marked for removal by one of PG&E's arborist employees to be taken off the list at this stage. Property owners who hire their own Certified Arborists or Registered

Professional Foresters (RPFs) to inspect their trees have often found the vast majority of trees marked for removal have no defects that rise to the level of being Hazard/Danger trees, which are typically defined as, “Dead, Dying, or Diseased.” PG&E is becoming more aggressive, both with the trees they are marking for removal and their occasional hardball tactics to down trees, particularly in relation to their Enhanced Vegetation Management (EVM) [PG&E-EVM].

PG&E’s criteria for marking trees to remove or top appears to be based primarily on the height of the tree and its distance from the power lines. PG&E tree-marking process begins with employees from companies such as ACRT Pacific [ACRT] and Mountain G Enterprises, Inc. [Spencer, 2019], who are focused on the use of a range finder to measure the height of the tree and its distance from a power line. These workers are equipped with “scorecards,” which list deficiencies a tree could have, including but not limited to mistletoe, a scar, a lean, multiple leaders, root rot, or a snow loader. In 2019, these “scorecards” had a 1 to 10 scale to rate the severity of the ailment or defect. High scoring trees were marked for removal. In 2020 the scorecards transitioned to a simple “Yes” or “No,” with a “Yes” being a recommendation for removal.

PG&E’s Vegetation Management leadership has been emboldened by AB 2911, which passed in 2018 and took effect in January 2019, modifying the California Public Resources Code by adding the following: (PRC 4295.5(a)) “...may traverse land as necessary, regardless of land ownership or express permission to traverse land from the landowner, after providing notice and an opportunity to be heard to the landowner, to prune trees to maintain clearances pursuant to Section 4293, and to abate, by pruning or removal, any hazardous, dead, rotten, diseased, or structurally defective live trees. The clearances obtained when the pruning is performed shall be at the full discretion of the person that owns, controls, operates, or maintains any electrical transmission or distribution line, but shall be no less than what is required in Section 4293...”

As stated above, PG&E continues to disregard providing notice. By failing to disclose, it denies property owners the right of an opportunity to be heard, although the law allows for a fairly extensive review and appeal process. PG&E frequently fails to follow the review and appeal process. If a property owner learns of their right to refuse, PG&E’s procedure is for the Area Vegetation Manager to rule on their refusal. In many cases this Area Vegetation Manager is the same individual who either marked the trees in question or approved the marking. Therefore, we have a situation where one party to the dispute is unilaterally making the final determination, suggesting a conflict of interest. When contractors and their employees are the only contact, property owners have not been informed of their right, much less have an opportunity to pursue their right to refuse.

Both the CPUC and CalFIRE are reluctant to “micromanage” PG&E activities [Batjer, 2019]. Thus, the process lacks any official oversight, and ignores property owners who seek an objective decisionmaker to review evidence, such as an independent certified arborist or Registered Professional Forester (RPF) report on the condition of the trees. Furthermore, certified arborists or RPFs may well be reluctant to “vouch” for the health of a tree once it has

been marked by PG&E out of fear of liability should the tree fall, leaving the property owner to face an uphill and expensive battle to protect their property.

Frequently, intimidation by PG&E or its contractors hampers the owner's ability to obtain objective advice. In an increasing number of cases, PG&E is dispatching tree crews to trim, top or remove trees on private property over the objections of the property owners, occasionally with law enforcement escorts. PG&E is also cutting power to properties when the owner has a gate or other obstruction and is refusing consent.

Additionally, while PG&E is making the most out of its expanded authority under the newly amended PRC 4295 to work or remove trees outside its easements on private property, it is not recognizing its responsibility per PRC, 4295.5(b), "Nothing in subdivision (a) shall exempt any person who owns, controls, operates, or maintains any electrical transmission or distribution line from liability for damages for the removal of vegetation that is not covered by any easement granted to him or her for the electrical transmission or distribution line." However, there is no defined process for property owners to collect on damages.

At this time, PG&E is actively lobbying to gain even more flexibility to remove trees at the expense of the environment and private property rights as specifically stated in this segment of its 2020 WMP, and the utility is succeeding. The utility has proposed that, "...if the legislature extended PRC Section 4295.5 to also authorize utility tree workers to trim or remove trees or clarified the definition of a "conversion" in the forest practice rules to clearly exclude maintenance of a utility right of way, it could significantly improve the ability to execute vegetation management work. Likewise, legislative action could restrict the discretionary terms attached to encroachment permits," [PG&E-WMP, 2020]. PG&E's lobbying has thus far succeeded: The first law change has occurred, AB 2911, and the second is in process in the Board of Forestry.

III. DEFINITION OF HAZARD/DANGER TREES

All trees will eventually fall. Some will fall harmlessly to the ground and return their material to the forest floor as nutrients. Hazard/Danger trees pose the risk of damage to something of value in a spatial and temporal setting. A large unstable dead tree leaning toward a power line within strike distance is an obvious and imminent hazard. A large healthy tree with only a slight lean is not an imminent hazard unless the lean is too great a sweep or it is poorly rooted. Determination of risk and the combination of likelihood and effect requires careful discernment to conserve the value of trees or to save the cost of removing them. Common sense tells us that Hazard/Danger trees are the exception, the accumulation of negative factors like age, disease and damage that destabilize a small fraction of trees in the forest at any moment. "Hazard/Danger" is not the absence of perfection as reflected by inexperienced utility arborists and cloistered PG&E executives.

Current removal practices by PG&E are extreme, very costly to homeowners, forests, and ratepayers. PG&E exhibits poor discernment, especially where wide swaths on private property are clear cut without regard to the hazardous or nonhazardous conditions of

individual trees. This excessive cutting exposes trees to the potential of windthrow where previously protected by surrounding trees, the once interior trees are more likely to fall in high wind or rain events. These practices have been directly observed on the North Complex, the CZU Lightening Complex Fire, and reported generally throughout PG&E's territory. PRC 4295.5 authorizes entrance onto private property, "to abate, by pruning or removal, any hazardous, dead, rotten, diseased, or structurally defective live trees," but not any or all trees. PRC 4295.5 is not an extension of a deeded easement that allows removal of all vegetation for the purposes of constructing and maintaining PG&E's equipment. Nor are all trees, slightly fire damaged or imperfect, a "reasonable and foreseeable" hazard [Porter, 2020]. Many trees are fire adapted and tree ring studies show that these trees have survived many fires in their long healthy lives.

Trees possess attributes that are valuable to a home, wildlife, and forests. Forests are valuable, especially today as they sequester carbon that would otherwise be in the atmosphere making our environment uninhabitable. Cutting trees to restore forest health should be a carefully managed selection process balancing species diversity and spatial distribution to improve and sustain robust carbon sequestration. PG&E's tunnel vision of converting forests to wide linear brush or fire-sensitive grass fields does little for power line safety and increases the flammability of the greater landscape, including its flammable poles. Alive or dead, trees are a public resource whose value must be balanced against removal for purported power line safety.

Information presented in PG&E's WMP shows that tree interactions with power lines are responsible for 25% of utility ignitions. Equipment failures are responsible for 37%, and bare wire creates other vulnerabilities that are responsible for 38% of utility ignitions [PG&E WMP, 2020]. Instead of this focus on tree destruction, PG&E, its customers, and shareholders would be better served by PG&E reconstructing its unsafe system with undergrounding or insulated conductors and failsafe circuit breakers. Throughout PG&E's territory, it is common for its explosive fuses, when working properly, to spray molten metal on the tinder dry fuel beds in forests and along city streets. A newly reconstructed system would last approximately 40 years, once and done, without requiring the wasteful destruction of private and public tree and shrubs resources that must be performed at least bi-annually under the current misguided paradigm.

IV. ARBORISTS' ROLE

There are several related issues to consider regarding the arborists' role in identification of Hazard/Danger trees. First, as of November 18, 2020, PG&E and its Licensed Timber Operators (LTOs) were presented with three rigorous and disturbing Notices of Violations (NOVs) (see Attachments A, B1, and B2), with further violations pending, by CalFIRE San Mateo/Santa Cruz County Forest Practice Inspector, Richard Sampson. Since November 10th, PG&E is reinterpreting the Forest Practice Rules (FPRs), saying the utility is not harvesting to sell so it doesn't need an Exemption Permit, even though it has regularly applied for such Permits in 2018, 2019, and 2020 – affecting 20,000 acres in Santa Cruz County alone.

Property owners state that it looks like PG&E's lawyers are paid to stall so the tree-clearing process can continue unabated. Property owners know the massive clearing, the

disturbance of fire-seared soil, the impacts on waterways, and the complete lack of adequate prevention measures ensure a threat to life, and severely exacerbated erosion, including mud and debris flows. These impacts will cause further damage to properties and threaten homes downhill, below the fire lines. Trees need to remain in the forest to help forest restoration stability and recruitment, including protection of threatened and endangered wildlife species and their habitat in currently untouched areas. PG&E has claimed it is using arborists to identify trees to be removed. The extensive clearcutting shows that individual trees are not being evaluated for their potential to thrive.

Second, PG&E has applied to the CPUC for approval of a \$1 billion rate increase, putting future tree removal costs on the backs of the rate payers. Only a portion of those funds should be spent on vegetation management, and those funds should be limited to CPUC requirements such as the 4-foot radial trim around the wires. The remainder of the funds should go towards updating infrastructure.

Third, PG&E lobbied for unreasonable regulation changes in the Public Resources Code and Forest Practice Rules. The utility was successful in having its sought-after changes passed by legislation (AB 2011) and signed into law in September, 2018, thus creating PRC 9245.5. To support these added regulation changes further, Forestry Rule revisions are under consideration, specifically rewriting the THP Utility Exemption Permit. The draft THP Utility Exemption Permit language would meet PG&E's goals to have control over tree removal both inside the ROW and on private property. The Board of Forestry (BOF) revision process is projected to continue to be completed sometime in the spring, 2021.

PG&E is continuing to implement its EVM, which has magnified tree removals exponentially, and even more since 2019 when a decision was made to take down every tree within striking distance. Few, if any, property owners understand how the Legislature, the CPUC, and PG&E rationalized this invasion onto private property, and they consider it an example of PG&E exercising eminent domain and their trees being cut down as a "taking." Under current 2019 additions to PRC 4295.5, several changes are having great impact and should be amended. These changes include the following: 1) Trees must be considered Hazard/Danger trees. However, the definition for Hazard/Danger trees has been so loosely defined as to be applicable to virtually any tree. 2) Notifying property owners and giving them "an opportunity to be heard" (PRC 4295.5(a)) before removing trees on private property is required. However, there is no process to provide notification. So, property owners have no way to stop PG&E from removing trees, except for PRC 4295.5(b), which provides for PG&E to pay damages. However, here again, there is no process for property owners to pursue damages. 3) PG&E claims it has Certified Arborists identifying trees for removal. PG&E, alone, determines whether the trees are Hazard/Danger trees. Many property owners report never having been contacted at all and find their trees downed or gone. PG&E continues to train arborists it hires to follow the utility's criteria for Hazard/Danger trees.

Currently, tree evaluation to determine which are Hazard/Danger trees is performed by either PG&E arborists or contractor-hired arborists. Generally, arborists have some sort of

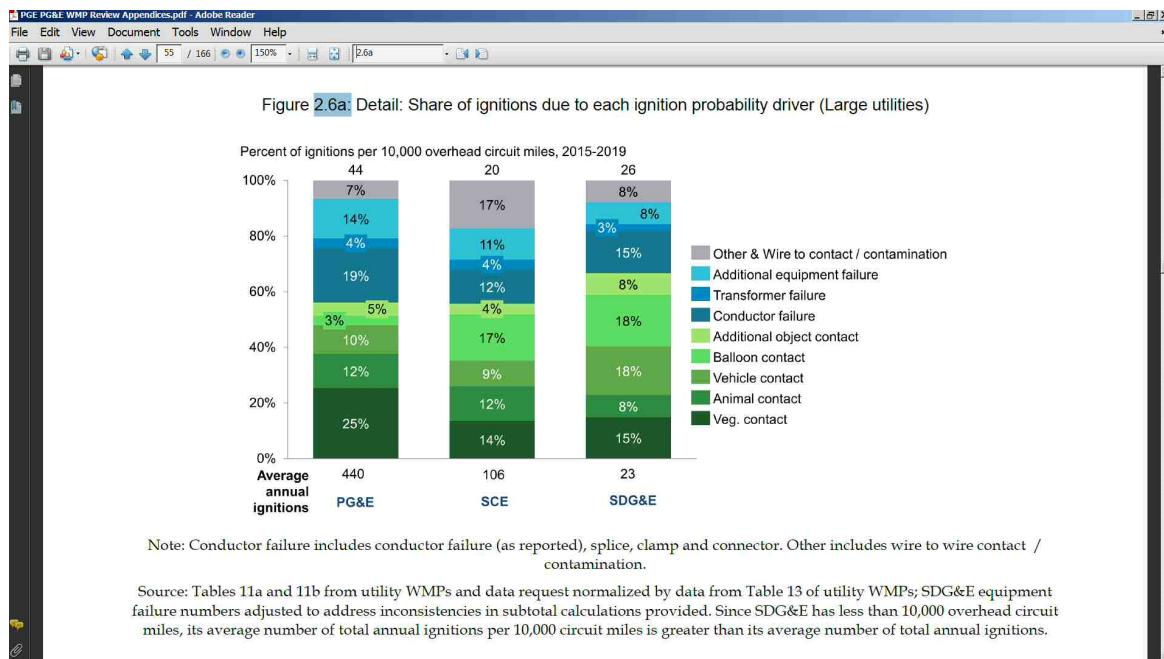
experience or training leading to “certification,” but there are no specific requirements in California regulations describing a “Certified Arborist.” The closest requirements are found in the California Division of Occupational Safety and Health [Cal/OSHA], which basically require tree workers to have “documented safety instruction.” This makes the requirement of having a Certified Arborist nonspecific, leaving it to other regulatory agencies to establish required standards.

PG&E holds power over the certification of arborists by the International Society of Arboriculture (ISA), the best-known provider of classes and testing to achieve certification. The current ISA President is a PG&E employee. Many of the classes and supplemental courses are structured and taught by PG&E. There are several certification programs offered by the ISA. All these programs require three years of on-the-job experience, and/or a “degree in the field of arboriculture, horticulture, landscape architecture, or forestry from a regionally accredited educational institute.” Finally, a potential arborist must pass one of ISA’s 200-question exams to be certified. A “Utility Arborist” specialty is an option. To support the applicant, ISA offers a packet of 25 online courses to prepare for the exam. Once certification has been approved, it is valid for three years, and additional courses must be taken to maintain certification [ISA, 2020].

The ISA Certification Program demands rigorous requirements, providing the potential for skilled evaluation. However, there is no guarantee that the student will learn specifics regarding California native tree species. Significantly, the program does not provide any Risk Assessment Course that addresses fire-damaged trees [Lashonna, 2020]. Tree species reactions to fire are a crucial component for training and experience when dealing with the ever-increasing number of fire-affected trees, and should be a requirement for utility arborists doing California fire and post-fire inspections.

It is clear, especially since the many lightning complex fires beginning in August of 2020, that PG&E and other agencies must go outside California for arborists. From conversations between multiple private property owners and PG&E/contractor arborists in the CZU fire area, arborists have been recruited from Nebraska, Tennessee, Texas, and elsewhere. Those arborists had received PG&E training and Hazard/Danger tree “guidelines,” i.e., the previously named scorecard, for their current work. However, they had limited or no experience with California native fire-affected trees and their capability to survive fires.

PG&E stated in United States District Court to Federal Judge Wm. Alsup, that it will never be able to trim or remove enough trees because major trimming companies are backing out due to insurance costs [New York Times, 2019]. It must be known that EVM will not succeed in reducing wildfire ignition because 75% of the problem, as noted in Figure 2.6a below, is with the antiquated infrastructure, not the trees.



V. MISLEADING INFLUENCE

For decades PG&E has endeavored to influence public opinion and affect legislation towards tree removal rather than upgrade utility infrastructure. Blaming the problem on the trees gained acceptance as PG&E sought to limit its liability and expenses while paying its shareholders. This carried into the courtroom. Judge Alsup's tree removal mandate inadvertently results in reinforcing the misconception promulgated by PG&E. As a result, PG&E is highly motivated to cut down as many trees as possible both in and out of the ROW. This pressure directly affects what PG&E requires of its arborists and contractors, the protection of healthy mature trees, and infringement on private property rights.

It should be noted that the cost of tree removal is considered maintenance and can be passed on to rate payers. Equipment upgrades are considered capital improvements, and as such come out of profits, and the shareholders' pockets. In their analyses of PG&E's WMP, the WSD criticized PG&E for conflating the actual costs of routine and EVM so that a reasonable comparison of system hardening cost effectiveness cannot be made, leaving the CPUC and other regulators, state and local governments, and the public misinformed about those costs [WSD-Guidance Resolution].

VI. SOLUTIONS

CIRCUIT SAFETY

Solutions to reduce or eliminate utility-associated wildfires include installation of steel reinforced core fully insulated aluminum cable (conductor), the use of spacer cables, and undergrounding. When undergrounding is contraindicated, improved conductors combined with computer operated circuit safety relays would solve California's utility wildfire problem. A priority in forest areas should be undergrounding electrical systems. The cost of these improvements is regularly used to justify delays in safety upgrading. This is a specious argument

when faced with the scale of suffering, property losses, and loss of life, plus financial impacts to the public and the state caused by repeated utility ignited wildfires, and recently further exacerbated by Public Safety Power Shutdowns (PSPS) as a substitute for safe electrical supply circuits. This will substantially reduce the current enormous costs of EVM by eliminating its rationale for continuing to cut trees. It is also important that utilities adhere to CPUC requirements for consistent timely tree trimming around above-ground wires. In addition, PG&E needs to be transparent in providing local governments and the general public realistic timeframes of replacement updates.

INCURSION ONTO PRIVATE LANDS

The solution to infringements on private property rights, is that PG&E adhere to current laws. These laws state that PG&E and its contractors may not enter private property without Notice and Consent, and that removing trees from private property without Notice and Consent, per CPUC GO 95, the 5th Amendment to the Constitution, California state law, and numerous court cases is a “Taking,” [U.S. Constitution], [CALIFORNIA CONSTITUTION], [CPUC § 130220.5], [Westgate Ltd., 1992]. In addition, case law requires PG&E to compensate property owners for damages when its actions result in loss to the value of that property [Krieger, 1981]. Thus, PRC Code 4295.5(a) and related enforcement regulations from other agencies, must be amended to incorporate Notice and Consent, before commencing any vegetation management. Entitled “hearing” from 4295.5(b) needs to be defined as to procedure, place, and responsible party. The Notice and Consent process should include: 1.) provide proper Notice requesting a visit to inspect the property; 2.) allow the property owner to oversee and be involved in the inspection; 3.) assure that the property owner is not pressured, harassed nor threatened; 4.) provide the property owner with a detailed written description of proposed work; 5.) include the right to provide alternative expert opinion to challenge PG&E’s arborists or others designating what trees to cut and how severely, and what trees to remove as Hazard/Danger trees; 6.) allow negotiation to achieve agreement; and 7.) allow property owners’ Right of Refusal.

DEFINITION OF HAZARD/DANGER TREES

The CPUC, PG&E, and CalFIRE refer to “Hazard” trees, and the BOF refers to “Danger” trees. One definition with one name for “Hazard/Danger trees” should be amended into PRC Code 4295.5(a) and related enforcement regulations from other agencies including but not limited to CPUC, BOF, CalFIRE and CDFW. A clause must be included in the new definition stating that not all trees with defects or fire damage are necessarily Hazard/Damage Trees, with clarifying examples. This definition should clarify that trees not Hazard/Danger are important to retain as beneficial trees to protecting forests, providing listed species habitat, and enhancing the environment. The definition’s scope shall be “reasonable and foreseeable,” [CA Power Line Fire Prevention Field Guide, 2020] including “imminence within one year.” Specific protection measures should be included to retain old growth trees and late seral second growth trees, with only limited trimming to retain their viability.

ARBORISTS

Minimum requirements for Certified Arborists, hired to determine Hazard/Danger trees, should include experience working with native California tree species with respect to

fire and wind, and to understand each species' functions within their region. This should be amended into PRC 4295.5 and regulations of related enforcement agencies. The Board of Forestry must reject the draft revisions to the THP Utility Exemption Permit process that allows utilities to define Hazard/Danger trees and education and training requirements for arborists.

VII. CONCLUSION

After decades of infrastructure neglect, PG&E has received 6 federal felony convictions and 84 manslaughter convictions for failing to maintain safe and reliable gas and electrical systems. Faced with lawsuits, legislative action, and bankruptcy, PG&E still fails to confront the emergency nature of improving its antiquated infrastructure. There are five primary issues that cause this problem: lack of circuit safety, incursion onto private lands, a vague definition of Hazard/Danger trees, arborist non-qualifications, and misleading influence.

One way to directly improve PG&E's performance would be for the court to revise its tree-cutting mandate and replace it with a mandate to update the unsafe infrastructure. Court action would thereby expedite replacement of aboveground bare wire distribution lines with a combination of underground distribution lines, and aboveground triple insulated steel reinforced cable and advanced circuit protection, as the most effective and primary means of reducing utility-caused wildfires. Vegetation management should be secondary as it is temporary and results in environmental degradation. The infrastructure should be designed to be fail safe.

PG&E's EVM program is causing extensive environmental damage to public and private lands. This is exacerbated by PG&E's dependence on unqualified arborists using broad and misleading Hazard/Danger tree definitions. Their EVM is causing the loss of millions of healthy mature trees and loss of carbon sequestration. In addition, the people of California face increased erosion and risk of flooding, damage to property and communities, loss of wildlife habitat, increased fire risk from wind tunnel dispersed firebrands, flammable invasive plants, and hotter local microclimates.

Private property owners deserve to have regulations revised to include processes for notice prior to work, right to negotiate or refuse, and a system for collecting on damages. Arborists must be trained and/or experienced in working with California tree species in relation to their responses to wind and fire. A single clear definition of Hazard/Danger trees needs to be established for arborists. The public deserves a safe and reliable system as stated in the CPUC mission.

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ATTACHMENTS

Attachment A Notice of Violation, CalFire-Richard Sampson to PG&E, et al., 30 Oct 2020
Attachment B1 Notice of Violation, CalFire-Richard Sampson to PG&E, et al., 11 Nov 2020
Attachment B2 Notice of Violation, CalFire-Richard Sampson to PG&E, et al., 18 Nov 2020
Attachment C PRC 4295.5 Expanded History and Discussion

Dated: November 23, 2020, edited January 18, 2021

Addendum to PG&E White Paper

WHITE PAPER DATED 11-23-20, ADDENDUM DATED 1-20-21

Additional activities have taken place since the completion of the White Paper. Copies of these documents are attached.

Additional Notices of Violations (NOVs):

The Coastal Commission NOV to PG&E regarding the Santa Cruz mountains tree removal, Dated November 20, 2020 (Attachment D).

CalFIRE's fourth NOV to PG&E regarding CZU Lightning Fire utility work, dated November 30, 2020 (Attachment E).

The California Regional Water Quality Control Board NOV to PG&E regarding unauthorized discharges of waste to waters, dated December 15, 2020 (Attachment F).

Other Activities:

A letter was sent from CPUC President, Marybel Batjer, to PG&E on November 24, 2020 (Attachment G), stating that PG&E will be "held accountable" for failing to improve safety. The work of the Taskforce is having an impact. Chuck Roselle, an active member of the Sierra Club East Bay commented that he, "will not give this much credence until and unless the CPUC invokes the enhanced oversight and takeover process defined in Appendix A of the *Bankruptcy Proceeding Decision* (beginning on page 110)." We see this as a foot in the door opportunity – getting the CPUC to invoke enhanced oversight and to takeover processes.

The County of Santa Cruz Board of Supervisors (BOS) unanimously passed a Resolution (Attachment H) on December 8, 2020, directing the District Attorney, CalFIRE, The California Public Utility Commission (CPUC), and the California Department of Fish and Wildlife (CDFW) to investigate PG&E's violations, asking that they look at the situation and consider taking criminal or civil action. In addition, as part of the Resolution, the BOS is writing a Formal Complaint to the CPUC.

Copies of the Resolution and the 20 pages of violation back-up documents were sent in letters from the Santa Cruz BOS to Judge Alsup on December 15, 2020 (Attachment I), and Jennifer Hutchings, Probation officer of Judge Alsup at the U.S. District Court on December 17, 2020 (Attachment J).

The City of Santa Cruz sent a letter of complaint (Attachment K) to PG&E on January 6, 2021, notifying it and its vegetation management contractors that they are endangering City of Santa Cruz's water supply, and fuel conditions are worse than prior to their tree removal per City code.

The Utility Reform Network (TURN) sent a letter to the CPUC and Governor's office (Attachment L) on April 22, 2019, asking the CPUC to protect utility ratepayers. The letter includes financial information showing that PG&E is conflating costs, thus misleading ratepayers and agencies, primarily the CPUC, and Judge Alsup.

The Butte County District Attorney summarized the Camp Fire Investigation in *The Camp Fire Public Report* dated June 16, 2020 (Attachment M). From pages 48 to 54, the District Attorney reviews PG&E's finances regarding maintenance, repair, and replacement of transmission assets. The analysis demonstrates PG&E's preference to use antiquated infrastructure that was neglected and left to fail, "The evidence established that PG&E personnel were consistently looking for ways to charge expense budget projects to the capital budget" (page 51).

ATTACHMENTS

- Attachment D Notice of Violation, Coastal Commission to PG&E, 20, Nov 2020
- Attachment E Notice of Violation, CalFire-Richard Sampson to PG&E, et al., 30 Nov 2020
- Attachment F Notice of Violation, California Regional Water Quality Control Board to PG&E, 15 Dec 2020
- Attachment G Letter from CPUC President, Marybel Batjer, to PG&E, 24 Nov 2020
- Attachment H County of Santa Cruz Board of Supervisors Resolution, 8, Dec 2020
- Attachment I Letter from Santa Cruz Board of Supervisors to Judge Alsup, 15 Dec 2020
- Attachment J Letter from Santa Cruz Board of Supervisors to Jennifer Hutchings, Probation officer of Judge Alsup, 17 Dec 2020
- Attachment K Letter of Complaint from City of Santa Cruz to PG&E, 6 Jan 2021
- Attachment L Letter from Utility Reform Network (TURN) to CPUC and Governor's office 22 Apr 2019
- Attachment M Butte County District Attorney, *The Camp Fire Public Report*, 16 Jun 2020

Addendum II to PG&E White Paper

WHITE PAPER DATED 11-23-20, ADDENDUM DATED 1-20-21, ADDENDUM II DATED 3-30-21

COST BENEFIT ASSESSMENT OF PG&E'S EXPENDITURES FOR VEGETATION MANAGEMENT v. BENEFITS OF INFRASTRUCTURE IMPROVEMENTS

PREFACE

The massive system failures in Texas these last days, has awakened the nation to how our Utilities are vulnerable. From the Big Freeze we heard words such as "It is as bad as California".

Texas, also, has a history of Utility failures. Out of cold frozen nights, broken pipes and rotating power outages, comes the word that they didn't perform:

MODERNIZATION

And it applies to us. For over one hundred years, PG&E's treatment of thousand after thousands of miles of their distribution system has been in opposition to Modernization. Think about it, the greatest change of their primary solution to any Wildfire-Safety-Plan, has been more Vegetation Management. And over those miles and years, their modernization solution to fire ignition has been changing from a tree ax to a chainsaw.

Their bare lines exist, as a testimony to their lack of foresight.

In the enclosed paper, we will show that working on vegetation is no excuse for ignoring modernization of an antiquated system while achieving only a 5% reduction of causation of wildfire, which is not economically justified, and falls far short of making PG&E's circuits safer compared to other operators.

Southern California Edison's approach to a modern system is not only better, cheaper, but also significantly safer, and PG&E should, without doubt, follow SCE's lead and drop Enhanced Vegetation Management and install covered conductors which address almost 90% of known initiators.

COST-BENEFIT ASSESSMENT OF PG&E'S EXPENDITURES FOR VEGETATION MANAGEMENT
VS BENEFITS OF INFRASTRUCTURE IMPROVEMENTS
March 30, 2021

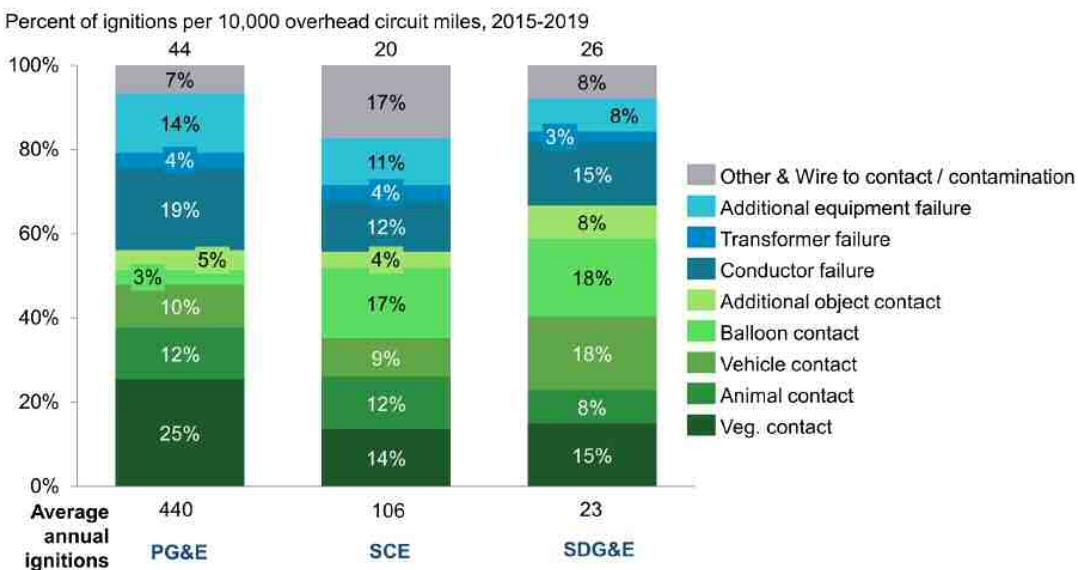
Addressing PG&E's Unsafe, Unsuccessful and Inadequate Wildfire Mitigation Plan (WMP)

- This paper demonstrates that on a Cost Benefit basis, it is significantly more efficient to replace bare wire conductors, than to spend billions of dollars on vegetation management. Enhanced Vegetation Management (EVM) has a cost greater on a mile-to-mile basis than the replacement cost of bare wire with covered conductors. Here we compare two Utilities, Pacific Gas and Electric (PG&E) and Southern California Edison (SCE), their philosophies of how to handle drivers of ignition and the cost of their solutions. Beyond that, PG&E's projected cost for line replacement of one million dollars a mile is more than double the actual real world cost: Southern California Edison has shown by modernization, that installing covered conductor can be done for \$428K per mile. PG&E has proven that performing non-modernized Enhanced Vegetation Management costs \$494K per mile.
- PG&E's solution to protect its lines (EVM) only addresses 25% of all ignition drivers. SCE's solution (replacing aging lines with covered conductors) solves up to 90% of all causes of ignition. It is obvious which solution provides greater safety and reliability, while preventing environmental degradation.
- Wildfire safety for a utility is of paramount importance. PG&E's business practices have been failing the mandate to provide a safe and reliable system for decades. This is due to the excessive expense of a program which cannot achieve its stated goals. As a business, its current handling of wildfire mitigation can only be assessed as a long-term failure. PG&E should be addressing all drivers of wildfire ignition; however, the majority of its monies is only going to one, and that pathway is so repeatedly expensive for the protection of bare line conductors, as to guarantee failure.
- This paper is supported by analyses from the Wildfire Safety Division (WSD), the Wildfire Safety Advisory Board (WSAB), the CPUC, this state's other Investor Owned Utilities (IOU's), Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E).
- "PG&E accepts and acknowledges that, with respect to wildfire mitigation measures, there are certain areas in which SDG&E and SCE are more advanced than PG&E."¹ These mitigations are superior to any vegetation management.
- PG&E is spending billions of dollars on a driver that only mitigates 5 fires out of 440 a year, creating a repeatable pathway to bankruptcy while failing to address the real problem (p.3). They are spending huge amounts of money to address a driver of ignition which addresses at most 35% of all ignitions. Compare that with triple layered covered conductor, which addresses a prevention of up to 90% of all ignitions. PG&E for all it does is still left with an aging system.

The charts below are from the **Wildfire Safety Division (WSD) "Draft Guidance Resolution WSD-002, May, 2020,"** except Chart 4, 31.1, which is from **PG&E's "Wildfire Mitigation Plan Report," February 28, 2020.** What they show is that PG&E's historic narrow focus is a waste of money, and of limited, unproven efficacy in reducing wildfires. WSD charts compare PG&E with SCE and SDG&E.

¹CASE 3:14-cr-00175-WHA Document 1022 1022.Pitre-and-Campora's-Comments-on-Accuracy-of-PG-E's-Response-(Part-1).pdf
Page 45 line 24

Figure 2.6a: Detail: Share of ignitions due to each ignition probability driver (Large utilities)



Note: Conductor failure includes conductor failure (as reported), splice, clamp and connector. Other includes wire to wire contact / contamination.

Source: Tables 11a and 11b from utility WMPs and data request normalized by data from Table 13 of utility WMPs; SDG&E equipment failure numbers adjusted to address inconsistencies in subtotal calculations provided. Since SDG&E has less than 10,000 overhead circuit miles, its average number of total annual ignitions per 10,000 circuit miles is greater than its average number of total annual ignitions.

Chart 1: Wildfire Safety Division (WSD) "Draft Guidance Resolution WSD-002" (336461968.pdf), p.118, May, 2020

Chart 1 shows sources of ignition, with only 25% attributed to vegetation contact by PG&E. It shows that PG&E's vegetation ignitions are almost double versus the other IOU's. Most ignitions are within PG&E's forested regions, where thousands of circuit miles are antiquated bare copper wire. (Liberty Consulting Group, *Study of Risk Assessment and PG&E's GRC*, May 6, 2013) We don't know how many of their ignitions are from failed splices igniting ground vegetation but that may be reflected in the Conductor Failure numbers. Pictures from the Tubbs Fire show initial cause was not trees catching fire, but the grass along the highway, something arc-fault interrupters (computerized circuit breakers) would have handled, even with antiquated conductor. Steel-core, triple insulated cable would have prevented ignition in the first place.

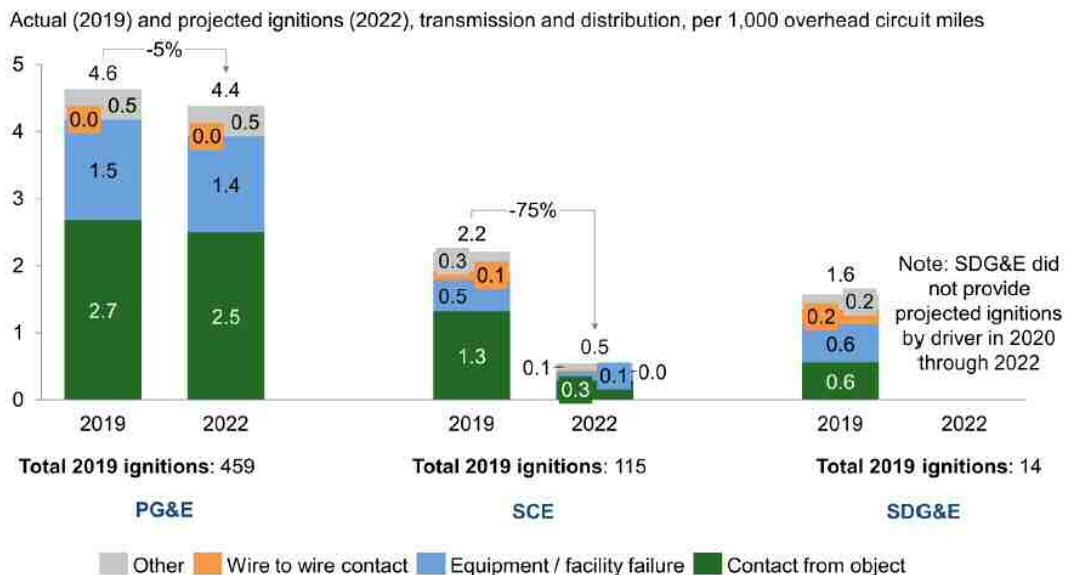
In analyzing PG&E's section of the chart, you will see that 75% of the ignition drivers are unrelated to vegetation. The effort to control Vegetation Contact through Enhanced Vegetation Management (EVM) and expanded inspections, is taking over \$1.45 billion annually, while only reducing ignitions by an average of 5 per year out of 440. This is less than a 5% improvement over three years, while being ineffective for any other ignition causes. (See following Charts.)

Yet, the WSD and the CPUC are allowing PG&E to continue in this manner rather than requiring alternative solutions, specifically upgrading its systems. Such upgrades must be effective on all on all ignition drivers, this is being better accomplished by the two other major IOU's and include the following: replacing bare distribution cable with steel core, triple insulated conductor (as done by Southern California Edison (SCE)), the installation of computerized circuit breakers for immediate protection from arcing broken cable (as done by San Diego Gas & Electric (SDG&E)), or even installing spacer wire for significantly improved strength and safety at relatively lower cost (about \$100,000/mile, plus installation, per Hendricks Spacer Cable and Services for Norman Utilities LLC in New Hampshire).

SCE has committed to replacing all its distribution cable at a rate of over three times PG&E's Wildfire Mitigation Plan (WMP). SDG&E has greater than 60% of its system underground, hence the very low Average Annual Ignitions; it went underground rather than replacing miles of wires. Significantly, in contrast to PG&E, they are rapidly installing computerized circuit breakers to improve their safety on the remaining 40% of its system.

CHART 2 NEXT PAGE

Figure 2.7a: Actual and projected ignitions for top ignition drivers, 2019 and 2022



Note: Projections assume WMP implementation according to plan and weather patterns consistent with 5 year historical average. See the 2020 WMP Guidelines for further detail.

Small utilities populated Table 31 either not at all or with all zeroes. Specifically: Horizon West Transmission left it blank as it did not yet have operational facilities when it submitted its 2020 WMP; Trans Bay Cable and Bear Valley Electric Service reported anticipating no ignitions (having seen no ignitions in the past 5 years); Liberty did not populate Table 31; PacifiCorp reported only a general reducing trend anticipated with no discrete data available.

Source: Tables 11a, 11b, 31a, and 31b from utility WMPs and data requests; SDG&E equipment failure numbers adjusted to address inconsistencies in subtotal calculations provided by SDG&E.

CHART 2 shows a meager 5% reduction in projected ignitions by PG&E under its vegetation focused plan. Worth noting, PG&E will be spending over \$4 billion in the period between 2020 and 2022, for vegetation management alone (see Resource Allocations, Chart 4). Thus, it takes \$1.3 billion per year to achieve a reduction of barely 5 fires per year, out of 459 projected fires per year. Southern California Edison (SCE) is projecting a 75% reduction in the 2019-2022 period. That is reduction of 86 fires out of a current level of 115 per year. San Diego Gas & Electric (SDG&E) has 14 total ignitions per year, currently. This is the result of over 60% of their system circuits being undergrounded, hardening of their overhead wires, and on-going installation of arc fault interrupters (computerized circuit breakers).

This failure guarantees that PG&E will be forced to depend upon Public Safety Power Shutoffs (PSPS) to protect its antiquated system. PSPS, however, is not the answer they thought it could be, as demonstrated by the January 18-19, 2021 fires and lengthy outages caused during the high winds in the Santa Cruz Coastal Mountains, in spite of PSPS in the area. (<https://sanfrancisco.cbslocal.com/2021/01/19/fire-santa-cruz-county-evacuations-aptos-hills-larkin-valley/>)

CHART 3, NEXT PAGE

**TABLE 31-1: CHANGE IN DRIVERS OF IGNITION PROBABILITY TAKING INTO ACCOUNT PLANNED INITIATIONS,
FOR EACH YEAR OF PLAN – DISTRIBUTION**

Incident type by ignition probability driver	Detailed risk driver	Are near misses tracked ?	Number of incidents per year				Average percentage likelihood of ignition per incident			Number of ignitions (mitigated)			
			2019 (Actual)	2020	2021	2022	2020	2021	2022	2019 (Actual)	2020	2021	2022
Contact from object	All types of object contact	Y	13,434.00	13,094.17	12,788.32	12,513.05	1.88%	1.88%	1.88%	253.00	246.60	240.84	235.66
	Animal contact	Y	2,072.00	2,034.33	2,000.42	1,969.91	3.19%	3.19%	3.19%	66.00	64.80	63.72	62.75
	Balloon contact	Y	464.00	464.00	464.00	464.00	3.02%	3.02%	3.02%	14.00	14.00	14.00	14.00
	Vegetation contact	Y	8,167.00	7,807.10	7,483.19	7,191.67	1.44%	1.44%	1.44%	118.00	112.80	108.12	103.91
	Vehicle contact	Y	1,835.00	1,835.00	1,835.00	1,835.00	2.02%	2.02%	2.02%	37.00	37.00	37.00	37.00
	Contact from Object - Other	Y	896.00	896.00	896.00	896.00	2.01%	2.01%	2.01%	18.00	18.00	18.00	18.00
All types of equipment / facility failure	All types	Y	13,031.00	12,835.54	12,659.62	12,501.29	1.07%	1.07%	1.07%	140.00	137.90	136.01	134.31
	Capacitor bank failure	Y	70.00	70.00	70.00	70.00	10.00%	10.00%	10.00%	7.00	7.00	7.00	7.00
	Conductor failure—all	Y	3,382.00	3,328.60	3,280.54	3,237.29	2.25%	2.25%	2.25%	76.00	74.80	73.72	72.75
	Conductor failure—wires down	Y	1,593.00	1,593.00	1,593.00	1,593.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Fuse failure—all	Y	345.00	345.00	345.00	345.00	0.58%	0.58%	0.58%	2.00	2.00	2.00	2.00
	Fuse failure—conventional blown fuse	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Lightning arrester failure	Y	130.00	130.00	130.00	130.00	3.08%	3.08%	3.08%	4.00	4.00	4.00	4.00
	Switch failure	Y	189.00	179.55	171.05	163.39	2.12%	2.12%	2.12%	4.00	3.80	3.62	3.46
	Transformer failure	Y	3,962.00	3,905.40	3,854.46	3,808.61	0.53%	0.53%	0.53%	21.00	20.70	20.43	20.19

CHART 3 This is PG&E data from their 2020 Wildfire Mitigation Plan. (The WSD has based Chart 2 on this data.) Look closely at the *Contact from Object* section, and the “Number of Ignitions (Mitigated)” column. Subtract the number of ignitions projected each year from the year before to reach the average 5 mitigations per year), at a cost of over \$2 billion per year. NOTE THE OTHER TYPES OF EQUIPMENT AND THEIR PROJECTED FAILURES: balloon and animal contacts, though less frequent, have double the likelihood of causing a wildfire than “vegetation.” (Further note that the “Conductor Failure-wires down” data is the same for four years, and then “Not Available” (NA) after that because PG&E’s record keeping is not granular enough. (Poor record keeping is an on-going problem with PG&E’s data.)

CHART 4, NEXT PAGE

1.3 Resource Allocation

Figure 3.1a: Overview of total plan spend across utilities (Large utilities)

	PG&E	SCE	SDG&E
Total spend	2019 planned spend	\$2,296M	\$255M
	2019 actual spend	\$2,999M	\$307M
	2020 planned spend	\$3,171M	\$444M
	2021 planned spend	\$3,130M	\$445M
	2022 planned spend	\$3,247M	\$448M
	Total planned spend as for 2020, 2021 and 2022, as reported by utility	\$9,548M	\$4,511M
Normalized spend	Total planned spend for 2020, 2021 and 2022 per overhead HFTD circuit mile	\$307K	\$318K
			\$291K

1. Totals for SDG&E include a calculation error on the part of SDG&E in which the sum of the reported spend for 2020, 2021, and 2022 is not equal to the reported total 2020-2022 planned spend. This error has not been corrected by the WSD in this table.

Note: "M" stands for millions, "K" stands for thousands.

Source: Tables 21-30 from utility WMPs and data requests, normalized by data from Table 13 of utility WMPs

CHART 4 *The cost per overhead High Fire-Threat District (HFTD) circuit mile*

Even though the amounts are almost the same, there is a great difference. PG&E is spending empty calories for its EVM, amounting to billions of dollars, but not adding worth to its physical system. SCE on the other hand, is hardening its system, adding worth year after year. Even more interesting is that SCE has recently published an estimate of how much it costs to steel core-triple insulate its lines --\$428K per mile. This is far less than PG&E's claimed costs. It is an investment which will pay off for SCE in the coming decades, with far less maintenance cost coupled with greater safety, including wildfire protection, fewer electrocutions, and protection from all causes of ignitions -- and they are justifiably proud of it. Another way to look at this, PG&E's Table 3.4b (p.6) shows that Enhanced Vegetation Management (EVM) costs consumes 24 percent of PG&E's total spend. That works out to 24/28 or 86 percent PG&E's total allocation for "Vegetation management and inspections". The result is 86% of total expenditures for Vegetation Management are being spent for a mitigation of a 25% ignition driver., Vegetation Contact (Chart 1).

For 2020, PG&E completed 1878 EVM miles (p.7). If PGE had kept to its budget, EVM cost per circuit mile would have been $\$3,171M \times .24/(1878 \text{ circuit miles}) = \$405K/\text{circuit mile}$. But PG&E didn't keep to its budget.

CHART FIVE, NEXT PAGE

Figure 3.4b: PG&E resource allocation detail for top 4 categories by planned spend

Total plan spend is shown for 2020-2022 plan period as calculated by utility

Category	Total Category Planned Spend	Category spend as percent of total planned spend	Top 3 initiatives by planned spend in category Initiative names as reported in WMP	Initiative spend as percent of total planned spend
Grid design and system hardening	\$5.1B	53%	17-1. System Hardening, Distribution	17%
			15. Transmission tower maintenance and replacement	10%
			6. Distribution pole replacement and reinforcement, including with composite poles	7%
Vegetation management and inspections	\$2.6B	28%	15. Remediation of at-risk species-Enhanced Veg Mgt.	15%
			2. Detailed inspections of vegetation-Distribution	6%
			9. Other discretionary inspection of veg. around distribution lines and equipment, beyond those required by regulations	3%
Asset management of inspections	\$499M	5%	1. Detailed inspections of distribution electric lines/equip.	3%
			2. Detailed inspections of transmission electric lines/equip.	2%
			15-1 Substation inspections - Transmission Substation	0%
Grid operations and protocols	\$788M	8%	5-1. PSPS events and mitigation of PSPS impacts-Distribution	4%
			5-3. PSPS events and mitigation of PSPS impacts - Additional PSPS Mitigation Initiatives, Distribution	2%
			2. Crew-accompanying ignition prevention and suppression resources and services	1%

Note: "M" stands for millions, "B" stands for billions.

Source: Tables 21-30 of utility WMP

CHART 5 shows PG&E's vegetation planned spend is 28% of total spend for years 2020-2022. Grid design and system hardening is 53% of planned spend. This value is in light of what actually has been accomplished, which is deeply disturbing. For decades, PG&E has consistently specified vegetation management as solution to their problems. Hence, it fails the mandate to provide a SAFE and RELIABLE system. Instead, with a system of bare wires, antiquated age, and thousands of pole attachments and line splices which will necessarily fail, it spends millions annually removing healthy, mature trees at enormous cost and enormous environmental damage, for little benefit. It is certainly not an upgrade to a modern system.

Not only has PG&E's 53% hardening expense been equaled, it is woefully short of SCE's 70% projected spending and conductor replacement mileage in the same period. PG&E's monies allocated for 2000 miles in this period, have resulted in 370 miles of hardening with covered conductors in 2020, and even that low figure is debatable. The difference between what they claim in their rate case (2,000) and their actual (370), is systemic in their language in a multitude of documentation. **The percentage of cost for vegetation management by PG&E is 6 times that of SCE. In contrast, PG&E's percentage spending on system hardening is not only significantly less than the other large Investor Owned Utilities (IOU's), it fails to prioritize modernization of its system by replacing bare line conductors (with less than 400 miles planned yearly for replacement, almost half of SCE's projected mileage).**

Calculated Cost per Mile for Enhanced Vegetation Management and Enhanced Inspection

Note	Amounts	Reference found Online
1.	\$2645M	Total Vegetation Maintenance and inspection Figure 3.3a in 336461968.pdf
2.	\$229M	Routine VM (RVM) projected spend for full year 2020 in ELEC_5951-E.pdf
3.	\$319M	EVM (Enhanced Vegetation Management) full year in ELEC_5951-E.pdf
4.	\$416M	EVM spend by end of August 2020 in ELEC_5951-E.pdf
5.	\$494M	RVM spend by end of August 2020 in ELEC_5951-E.pdf
6.	1878	EVM miles completed by end of 2020 in 2021-Wildfire-Safety-Plan.pdf
7.	15%	Remediation of at-risk species EVM Figure 3.4b in 336461968.pdf
8.	6%	Detailed inspection of vegetation Figure 3.4b in 336461968.pdf
9.	\$1451M	Total Cost of VM by end of 2020 in 2021-Wildfire-Safety-Plan.pdf

$\$229M + \$319M = \$548M$ (Total projected spend for RVM and EVM 2020) [2][3]
 $\$548M \times 3 = \$1644M$ (Total cost for 3 year period for RVM and EVM 2020-2022)

$\$2645M - \$1644 = \$1001M$ (cost for 3 years of vegetation inspection, non-VM) [1]
 $\$1001M/3 = \$333M$ (spend per year for vegetation inspection)

$8/12 = .67$ (67, percent of months in the year-to-date, as of end of Aug. 2020)

$\$416M$ = Real cost reported for Enhanced Vegetation Management as of August 31 [4]
 $\$494M$ = Real cost reported for Routine Vegetation Management as of August 31 [5]

$\$416M/.67 = \$621M$ (new projected cost of EVM for whole year) [4]
 $\$494M/.67 = \$737M$ (new projected cost of RVM for whole year) [5]

$\$621M + \$737M = \$1358M$ (Total new projected cost for RVM and EVM as of December 31)
 $\$1358M/\$548M = 2.48$ (ratio of overspending for RVM and EVM)

$\$621M/\$1358M = .46$ (46 percent of projected cost for EVM)
 $\$737M/\$1358M = .54$ (54 percent of projected cost for RVM)

$\$1451M$ = Total VM as reported in 2021-Wildfire-Safety-Plan[9]
 1.068 = Ratio of estimated to reported VM ($\$1451M/\$1358M$)
 1878 = (EVM, Crews completed 1,878 miles in 2020)[6]

$6\%/15\% = .40$ (ratio of spend for inspection of EVM and EVM cost)[7][8]

$\$663M = 1.068 * \$621M$ (ratio of estimated to real, times estimated EVM)
 $\$265M = \$663M \times .40$ (calculated enhanced inspection spend as a percentage of EVM)

$\$663M + \$265M = \$928M$ (Total spend for EVM and enhanced inspection for 2020)

$\$928M/1878 \text{ miles} = \$494K/mile$ (spending per mile for EVM and enhanced inspection for 2020)

Conclusion from Charts

Vegetation Management (VM) costs 28% of the monies of PG&E's Wildfire Mitigation Plan (WMP). Vegetation Contact is responsible for 25% of ignitions, **75% of known causes of ignition are not addressed by PG&E's VM** (see Chart 1, p.2). On-going total vegetation management costs are an unnecessary waste of funds when bare line conductors are not replaced. PG&E has historically fought modernization.

Additional Documented Cost-Benefit Arguments

Excessive Vegetation Management (VM) Expenditures

From: https://www.pge.com/en_US/safety/electrical-safety/safety-initiatives/system-inspections.page

"In 2020, we plan to inspect more than 15,000 miles of electric lines, including all lines in Tier 3 areas and one-third of lines in Tier 2 areas. We inspect infrastructure in non-high fire-threat areas at least every five years.

PG&E's data is manipulated to confuse. Even so, it is obvious that its vegetation management costs are out of control. In *PG&E's Advice 5951-E, October 20, 2020* (to the CPUC), it admits to massive overspending for *total* vegetation management (VM). Its projected total for VM expenditures for 2020 was \$548M.

"The GRC Settlement Agreement, if approved, would adopt an expense amount of \$548M for Vegetation Management costs in 2020, including both Routine VM and EVM activities: Routine VM \$229M EVM \$319M = \$548M"

However, their Enhanced Vegetation Management (EVM) costs alone, *through August, 2020*, came to \$416M. Combined with the additional \$494M spent, in that time, for Routine Vegetation Management (RVM), the total spent far exceeds the projected costs for a year. EVM costs for a full year, at the same pace, would reach \$621M; RVM would reach \$737M. The grand total reaches \$1358M versus real reported \$1451M (see page 7). PG&E is spending two and a half times what was planned for 2020. **This equates to \$494K per mile for EVM for 1878 miles completed for the year.** Place that against Southern California Edison's (SCE) **cost for hardening a mile is \$428K for modernization with covered conductors (p.11).** Another important reason for covered conductors, it **reduces fire risk by at least 75% versus at most 35% for EVM.**

These figures strongly challenge PG&E's assertion that covered conductor installation is too expensive and costs over \$1,000,000/mile.

Here is where system hardening estimations comes into the calculations, changing EVM to RVM with up to a 5 year maintenance service cycle for covered conductors.

What the calculations show is that costs for System Hardening are less than for EVM and its associated, on-going costs alone. This is a revealing and remarkable cost analysis. The current cost-benefits are abysmal for Vegetation Management, only a 1.4% of their ignitions are mitigated per year (see p.3). For a one-time System Hardening \$428K/mile cost-benefits are superior in every way. Costs for System Hardening in Tiers 2 and 3, if accelerated, provide economies of scale for new installations, lead to significant reduction of on-going equipment maintenance costs, and major reductions in all Routine Vegetation Management costs, due to a far-stronger, modern, and a more resilient infrastructure. It also shows a benefit for the environment in saving more than 100 million trees which convert CO₂ to Oxygen, helping to mitigate Climate Change, along with fewer fires and a greener environment – as opposed to an EVM which is counter to California's Climate Change laws. The result of a faster deployment of System Hardening, is a safer system, fewer fires and greatly reduced year-after-year costs to rate-payers.

In addition, EVM never ends while failing to significantly reduce wildfire ignitions, leaving PG&E continuously vulnerable to increasing liability and forced usage of Public Safety Power Shutoffs (PSPS) with all its devastating economic impacts.

PG&E's Distorted Information

Importantly, determining these costs required the analysis of data that is not in PG&E's documentation. This is an example of PG&E's typical manipulation of data. The Wildfire Safety Division (WSD) points out in its comments on PG&E's 2019 WMP that there are many areas where PG&E's data is incomplete, conflated or otherwise manipulated. For example, "PG&E reported all inspection types together, providing no basis for comparison of PG&E to its peers by inspection type and making it difficult to determine the effectiveness of PG&E's various inspection types."⁴ This meant that it became very difficult to differentiate inspection of individual trees by arborists to determine trees for removal, vs inspection of circuit lines for defects or age and ready to fail – a crucial distinction.

Another paragraph states, "A continuing issue from 2019 that persists in 2020 WMPs is the extensive use of non-committal equivocating language. The prevalent use of equivocating language results in sparse commitment from utilities for achieving the intended goal of WMPs – reducing the risk of catastrophic wildfire posed by electrical lines and equipment."

And "In R.18-10-007, as noted above, the Commission directed the electrical corporations to use metrics that do not simply count trees trimmed or miles of covered conductor installed, but that measure **the effectiveness of these actions in mitigating utility-caused wildfire.**"

For PG&E, a 5% reduction of mitigated fires over a 4 year period is not demonstrating the reliability or trustworthiness of its documents and data.

SCE Sets the Standard

Southern California Edison (SCE) is replacing lines with superior covered conductor, with the approval of the CPUC, "the first large-scale deployment of covered conductor in California to harden the distribution system against extreme weather events and designed to reduce wildfire ignition events". Southern California Edison's projected cost for triple covered conductors is \$428K/mile. It is cheaper to harden their system which protects over 75% of their circuits from wildfires. Along with their normal vegetation management (no EVM), over 90% of sources of ignitions are addressed. (see p.11)

PG&E Fails to Respond to Emergency Nature of Increasing Wildfires

Touting a meager few hundred miles hardened, while counting on PSPS and massive expenditures on EVM to protect us from wildfire, PG&E's accomplishments don't hold up when the facts are known. PG&E's **Currents** article, "*PG&E Crews Meet the Challenge-- Hardening Infrastructure as They Rebuild in Areas Burned by Wildfires,*" posted on December 2, 2020, is a case in point: "To date, PG&E has completed over 370 miles of hardening work in the field this year – that's 370 miles of more resilient and fire-resistant distribution system."

That statement is not untrue but it is an empty boast. PG&E had set an extremely low goal for distribution cable replacement in its 2019 Wildfire Mitigation Plan (to last through 2021), resulting in a disturbingly minimal number of miles (370) upgraded in 2020, in face of the following facts:

- The number of overhead circuit miles, Figure 1.2a (from WSD Report on 2019 WMP) is 25,921 miles of distribution line in high fire threat areas.
- Add transmission lines of 5,448 miles to make 31,369 circuit miles. Much of these, and their related equipment and poles/support structures are antiquated and severely degraded.
- In "<https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M272/K342/272342923.PDF>" 2,713 miles of those distribution lines are obsolete bare 6-gauge copper line, critically in need of replacement due to severe deterioration and age. PG&E gives no indication of where the replacements will be installed, nor with what type of cable will be used (i.e. tree wire vs the far superior SCE, cost-benefit-assessed, steel core/triple insulated conductor.).
- In its current 2020-2022 General Rate Case argument, PG&E promises mitigation through Smart Meters software

⁴ Resolution WSD-003 WSD/CTJ/gp2 DRAFT

that will “detect downed wires within minutes.” However, SmartMeters data won’t show if the wires are arcing or broken, and therefore a wildfire ignition point, requiring on-site investigation to determine any hazard and taking unknown minutes to respond. The time taken to respond and inspect the site will allow damaged wires to ignite and cause a fire.

- However, with readily available, well tested, off-the-shelf ready computerized circuit breakers, such as arc fault interrupters, that cut the power within a second or so, the danger is eliminated quickly – no matter the cause, whether branch or balloon, vehicle or animal, wind or vandalism. It can even give the precise location to PG&E so it will take far less time to repair.

PG&E’s Slow-moving Infrastructure Improvements

PG&E’s failure in planning and prioritizing decision-making is evident in this statement of its *2020-General-Rate-Case-Fact-Sheet-121218.pdf*, p.1: “**Hardening Wires and Poles:** Installing stronger and more resilient poles and covered power lines across 2,000 miles of high fire-risk areas.” PG&E obviously wants the CPUC to be impressed by this inadequate number.

Significantly, that 2,000 miles of hardening will take place over three years, while there is a total of 25,921 miles of distribution lines in high-fire threat areas. After 2020, the first year with the increased Rate Case income, PG&E touted replacing 370 miles. (Only about 25,551 miles to go.) In previous documents, PG&E claimed that there are only 7,100 miles of wire that needs hardening and it would take ten years. Later, PG&E stated that there were 2,713 of obsolete bare #6 copper wire conductor in Tier 2 and 3 High Fire-Threat areas. This is out of a total of 22,000 miles of bare #6 copper wire system-wide as presented in CPUC’s *Study of Risk Assessment* by Liberty Consulting, 2013). At 2,000 miles in three years, it will be almost a decade to replace that bare copper wire alone, based on PG&E’s own information. There are many other unsafe wire types requiring replacement but there is no way to tell what wires PG&E will focus on, nor where, nor how much.

Without major changes in priorities, it will take far more money to “protect” degraded wires over time, by cutting down trees, than replacing the wires would cost. This does not account for the reduction of Routine Vegetation trimming (the 4-foot radial trim requirement) when it is reduced to a 6-inch radial trim with such covered conductor.

See SCE approach to system hardening in pages 3, and next page 11.

From: “SCE 2021 WMP Update.pdf”

“SCE has already seen real-world success from covered conductor. For example, when a vehicle hit a pole and caused energized 16kV covered conductor to fall into adjacent trees, no fault or ignition occurred.”

We also learned some success stories of covered conductor that prevented wildfire ignitions from United Power in Colorado, From: “Feb. 27th Workshop SCE Covered Conductor Presentation.pdf”

“United Power has experienced wildfires in years past in the forested area, typically in high elevation of Colorado. To mitigate this issue, United Power installed covered conductor on spacer configuration due to compact right-of-way. United Power received a notification from the forest services tree fall on line after a wind storm on Fall 2018. United responded to the site and removed the tree, found the covered conductor intact, with no interruption or wildfire ignition. The manager at United Power reflected that this wind storm event would have resulted in a wire down event, and possibly a wildfire ignition if the tree fell on bare conductor span.”

Southern California Edison (SCE) is replacing lines with superior covered conductor, with the approval of the CPUC, “the first large-scale deployment of covered conductor in California to harden their distribution system against extreme weather events and designed to reduce wildfire ignition events,” as this article explains:

CPUC Ok's the Largest Rollout of Covered Conductor

Modern Insulated Lines More Effective Than Traditional Tree Wire Proponents Say

By Hudson Sangree

April 21, 2020

RTO Insider

The California Public Utilities Commission on Thursday approved Southern California Edison's ambitious plan to install nearly 600 miles of covered conductor to prevent its higher-voltage distribution lines from starting wildfires. The move comes after devastating utility-sparked fires swept Northern and Southern California in 2017 and 2018, causing the state and utilities to rethink prevention efforts.

Covered conductor, with layers of insulation to protect it from sparking vegetation, is one of the main tools that utilities plan to use in fire-prone areas.

SCE's Wildfire Covered Conductor Program would replace bare wires with insulated ones across a sizable slice of its service territory. This is the first large-scale deployment of covered conductor in California to harden the distribution system against extreme weather events and designed to reduce wildfire ignition events.

Administrative Law Judge Robert Haga wrote in a proposed decision that the commission adopted unanimously, without discussion as one of the items on its consent agenda. In its ruling, the commission accepted a settlement between its Public Advocate's Office consumer groups and SCE, granting the utility more than \$407 million for its Grid Safety and Resiliency Program, including nearly \$285 million to install 592 circuit miles of covered conductor representing about 6% of SCE's primary distribution lines (typically rated at 12 to 16 kV) in high-risk fire areas.

SCE estimated a cost of \$428,000 per circuit mile, including replacing wooden poles with stronger composite ones and installing fiberglass crossarms as needed.

High-voltage transmission lines have been blamed for sparking some of the worst fires in recent years, including the 2018 Camp Fire, the state's deadliest and most-destructive blaze. A Pacific Gas and Electric line fell from a broken C-hook, igniting dry vegetation, state fire investigators found.

Distribution lines have been less prone to starting major fires. But SCE said that from 2015 to 2017, its distribution lines in high-risk regions sparked at least 132 fires large enough to report to the CPUC. The utility said 22 of the fires were started by lines contacting vegetation, more than any other identifiable cause. "All else [being] equal, there was a relatively greater likelihood that a vegetation-related fault was ultimately associated with a fire event" SCE said in *written testimony* to the CPUC in September 2018 that urged it to approve rate increases to fund its fire-prevention efforts, including covered conductor.

SCE said the covered conductor now used is a big improvement over traditional tree wire that had one layer of low-density polyethylene insulation. Today's wire, the new standard, has three layers, an outer coating of high-density polyethylene, an inner wrapping of cross-link polyethylene, and a semi-conducting sleeve wrapped around aluminum or copper wires. The old covered conductor was heavy, required careful handling to avoid damage, and reduced load capacity because it heated up without the cooling properties of bare wire. It also was subject to degradation from the sun's ultraviolet rays. SCE said.

The new insulated conductor is lighter but still weighs more than bare wire. It catches the wind because of its added bulk and needs stronger poles and cross arms. It also takes longer to install, said Brian Wilbur, electrical service manager with the Los Angeles Department of Water and Power. Wilbur made his case in a separate meeting Wednesday of the CPUC's Wildfire Safety Advisory Board, a group created last year to advise the commission's new Wildfire Safety Division.

Wilbur said LADWP is using covered conductor in high fire-risk areas. "Covered conductors or tree wire is certainly nothing new to the industry," Wilbur said. "But the advancement of the technology used today has made tree wire a

viable solution in a lot of areas. The old tree wire that we used — that we've had in the systems for a long time — was heavy, required more robust construction techniques, had reduced loading capabilities and was very difficult to work with. Today's tree wire is essentially a stronger construction material, and a lighter installation available on these conductors is becoming a great solution where other mitigating measures are not possible."

"Covered conductor is being used with along with vegetation management, composite poles, fiberglass crossarms and other measures", he told the board. "The conductor adds an additional layer of safety." he said. "One of the major things that we learned from the past wildfires is that even the most thorough vegetation management plan may not prevent branches from being blown into lines from an untrimmed palm tree on private property 50 feet away from our lines", Wilbur said. "They can still dislodge, blow long distances and wreak havoc on our system." **"Covered conductors and resilient construction materials are critical in the high-fire-threat area ..."** prevent these hazards" he said.

End-of -article.

Prepared Testimony in Support of Southern California Edison Company's Application for Approval of Its Grid Safety and Resiliency Program – Annotated (September 10, 2018, p. 35)

"Given the significance of contact from objects as a cause of fire ignitions, SCE evaluated a number of potential risk mitigation measures focused on: (1) reducing the population of potential objects (i.e., reducing tree branches, metallic balloons, animals, etc. near overhead lines); and (2) **designing the system to be able to withstand such contact without leading to a fire ignition**. Regarding the first approach, enhanced vegetation management practices can further reduce the likelihood that vegetation will contact overhead distribution system by increasing clearances and removing even more trees. **But this approach has limitations, including the utility's limited ability to increase clearances in certain areas, the fact that wind can often blow debris into lines from significant distances despite appropriate clearances to nearby trees, and that taller trees can fall onto lines even when located well outside of the utility's right of way.** Thus, **SCE also evaluated mitigation measures focused on the second approach (withstanding contact), concluding that covered conductor is the most feasible mitigation solution for fault and ignition prevention."**

Respectfully submitted,

Paul Norcutt, Santa Cruz County; Senior Systems Programmer, retired; Recipient 2019 Hammer-Marcum Award.

Nancy B. Macy, Santa Cruz County; M.A.T.; Chair, Valley Women's Club's Environmental Committee for the San Lorenzo Valley; Director SLV Redemption/Recycling Centers and College Professor, retired; founding President, Valley Women's Club of SLV.

Kevin Collins, Santa Cruz County; B.A. Political Science, CA Licensed General Building Contractor; Author/Complainant CPUC Adjudicatory Complaint, C.18-09-011 filed 9-17-18; Co-founder, Lompico Watershed Conservancy.

Dan Courtney, Tuolumne County; Trustee, The Jacqueline Courtney Trust; Landowner.

Jodi Frediani, Santa Cruz County; Wildlife Photographer; Environmental Consultant and Sierra Club Consultant, retired; Executive Director-Central Coast Forest Watch, retired.

Robin McCollum, Butte County; Certified ISA Arborist and Urban Forester; Wildland Firefighter; Chair of Chico Tree Advocates; Butte County Public Works Tree Crew Supervisor, retired.

Julie Wuest, Santa Cruz County; Board Member, Valley Women's Club of San Lorenzo Valley; Member, VWC Environmental Committee for SLV

Jennifer Gomez, Santa Cruz County; Board Member, Valley Women's Club of San Lorenzo Valley; Member, VWC Environmental Committee; Member, Santa Cruz County Fish and Wildlife Commission.

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Jeanne Wetzel Chinn, Mendocino County; M.S. Environmental Management; Chair, Ukiah's Western Hills Fire Safe Council; CA Department of Fish and Wildlife, retired; former Board Member and Chair, Conservation Affairs Committee-Bay Area Chapter-The Wildlife Society.