BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018).	Rulemaking 18-10-007

PUBLIC ADVOCATES OFFICE
COMMENTS ON THE WILDFIRE MITIGATION PLANS

SUPPORTING ATTACHMENTS

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Risk and Safety Aspects of Risk Assessment and Mitigation Phase Report of Pacific Gas & Electric Company Investigation 17-11-003

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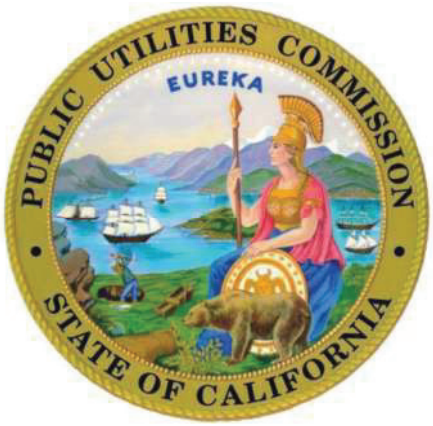


March 30, 2018

PG&E presented documentation for recorded costs for all existing controls, but to thoroughly apply this step to the evaluation, detailed cost estimation projections and the methodologies to arrive at those cost projections would have to be examined. For this RAMP, SED did not review the reasonableness of the projected costs or the methodologies to arrive at those projected costs.

Evaluation Result: SED did not evaluate the reasonableness of the cost estimates. For future RAMPs and GRCs, PG&E should explore optimization techniques to allocate the mitigation spending across the different risks.

8. **Adjust the set of selected RCMs based on real-world constraints such as availability of qualified people to perform the necessary work**

To fully satisfy this step, PG&E's RAMP would need to identify constraints used to justify the scope, pace, or mix of risk control measures. Although PG&E's RAMP provided very detailed description of the individual risks, controls, and mitigations, there is a notable absence of any detailed discussion of constraints in limiting or altering the scope, pace, or mix of risk control measures. Such descriptions are vital in providing a full justification of the proposed mitigations.

Evaluation Result: PG&E should provide full descriptions of how and what real-world constraints were considered in influencing the final selection of risk mitigation proposals.

9. **Steps 9 and 10**

The remaining steps 9 and 10 in the Cycla 10-step framework are not sufficiently applicable until the actual GRC application is filed and the decision in the GRC has been rendered.

1.3 PG&E's Approach and Risk Model Overview

PG&E provides a good primer on its approach for this RAMP in the Chapters A – Introduction and Chapter B – Risk Model Overview. Therefore, to avoid needless duplication, refer to PG&E's Chapter A and B.

1.4 Overall Assessment

Based on the overall level of maturity of the RAMP filing process, and the fact that only one RAMP has been filed previously, the PG&E RAMP filing provides several improvements and evolutionary steps. Nonetheless, there are aspects that may be improved to advance the RAMP from a required exercise to a tool valued by intervenors and parties for assessing whether the utility is focused its resources appropriately on safety issues and concerns.

Because Staff at this time does not know the parameters of a potential settlement of modelling issues being negotiated by Parties to the S-MAP cases, it is uncerain whether PG&E's particular approach will undergo minor or extensive changes as a result. In any event, refinement of RAMP guidance may well be a component of a future S-MAP application cycle (in 2019).

SED has determined in its evaluation of this RAMP filing that PG&E has largely met the requirements spelled out in the I.17-11-003, D.14-12-025, and D.16-08-018. PG&E's RAMP filing is reasonably complete and comprehensive but lacks in details that are necessary to fully evaluate the assertions and results of its RAMP filing and modeling process.

SED determined that, for the most part, PG&E has assessed its key safety risks, prioritized them, identified and considered alternative mitigations, and there do not appear to be any significant gaps in identifying risks and mitigation options.

In general, the RAMP filing was organized in a consistent fashion, which made for easy to follow chapters, but had a tendency to over-generalize the specifics at times. Each chapter included an executive summary, a tableau outlining the Risk Name, In Scope, Out of Scope, and Data Quantification Sources, which provided a short hand snapshot of the risk and provided the context for each risk, its breath and depth, as well as the potential consequence of failure.

PG&E's use of the bow tie method shows graphically the interrelationship and the relative importance of risk drivers, failure events, and outcomes. The distribution parameters are inputs and outcomes are outputs.[16] For the majority of the risks drivers identified, the utility offered a complete – if sometimes cursory– narrative describing their various risks and drivers, and included the required elements of the RAMP.

Another potentially useful addition to the bow tie is PG&E's identification of "Exposure" which is a way to define the relevant domain of assets (and data sources) affected by the risk event and drivers. An example would be, for Risk 1 -Transmission Pipeline Rupture with Ignition, the 6,500 miles of transmission pipe on PG&E's system. Exposure can also be expressed as a business function, such as company data systems for the 18 - Cyber risk analysis bow tie. In a cross-cutting risk, such as 22 - Climate Resiliance, the exposure is defined by 11 other risks that both inform the Climate analysis and/or are magnified by expected Climate Change.

Although the concept underlying Exposure identification is worthwhile for defining the realm of analysis and data, in this first impression, it is not consistently used, and should be vetted further.

In general, each chapter provided clear descriptions of the risk scenarios, and they provided a reasonable basis for understanding the intent of the mitigations and how they might be able to reduce the impact or frequency of the incidents. Yet for several mitigations, there needs to be more effort in showing the correlation between the risk and the mitigations proposed.

A major issue is the extent to which the assessment of event likelihood is based upon PG&E's own data, use of industry-wide statistics, or – when quantification is lacking – mostly subjective assessments. PG&E has made a major effort to employ better quantification, where available, and to identify the sources of data used, but this aspect of the assessment is not fully transparent.

[16] The drivers were arranged alphabetic order, however, to help better assess the most significant drivers they should be arranged in descending order of significance.

A general observation is that risk areas that have greater available data seem to provide a far more solid basis for evaluating the proposed mitigations.

Multi-Attribute Risk Score (MARS):

The following list organizes PG&E's Chapter risks in order of MARS TA Rank:

Table 1 - PG&E Multi-Attribute Risk Score and Risk Rank

Chapter #	Risk prefix	Risk Name	MARS-TA-Overall Average-Total	MARS-TA-Overall Average-Total-RANK
9	DIST	Distribution OH conductor	824.35	1
22	CR*	Climate resilience	665.33	2
2	GSO	Maintaining system capacity (GSO)	325.34	3
15	EMPSAFE	Employee Safety	263.01	4
11	WILD	Wildfire	257.58	5
19	INSIDER	Insider Threat	233.79	6
10	TRANS	Transmission OH conductor	227.50	7
16	MVS	Motor Vehicle Safety	214.30	8
7	DMS	Distribution - Non-cross bore	188.84	9
14	CONSAFE	Contractor Safety	181.48	10
18	CYB	Cyber attack	107.75	11
13	HYD	Hydro dam failure	100.89	12
17	FFD	Fitness for Duty	50.43	13
6	CPFAC	Compression & Processing facility	39.86	14
1	GAS	Transmission pipeline	37.62	15
5	DMSCB	Distribution - Cross bore	28.46	16
20	ERIM	ERIM	19.81	17
4	MCFAC	Measurement & Control facility	17.49	18
8	STO	Storage - Wells	12.68	19
3	MCDS	Measurement & Control downstream	12.07	20
12	NUC	Nuclear core damage	6.65	21
21	SQWF	Skilled and qualified	4.96	22

These overall total scores do not necessarily correlate to the safety score for each of these risks. In order to determine how they rank according the safety risk one must further sort on either of the two components of the safety scores (injuries and fatalities). Because the fatality and injury scores are Normalized, Weighted and Scaled these scores do not represent the TA in "Natural Units" derived from the model. The Safety Injury TA Overall Average values are components of the total TA Overall Average MARS. For example, in *Chapter 15 Employee Safety*, the model calculated a Natural Unit (NU) TA Overall Average Safety Injury value of 702.9 and Fatality value of 2.393, which represents the worst-case numbers for injuries and fatalities for the TA

using their 10,000 Monte Carlo simulations. After normalizing, weighting, and scaling the NU-TA Overall Average Safety Injury value becomes MARS-TA of 191.89 and the MARS-TA Fatality value becomes 65.26 for a MARS-TA total of 257.15, which is used to develop the MARS and RSE.[17]

The following table shows how the Natural Units Overall Safety values for injuries and fatalities can change due to normalizing, weighting and scaling to develop the MARS Overall Average Safety Total used in the MARS and RSE outputs.

Table 2 – Chapter Risk NU-TA Safety Value, MARS Safety Totals and Rank by MARS and MARS Rank

		Natural Units		Normalized, Weighted and Scaled		MARS RANK	
Chapter #	Risk Name	NU-TA-Overall Average-Safety_Injury	NU-TA-Overall Average-Safety_Fatality	MARS-TA-Overall Average-Safety-Total	MARS-TA-Overall Average-Safety-Total-RANK	MARS-TA-Overall Average-Total	MARS-TA-Overall Average-Total-RANK
9	Distribution OH conductor	11.112	7.073	195.92	2	824.35	1
22	Climate resilience	128.105	3.125	120.19	5	665.33	2
2	Maintaining system capacity (GSO)	0.730	0.252	7.08	12	325.34	3
15	Employee Safety	702.887	2.393	257.15	1	263.01	4
11	Wildfire	5.889	1.780	50.14	8	257.58	5
19	Insider Threat	4.443	0.099	3.91	19	233.79	6
10	Transmission OH conductor	2.971	2.971	81.84	6	227.50	7
16	Motor Vehicle Safety	41.897	4.583	136.41	4	214.30	8
7	Distribution - Non-cross bore	7.324	2.858	79.92	7	188.84	9
14	Contractor Safety	190.224	4.751	181.48	3	181.48	10
18	Cyber attack	0.765	0.038	1.25	21	107.75	11
13	Hydro dam failure	2.374	1.252	34.79	9	100.89	12
17	Fitness for Duty	5.031	1.167	33.19	10	50.43	13
6	Compression & Processing facility	0.128	0.250	6.85	13	39.86	14
1	Transmission pipeline	1.056	0.218	6.22	15	37.62	15
5	Distribution - Cross bore	1.134	0.235	6.72	14	28.46	16
20	ERIM	9.546	0.080	4.78	17	19.81	17
4	Measurement & Control facility	0.184	0.219	6.02	16	17.49	18
8	Storage - Wells	0.173	0.298	8.18	11	12.68	19
3	Measurement & Control downstrea	0.658	0.157	4.47	18	12.07	20
12	Nuclear core damage	0.000	0.000	0.00	22	6.65	21
21	Skilled and qualified	0.141	0.052	1.45	20	4.96	22

Table 2 is included to show the complexity of the model affects the MARS score used for ranking risks and they do not always reflect the MARS Safety ranking. Note that Nuclear Core Damage risk has no injuries or fatalities risk and that its MARS is comprised of environmental, trust and financial MARS values. The reason for Nuclear's small MARS overall score is due to the very small frequency of occurrence value assigned to the model.

[17] NU-TA Injury score of 702.89 times 1/1000 (Normalize) time 0.02727 (Injury weighting) times 10,000 (Scaling Factor) = 191.89 MARS TA Injury total. Adding the MARS TA Overall Average Fatality value of 65.26 that becomes the cumulative MARS TA Overall Average Safety Total of 257.15.

The review of the model and how it works was provided in the workshop, but as Staff found during the review process the model is very detailed and complex.

The initial impressions of the model are that it is appears to provide a framework that consistently calculates the Expected Values, Tail Averages and Risk Reductions. The weakness of the model is the extensive reliance on SME inputs that are unexplained, unchallenged and unsupported. Therefore, further evaluation of the model in S-MAP will give parties more opportunity to ask questions and offer observations.

Financial, Execution and Affordability Constraints:

In some RAMP chapters the financial, execution feasibility, and other constraints were discussed; however, in the larger context of affordability impacts and utility financial constraints, the discussion only scratched the surface. Although the original intent of RAMP and S-MAP, as expressed in D.14-12-025, was to focus solely on Safety risks, it is clear that to do so would neglect very important inter-relationships, such as that of Safety and Reliability, or the economic consequences of Safety lapses. PG&E's use of the multiattribute scoring, via MARS, will serve for this cycle as a way to incorporate and illustrate those relationships for individual risks. However, this does not address the larger concern of how to effect a total risk reduction portfolio in relationship to other, possibly conflicting state policies, or how to accommodate large incremental expenditures for safety without breaking the bank.

The best place to elucidate, discuss and evaluate affordability and financial constraints would be in the subsequent GRC filing where the safety risks can be holistically reviewed within the context of the entire utility's GRC.

Stand-alone and Cross-cutting Model:

SED appreciates PG&E's efforts to develop and illustrate their model for calculating the MARS and RSE. The model incorporates probabilistic calculations for the first time in a RAMP filing and suggests that PG&E devote further efforts to explain how it works within the S-MAP.

PG&E provided a review of the model and how it works in a workshop following the issuance of the RAMP, however, even with a subsequent review with PG&E model experts Staff still found the model to be very detailed, complex and difficult to follow.

The initial impressions of the model are that it works as intended and provides a framework to consistently calculate the Expected Values, Tail Averages and Risk Reductions.

The weakness of the model is the extensive reliance on SME inputs that are unexplained, unchallenged and unsupported. Therefore, further evaluation of the model in S-MAP will give parties more opportunity to ask questions and offer observations.

2019 Wildfire Safety Plan Overview

Sumeet Singh
Vice President, Community Wildfire Safety Program

Together, Building a Better California

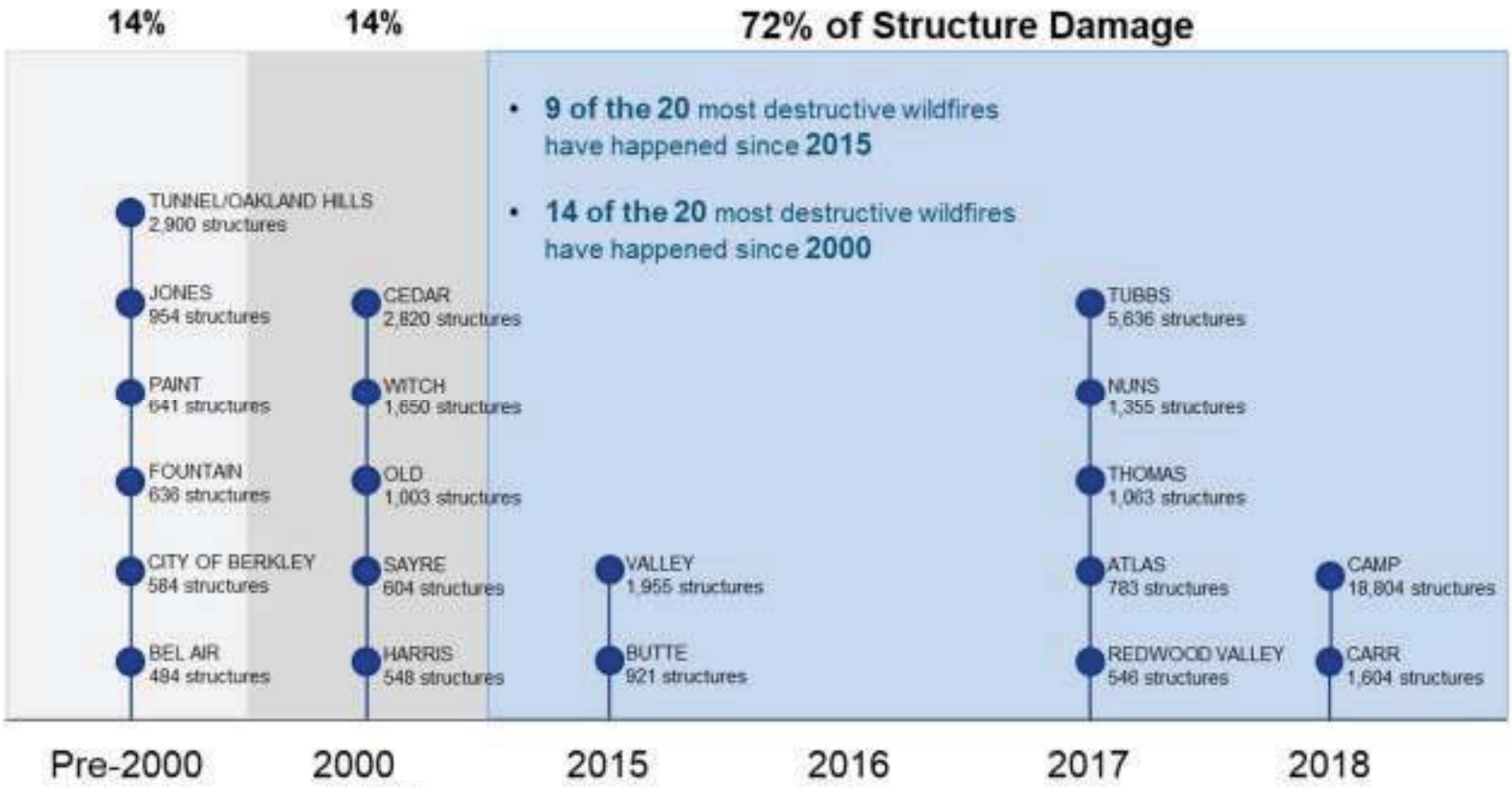
Agenda

- Wildfire Risk Background
- PG&E Specific Risk Drivers
- Wildfire Safety Plan Overview
- Wildfire Safety Plan Cost Estimates
- Targets And Indicators

Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Risk Background

Wildfire risks in California have increased significantly*



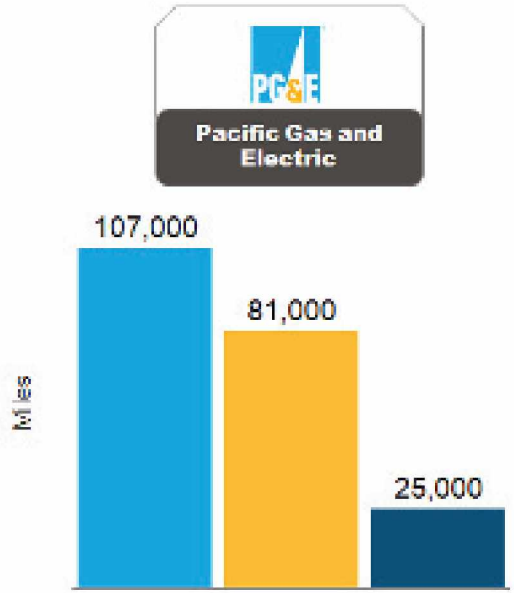
*Includes fires outside of PG&E service territory

Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

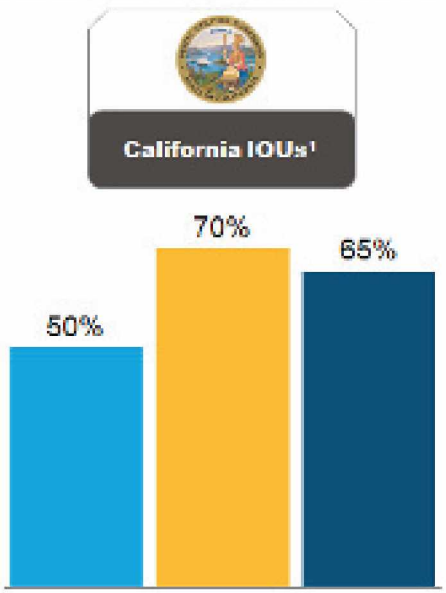
Wildfire Risk Background

Distribution Circuit Miles

PG&E SERVICE TERRITORY



PG&E % SHARE OF CALIFORNIA IOU DISTRIBUTION CIRCUIT MILES



KEY

- Primary distribution circuit miles
- Overhead distribution circuit miles
- Overhead distribution circuit miles in High Fire Threat Areas

OBSERVATIONS

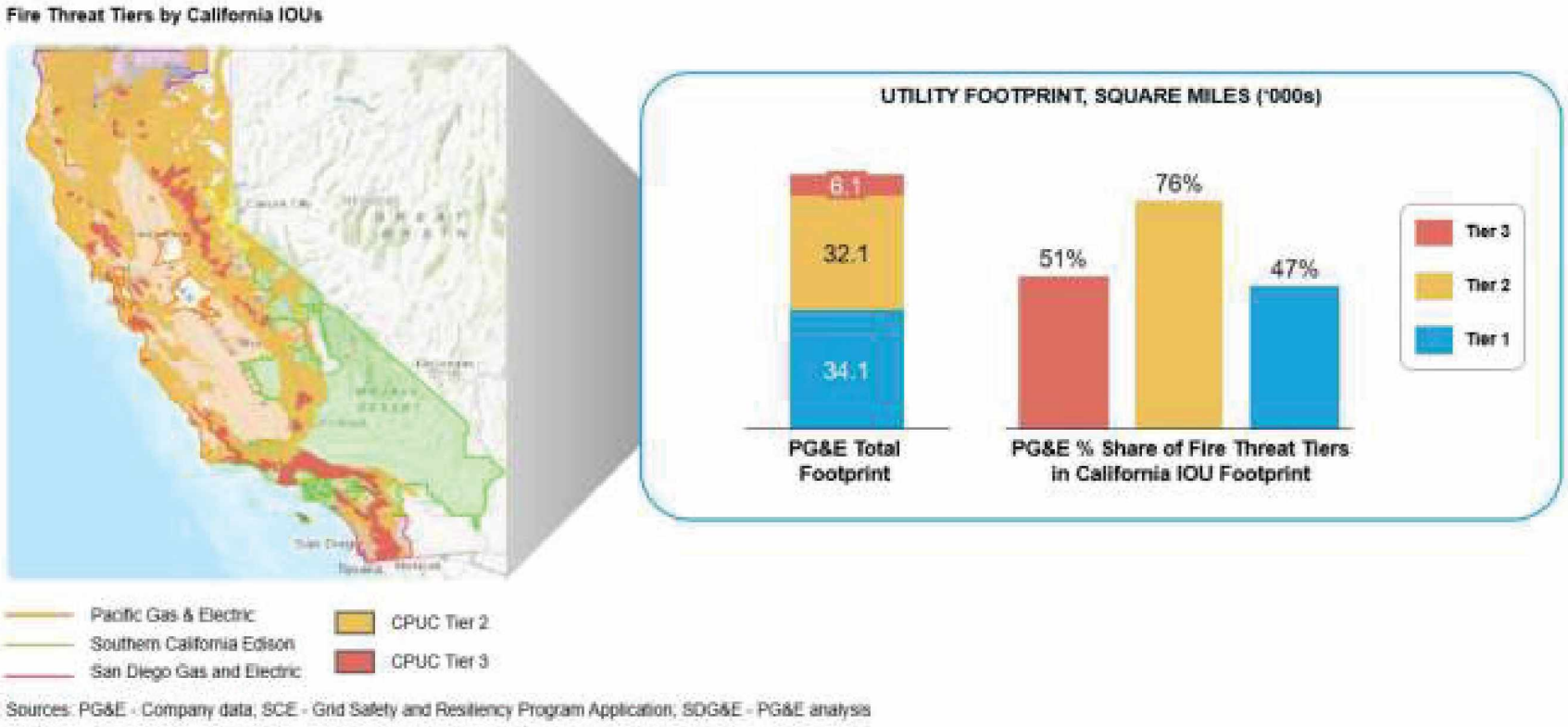
- PG&E has the largest population of overhead conductors in fire threat areas

Note: (1) California IOUs is comprised of PG&E, SCE, and SDG&E. PG&E Fire Threat Area mileage is defined as HFTD Tier 3, 2, and Zone 1. SCE Fire Threat Area is defined as High Fire Risk Area (HFRA), which contains Tier 3 and Tier 2 areas and additional areas selected by SCE. SDG&E Fire Threat Area is defined as Fire Threat Zone as established in its 2016 RAMP Filing
Sources: PG&E: RAMP Filing 2017, company data; SCE: Grid Safety and Resiliency Program, September 2018; SDG&E: RAMP Filing 2016

Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Risk Background

Wildfire Risks in PG&E's Service Area

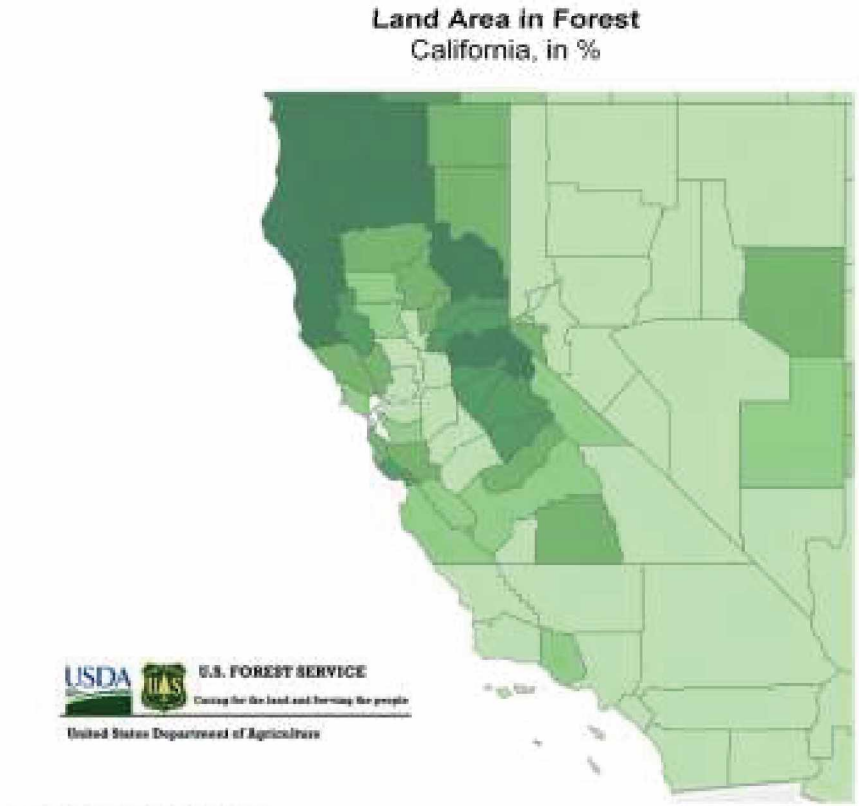


Sources: PG&E - Company data; SCE - Grid Safety and Resiliency Program Application; SDG&E - PG&E analysis

Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Risk Background

PG&E faces significant wildfire challenges due to the size and geography of its service area.



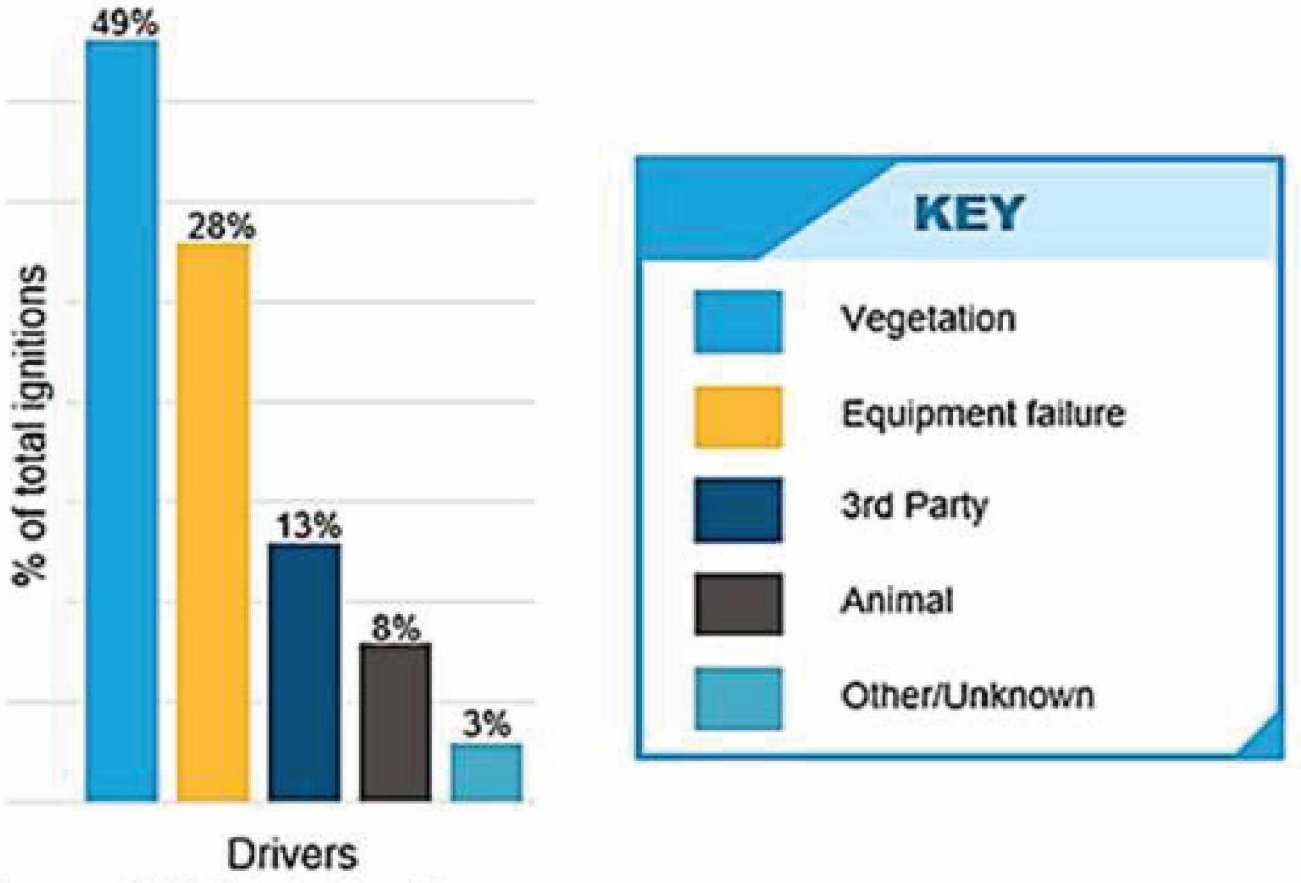
Observations

- Majority of the high-density forest area lies in the northern region of California
- Forest density of PG&E service territory is significantly greater than other California IOUs

Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

PG&E Specific Risk Drivers

2015-2017 Fire Incident Drivers for PG&E's Tiers 2 and 3, and Tier 1/Zone 1



Source: CPUC Fire Incident Data

* Equipment failure includes: conductor, conductor/hardware, fuse operation and other

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Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Safety Plan Overview

PG&E's **Community Wildfire Safety Program (CWSP)** manages, directs, and oversees the development, implementation, and refinement of the WSP programs.

Correlation of Programs to Ignition Drivers

Section	Program	Vegetation (49%)	Equipment Failure (28%)	Third Party (13%)	Animal (8%)	Other/ Unknown (3%)
4.1	Operational Practices	X	X	X	X	
4.2	Wildfire Safety Inspection Programs		X	X	X	
4.3	System Hardening	X	X	X	X	X
4.4	Enhanced Vegetation Management	X				
4.5	Enhanced Situational Awareness and Known Local Conditions	Enabler to Operational Practices and PSPS Program				
4.6	PSPS Program	X	X			
4.7	Alternative Technologies	Enabler for System Hardening				

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Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Safety Plan Overview[1]

Wildfire Reduction Measure	2018 (Approx.)	2019 (Approx.)	Percentage/ Capacity Increase (Approx.)	2019 Planned Work Completion by June[2]
Vegetation Management[3]	160,000 trees worked	375,000 trees worked	235%	42%
	760 miles of fuel reduction, overhang clearing, or Enhanced Vegetation Management (EVM)	2,450 miles of EVM	320%	40%
Inspections - Distribution	517,500 distribution poles for routine inspections	685,000 distribution poles in High Fire Threat District (HFTD) areas with enhanced inspections in five months in addition to routine inspections	130% -400% (excluding substations)	100%
Inspections - Transmission	9,400 transmission structures with enhanced inspections; 76,000 routine inspections of transmission structures	40,600 transmission structures in HFTD areas with enhanced inspections[4] in four months in addition to routine inspections		100%
Inspections - Substations	960 monthly routine inspections	200 enhanced risk-based inspections in HFTD areas in four months in addition to routine, monthly inspections		100%

1) Numbers in Table 1 are approximated for purposes of presentation in this table.
2) Completion dates are current estimates and may change depending on external factors such as the availability of equipment and qualified personnel, including third-party vendors and suppliers, as well potential legal or regulatory challenges to tree removal, vegetation management, and system hardening.
3) Includes trees removed under PG&E's Drought and Tree Mortality work vegetation management (CEMA) work, accelerated wildfire risk reduction vegetation management (AWRR), and EVM for 2018 and CEMA and EVM for 2019.
4) Including drone and helicopter inspections and climbing of all transmission towers.

Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Safety Plan Overview

Wildfire Reduction Measure	2018 (Approx.)	2019 (Approx.)	Percentage/ Capacity Increase (Approx.)	2019 Planned Work Completion by June
System Hardening[5]	17 circuit miles-tree wire projects	150 circuit miles	880%	30%
Situational Awareness	200 weather stations	400 additional weather stations	200%	50%
	9 cameras	70 additional cameras	780%	42%
	N/A	Developing fire spread model capabilities – Phase 1[6]	N/A	100%
Resilience Zones	N/A	At least 1 resilience zone operationalized	N/A	N/A
PSPS	7,100 distribution circuit miles in Program (Tier 3 HFTD areas)	25,200 distribution circuit miles in Program (Tier 2 and Tier 3 HFTD areas)	355%	100%
	370 circuit miles of transmission lines at 70 kilovolt (kV) and below	5,500 circuit miles of transmission lines at 500kV and below	1,485%	100%
	570,000 electric customer premises potentially impacted by PSPS events	5.4 million electric customer premises potentially impacted by PSPS events	950%	100%[7]

5) With the exception of light-duty steel poles, the System Hardening work will be performed for distribution.
6) Phase 1 includes modeling asset fire spread risks for overhead lines in Tier 2 and Tier 3. Later phases include more granular analysis and refined outputs.
7) All 5.4 million electric customer premises to be notified of the potential for PSPS impacts by June 2019.

Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Safety Plan Cost Estimates

The proposed 2019 Wildfire Safety Plan is estimated to cost between $1.7B to $2.3B, but actual costs will depend on a variety of factors

Wildfire Reduction Measure	2019 Capital Estimates ($M)	2019 Expense Estimates ($M)	2019 Cost Total ($M)	2019 Cost Breakdown
Operational Practices	8.3	14.7	23	Other (part of ~7%)
Inspections (in addition to routine inspections)	504 - 1,025	294-371	798 – 1,396	~57%
System Hardening	324.6	0.3	324.9	~16%
Vegetation Management	0	430.2 - 433.2	430.2 – 433.2	~20%
Situational Awareness	8.9	23	31.9	Other (part of ~7%)
PSPS Program	15.8	16.5	32.3	Other (part of ~7%)
Alternative Technologies	2.1	7.2	9.3	Other (part of ~7%)
Support (IT, PMO)	16.5-33.5	21-26	37.5 – 59.5	N/A
Totals	**~900 – ~1,400**	**~800 – ~900**	**~1,700 – ~2,300**	**100%**

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Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Targets and Indicators

A **target** is a specific goal that addresses either the work executed to reduce risk and/or the quality of the work executed.

An **indicator** is used to identify and track a trend resulting from performance of the Plan programs.

Program	2019 Target	2019 Indicator
Operational	SCADA enable ~285 reclosers in the Tier 2 and Tier 3 HFTD areas	N/A
Inspection	Inspect ~ 685,000 distribution poles, 50,000 transmission structures*, and 200 substations within the HFTD areas.	N/A
System Hardening	~150 circuit miles of system hardening work completed	• The number of wires down events within HFTD areas, when the FPI is rated as very-high or higher, will be trended year-over-year. • The number of equipment caused ignitions within HFTD areas will be trended year-over-year.
Vegetation Management	• ~2,450 circuit miles of EVM work completed in HFTD areas • Complete 100% of Drought and Tree Mortality CEMA Patrols by the end of 2019. • Removing or working all identified dead or dying trees by the Patrol ("CEMA trees")	• The number of vegetation caused outages within HFTD areas, when the FPI is rated as very-high or higher, will be trended year over year. • The number of vegetation caused ignitions within HFTD areas will be trended year over year.
Situational Awareness	• Install ~400 additional weather stations • Install ~70 additional high-definition cameras	N/A

*Inclusive of 9,400 inspections completed in December 2018

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Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans
Rulemaking 18-10-007
Data Response

PG&E Data Request No.:	CalAdvocates_002-Q04		
PG&E File Name:	WildfireMitigationPlans_DR_CalAdvocates_002-Q04		
Request Date:	February 8, 2019	Requester DR No.:	002
Date Sent:	February 22, 2019	Requesting Party:	Public Advocates Office
PG&E Witness:	Larry King	Requester:	Shelby Chase/ Charlyn Hook David Lievanos/ Nathaniel Skinner/ Nils Stannik/

QUESTION 04

On page 54 of its Wildfire Mitigation Plan, PG&E states that it "is working to improve its GIS data." Please describe PG&E's plans for improving GIS, including the need, process, expected timeline, and expected results.

ANSWER 04

Some of PG&E's current plans for improving GIS, including the need, process, expected timeline, and expected results are summarized below.

First, PG&E intends to ensure that critical electric distribution assets are recorded in GIS with accurate crucial data characteristics. Specifically, it will leverage wildfire safety inspection and routine inspections to work towards correcting asset data attributes that are inconsistent with the field. Also, it will collect new asset attributes, not currently tracked but beneficial, from the field for enhanced decision making. This work will be aligned with wildfire safety inspections and yearly routine inspections in the years to come. The goal of the effort is to make available additional asset data used in risk-based decision-making analysis.

Secondly, PG&E will digitize key transmission substation assets in GIS, including facility rating information. This will create a single electronic source of truth for transmission assets' facility ratings, which will help enable enhanced decision making.

Third, PG&E will create a data quality metrics dashboard and a metadata solution to provide background information on asset data. It will develop data quality scores for support structures, overhead circuits, underground circuits and switches. Once this concept is proven, it will expand the data quality score concept to other asset classes. This capability will provide an ability to measure asset data quality quantitatively, and improvements are trackable. It will also enhance asset information users' abilities to use asset data to make decisions.

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans
Rulemaking 18-10-007
Data Response

PG&E Data Request No.:	CalAdvocates_002-Q06		
PG&E File Name:	WildfireMitigationPlans_DR_CalAdvocates_002-Q06		
Request Date:	February 8, 2019	Requester DR No.:	002
Date Sent:	February 22, 2019	Requesting Party:	Public Advocates Office
PG&E Witness:	Nick Moran	Requester:	Shelby Chase/ Charlyn Hook David Lievanos/ Nathaniel Skinner/ Nils Stannik/

QUESTION 06

On page 63 of its Wildfire Mitigation Plan, PG&E describes its plans to upgrade approximately 7,100 circuit miles of its overhead electric distribution system as part of its System Hardening Plan. Please describe how PG&E decided on the overall target of 7,100 circuit miles, as well as the target of completing 150 circuit miles by the end of 2019, and 600 circuit miles during the 2020-2022 timeframes.

ANSWER 06

The initial development of PG&E's system hardening program focused on rebuilding the circuits within the Tier 3 of the high fire threat district (HFTD) as designated on the CPUC's January 2018 map. 7,100 circuit miles became the target based on the approximately 7,100 circuit miles of distribution system in Tier 3. As PG&E's system-hardening program has evolved, PG&E developed the risk model and re-prioritized the system hardening work to 7,100 circuit miles across both Tier 2 and Tier 3 within the HFTD.

PG&E determined that a 10-year program of system hardening was the most appropriate option to improve public safety by reducing the likelihood of fire ignitions and/or lessening the impact of any ignitions that do take place. PG&E's decision to pursue a 10-year program reflects a desire to complete the system hardening work as quickly as and efficiently as possible, while taking into account the planning and execution challenges associated with ramping up such a large new program.

As discussed in PG&E's Wildfire Safety Plan, the system hardening program faces many challenges and requires a ramp-up of execution capabilities. PG&E proposes to start at approximately 150 miles in 2019 as the initial phase, moving to approximately 600 miles per year from 2020 through to 2022 as the program gains experience and addresses these challenges.

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans
Rulemaking 18-10-007
Data Response

PG&E Data Request No.:	CalAdvocates_002-Q09		
PG&E File Name:	WildfireMitigationPlans_DR_CalAdvocates_002-Q09		
Request Date:	February 8, 2019	Requester DR No.:	002
Date Sent:	February 22, 2019	Requesting Party:	Public Advocates Office
PG&E Witness:	Shawn Holder	Requester:	Shelby Chase/ Charlyn Hook David Lievanos/ Nathaniel Skinner/ Nils Stannik/

QUESTION 09

On page 68 of its Wildfire Mitigation Plan, PG&E states that it "is proposing to install additional line reclosers at Tier 2 and Tier 3 HFTD boundaries." If these boundaries change in the future, how does PG&E propose to update its line recloser deployment?

ANSWER 09

PG&E expects climate change, environmental factors and as well as analysis of the wildfire risk to evolve over time. This may lead to identification of new locations for automated sectionalizing devices in the future to further reduce the risk of wildfire. If the Tier 2 or Tier 3 boundaries change in the future, PG&E will evaluate the need to add new devices.

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans
Rulemaking 18-10-007
Data Response

PG&E Data Request No.:	CalAdvocates_003-Q04		
PG&E File Name:	WildfireMitigationPlans_DR_CalAdvocates_003-Q04		
Request Date:	February 12, 2019	Requester DR No.:	003
Date Sent:	February 20, 2019	Requesting Party:	Public Advocates Office
PG&E Witness:	Nick Moran	Requester:	Nathaniel Skinner/ Shelby Chase/ David Lievanos/ Nils Stannik/ Charlyn Hook

QUESTION 04

On page 8, PG&E describes its system hardening efforts as targeting "150 circuit miles in total by December 31, 2019; and 7,100 circuit miles over a 10-year time horizon."

a. Please provide a year-by-year breakdown for the "10-year horizon".

b. How will PG&E ensure these targets are met?

c. If the targets in the 10-year horizon are not met or are exceeded, will PG&E change its individual or total targets, shift work between years, or take some other approach? Please describe.

ANSWER 04

a. The following annual targets for the 10-year horizon are approximates and may be adjusted based on reprioritization of Wildfire Safety Plan (WSP) programs or execution risk challenges, as described in PG&E's WSP:

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Miles	150	600	600	600	860	860	860	860	860	850

b. There are execution risks to accomplish the expanded and accelerated scope of work planned by PG&E. The availability of equipment, qualified personnel, and legal/regulatory issues (such as land rights and environmental permitting requirements) can impact the timing and scope of the programs proposed in this Plan. As described more in Section 4 of PG&E's Wildfire Safety Plan, PG&E intends to work aggressively to resolve these execution risks as they arise, including working with existing contractors and suppliers to increase available resources as quickly as possible. Going forward, PG&E will continue to

enhance and build upon these programs as we learn from our experience and our collaboration with customers, communities, and industry experts.

c. PG&E will continue to assess the system hardening program as part of the overall Wildfire Safety Plan. This could likely lead to the adjustment of the amount of miles and/or the solutions applied to mitigate the fire risk.

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans
Rulemaking 18-10-007
Data Response

PG&E Data Request No.:	CalAdvocates_003-Q06		
PG&E File Name:	WildfireMitigationPlans_DR_CalAdvocates_003-Q06		
Request Date:	February 12, 2019	Requester DR No.:	003
Date Sent:	February 20, 2019	Requesting Party:	Public Advocates Office
PG&E Witness:	Nick Moran	Requester:	Nathaniel Skinner/ Shelby Chase/ David Lievanos/ Nils Stannik/ Charlyn Hook

QUESTION 06

Prior to 2019, please describe all situations in which PG&E regularly deployed tree wire (covered conductor) on its system. For purposes of this question, "situations" refers to general circumstances (for example, "in heavily-wood areas" or "where requested by property owners") and not specific individual projects.

ANSWER 06

Prior to 2018, PG&E personnel could install covered conductor where occasional, but not continuous, contact with trees or limbs could occur. The decision to install covered conductor was at the discretion of local personnel, and such conductor was typically installed in heavily wooded areas or Eucalyptus groves.

In response to the wildfires that occurred in 2017, PG&E initiated the Community Wildfire Safety Program under which PG&E developed programs to implement new and enhanced safety measures to reduce the risk of wildfires, including expanding the use of covered conductor.

Since November 15, 2018, PG&E has used covered conductor where available for all new construction or system rebuild in Tier 2 and Tier 3 High Fire Threat District ("HFTD") areas.

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans
Rulemaking 18-10-007
Data Response

PG&E Data Request No.:	CalAdvocates_003-Q09		
PG&E File Name:	WildfireMitigationPlans_DR_CalAdvocates_003-Q09		
Request Date:	February 12, 2019	Requester DR No.:	003
Date Sent:	February 20, 2019	Requesting Party:	Public Advocates Office
PG&E Witness:	Mike Jones	Requester:	Nathaniel Skinner/ Shelby Chase/ David Lievanos/ Nils Stannik/ Charlyn Hook

QUESTION 09

To what extent will the proposed Wildfire Safety Inspection Programs (WSIPs) be recurring? If WSIPs are not one-time occurrences, how often does PG&E expect the scope of work (outlined on pages 40-41) to be carried out (yearly, every 2 years, etc.)?

ANSWER 09

As noted in the executive summary of PG&E's Wildfire Safety Plan (Plan), PG&E will continue to enhance and build upon these programs as we learn from our experience and our collaboration with customers, communities, and industry experts. PG&E is in the early stages of executing its Wildfire Safety Inspection Programs (WSIPs) and that, combined with on-going rapid technology advancements makes it premature to determine the scope, methods, and frequency of future inspections. Regarding technology, for example, as noted in Section 4.2.2 of the Plan, PG&E is investigating the use of helicopter-based autonomous image capture methods for inspections. This technology could prove to be superior to the ground and climbing inspections that PG&E is implementing in the 2019 Plan. Additionally, as noted in Section 4.2 of the Plan, the new and enhanced risk-based approach identifies WSIP work by assessing the risk associated with each asset and by explicitly considering equipment modes of failure. PG&E expects that these efforts will continue to evolve as information is gathered and more is learned. PG&E will use the results of the current inspections to continue to shape a risk-informed re-inspection program and schedule for subsequent inspections. As noted in Section 6.2, the programs described in the Plan will be continuously reviewed, evaluated, and modified as needed. PG&E's future wildfire safety plans will reflect continuous improvement gained by learning from implementing previous years' Plans.

PACIFIC GAS AND ELECTRIC COMPANY
Wildfire Mitigation Plans
Rulemaking 18-10-007
Data Response

PG&E Data Request No.:	CalAdvocates_006-Q01		
PG&E File Name:	WildfireMitigationPlans_DR_CalAdvocates_006-Q01		
Request Date:	February 22, 2019	Requester DR No.:	006
Date Sent:	February 27, 2019	Requesting Party:	Public Advocates Office
PG&E Witness:		Requester:	Shelby Chase/ Charlyn Hook/ David Lievanos/ Nathaniel Skinner/ Nils Stannik/

SUBJECT: PAGE REFERENCES BELOW REFER TO THE NUMBERED PAGES OF PG&E'S 2019 WILDFIRE MITIGATION PLAN UNLESS OTHERWISE STATED

QUESTION 01

In its Amendment (filed February 14, 2019) to its Wildfire Mitigation Plan, PG&E states in footnote 1 on page 3 that it has "expanded the scope of its 2019 Public Safety Power Shutoff program to include all ... of its electric customers."

a. Please describe why PG&E chose to include all customers in its PSPS program (as compared to certain customer groups).

b. Please provide all internal analyses regarding this change.

c. Does PG&E anticipate including all of its electric customers in its PSPS program going forward? If not, please describe how and when customers will or may be removed from the scope of the program.

d. Has PG&E performed any analysis of how likely customers or areas across its service territory are to be affected by an actual PSPS event (for example, a representative customer in downtown Oakland vs. a representative customer in Chico)? If so, please provide.

e. How will PG&E's inclusion of all electric customers change its PSPS noticing requirements, both at the beginning of the wildfire season generally and for specific PSPS events?

ANSWER 01

a. PG&E is significantly expanding the 2019 PSPS program scope to include high voltage transmission lines and the highest fire risk areas (Tier 2 (elevated fire risk) and Tier 3 (extreme fire risk)) as referenced in the HFTD Map adopted by the CPUC. As such, PG&E intends to notify approximately 5.4 million customers of the potential for PSPS events if they are served by a line that relies upon a line that traverses a Tier 2 or Tier 3 HFTD area. PG&E's approach to PSPS is described in more detail in Section 4.6 of the Wildfire Safety Plan (Plan).

PG&E did consider customer impacts in the decision to expand the program for 2019. To address customer impacts, PG&E currently offers several services to customers that can assist before, during, and after an emergency, including a PSPS event.[1] Given the anticipation that PSPS events will become more frequent due to extreme weather conditions, PG&E is actively exploring additional services and programs to support customers during PSPS events with a focus in the short term on customers who require a continuous electric supply for life support, as well as critical services (i.e. telecom, water agencies, hospitals, and first responders).[2]

b. PG&E,s Customer Care team used the information described above (and in Section 3 of the Plan addressing risk) to determine which customers may be more likely to experience a de-energization event. As such, PG&E will enhance communications and engagement with these customers through direct-to-customer outreach, earned/ paid media, digital/social media amongst other communication channels in addition to the notifications that will be sent to all of PG&E,s 5.4 million electric customers.

c. PG&E anticipates that all electric customers will be included in the PSPS program for the foreseeable future. If customers are removed from the scope of the program, PG&E will communicate with those customers accordingly and at that time.

d. Although PG&E is communicating to all electric customers about the possibility of PSPS, customers who directly receive electric service from lines which traverse Tier 2 or Tier 3 are more likely to be affected. PG&E plans to engage with this group of more likely affected customers through enhanced communications, which are detailed in 1(e) below.

e. Beginning in March 2019, PG&E will send customer education and awareness materials regarding the PSPS program to all 5.4 million of its electric customers. PG&E,s priority is to have customer contact information on file in the event we need to notify them of a PSPS event. Communications will continue throughout the year. For those customers in Tiers 2 and 3, PG&E will enhance communications and engagement through direct-to-customer outreach, earned/ paid media, digital/social media amongst other communication channels in addition to the notifications that will be sent to all of PG&E,s 5.4 million electric customers.

PG&E also plans to host community meetings across its service territory to educate customers about its Wildfire Safety Plan. These community meetings are currently being scheduled and will be posted on pge.com as well as marketed to customers via various channels.

Notifications for all potentially impacted customers during a PSPS event, regardless of where they are geographically, will follow the procedures outlined in Section 4.6.3 of the Wildfire Safety Plan.

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[1] WSP, Section 4.6.2.3 at p. 99-101.

[2] WSP, Section 4.6.2.3 at p. 101-104.

QUESTION 2:

Section 4.3.6 & 4.3.19, states that steel poles are being designed for instead of wood.

a. Please describe SDG&E's philosophy, engineering assessment, and risk avoidance that justifies the steel pole installation.
b. Please provide Risk Spend Efficiency calculations for the steel pole installation strategy.
c. Please provide a GIS map overlaid on the fire threat zone map of where the pole replacement & reinforcement is/will be focused?

RESPONSE 2:

a. As stated in Section 4.3.6, the fire hardening of SDG&E's trans mission and distribution system within the High Fire Threat District (HFTD) is a multi-faceted approach that begins with enhanced design criteria. As further stated in Section 4.3.6, lines were previously designed to withstand wind loads of 56 miles per hour (mph) as prescribed by General Order (GO) 95. After lessons learned from the 2007 fires, the installation and subsequent data collection from a dense network of anemometers, and wind studies, SDG&E learned that the maximum wind speeds its electric system endures is much higher than 56 mph; it is much closer to 85 mph and even 111 mph in certain areas. It is important to note that wind force is not linear. For example, a 56 mph wind exerts 8 pounds per square foot of force while an 85 mph wind exerts 18 pounds per square foot, an increase of 125%. Designing the system to withstand wind loads that occur during red flag conditions in Tier 3 and Tier 2 of the HFTD reduces the risk of equipment failure and potential ignitions.

   Additionally, SDG&E is replacing single aluminum and copper core conductors with high tensile strength steel core conductors to reduce the risk of wire down failures that could lead to ignitions. Where dense vegetation exists, covered conductor is being evaluated as a conductor solution to reduce the risk of vegetation contacts. SDG&E is also increasing the phase spacing beyond the requirements of GO 95, which results in a decrease in the likelihood of energized lines coming into contact with one another or arcing after being struck by flying debris.

   SDG&E is also utilizing steel poles instead of wood poles. There are two significant benefits that steel poles provide. The first is they are a more reliable material being manufactured versus natural, meaning a steel pole of a specified strength is more likely to have that strength that a wood pole of the same value. This is evident in the GO 95 safety factor requirements. A grade A wood pole is required to have a safety factor of 4 while a grade A steel pole is required to have a safety factor of 1.5. This means a steel structure is required to be only 1.5 times the strength of the calculated loads versus 4 times the strength with a wood pole, as there is less variability in the nominal strength of the material. In

addition, steel poles are more resilient to wildfires should a fire occur regardless of cause, which will result in shorter restoration times to the impacted communities.

b. SDG&E has not completed risk spend efficiency calculations for its fire hardening strategy, which includes the use of steel poles. SDG&E's 2019 RAMP Report will include risk spend efficiency calculations consistent with D.18-12-.

c. Please refer to the attached document: "CalPA-SDG&E-02 Q2c Attachment.pdf."

b. Has BVES been in contact with any of these sources yet? If so, please explain which organization and what has been negotiated so far. If not, please explain the circumstances BVES is waiting for.

Response: BVES has reached out to a local weather forecaster (Bensweather) and scheduled a meeting March 12, 2019 to begin discussions. BVES will reach out to potential sources and develop its final source list before issuing an RFP on March 29, 2019.

c. Has BVES talked with the National Weather Service or any other governmental or non-governmental organizations about the needs for more granular weather data? Please explain.

Response: BVES did reach out to NSW (NOAA San Diego) in the summer of 2018 regarding weather products. BVES intends to reach out to NWS and see if sharing data from its weather stations would result in better publically available weather forecasting services for the BVES service area.

4. On page 33, Chapter 4.4 Situational & Conditional Awareness states:

"Remote Monitoring (via Camera): BVES would also like to install cameras to monitor its system in remote areas that are difficult to patrol on foot, such as the Radford Area. BVES plans to issue a Request for Proposals (RFP) for cost and equipment-specification information to further analyze the feasibility and cost-effectiveness of installing HD cameras. BVES does not have the staffing resources to monitor such cameras continuously. Therefore, BVES will explore other monitoring options, such as partnering with San Bernardino County Office of Emergency Services (OES) before implementing this program."

a. Has BVES Response:? If not, please explain why not and when BVES expects to start this process, as well as how long it is expected to take.

Response: BVES has not started the process to issue an RFP for installing HD cameras. HD cameras require high bandwidth data transfer. BVES' service area is rural, mountainous and does not have data network owned by BVES or accessible to BVES. Therefore, before procuring and installing HD cameras, BVES must resolve the issue of transferring the video data stream to monitoring facilities.

BVES' relatively small staff is engaged in many high priority efforts, thus BVES must balance its limited resources. To properly balance commitments, BVES has projected the following timeline for the effort to evaluate the HD camera project:

Action	**Projected Target Completion Date**
Determine areas where HD cameras would provide benefit	6/14/2019
Source HD cameras	7/19/2019
Determine data network requirements	8/23/2019
Determine cost of data network and if network can be part of BVES' grid automation project	9/20/2019
Obtain lessons learned and best practices from other electric utilities that have proceeded with HD cameras	9/20/2019
Develop monitoring plan	9/20/2019
Develop preliminary scope of work	10/18/2019
Develop preliminary project costs	11/22/2019
Include project in next WMP if determined to be viable	1/17/2019

b. What other monitoring options have been considered?

Response: BVES intends to discuss monitoring opportunities with San Bernardino County Office of Emergency Services (OES), U.S. Forestry Service, and the Fire Department. BVES also intended to explore automated monitoring systems that, for example, might detect flare ups on the video stream.

c. What will be the deciding factors as to if this program will be implemented?

Response: Several factors will be used to determine if the project will be implemented. Some are:

- Feasibility of installing the HD cameras in locations that provide benefit to wildfire mitigation.
- Feasibility to collecting HD camera data in real time within BVES' service area, which is rural and mountainous.
- Feasibility of installing a data network and/or leveraging other potential data networks.
- Ability to effectively monitor the HD cameras.
- Lessons learned from other utilities that have installed HD cameras in their system.
- Cost benefit evaluation.

5. On page 33, *Chapter 4.4 Situational & Conditional Awareness* states:

"Grid Automation: In the coming years, BVES plans to continue to implement grid automation into its system. Grid automation would enhance operational efficiency, safety, and wildfire prevention tactics by allowing remote monitoring and fault detection in real-time."

a. Please explain what is meant by "grid automation."

Response: BVES Grid Automation project is described in BVES General Rate Case Application (A. 17-05-004), Volume 2, Direct Testimony, Results of Operations, Chapter 9, Part B. The Grid Automation project is a 4-year project that is designed to fully automate and integrate BVES grid into SCADA in order to allow remote real-time monitoring and control. Project elements consist of installing service area network, substation automation, remote fault indicators, and remote switching equipment. The project involves the following elements:

- Service Area Network: Installing a robust and secure Internet Protocol (IP) network throughout the BVES service area and implementing a comprehensive Supervisory Control and Data Acquisition (SCADA) to

DATA REQUESTS

Unless otherwise stated, all page and section references refer to Liberty Utilities' 2019 Wildfire Mitigation Plan.

Question 1

Does Liberty propose any cost- or efficiency-based metrics to track or indicate progress on any of its proposed programs in the Wildfire Mitigation Plan (for example: cost per mile reconductored, person-hours per device installed, cost per tree removed, etc.)? If so, please provide. If not, please explain why.

LIBERTY CALPECO RESPONSE: Liberty CalPeco has not proposed any cost or efficiency-based metrics to track progress. Liberty CalPeco does track various costs mentioned in its regular recorded costs. For example, cost per mile re-conductored and labor per device installed will be captured in the specific capital work order for each job performed. Liberty CalPeco also tracks the costs for tree removal in its O&M expenses.

Question 2

On page 19, *Chapter 4.3 Inspection and Maintenance, Equipment Inspection* states

> "Substations are inspected quarterly with substation relays being maintained every 3 to 6 years, depending on the type of relays as well as staffing availability."

On page 30, *Chapter 4.5.2 Identifying At-Risk Vegetation* states:

> "Since 2015, these concerns have grown with the exponential increase of tree mortality rates. Liberty CalPeco has determined that efforts to curb this issue is no longer manageable with current staffing levels. In response, costs have been identified that exceed current budgets by $1 million annually."

Will Liberty be creating additional staff positions to help with these mitigation activities? If so, please provide a description of each position including job duties, how this position will have a direct effect on wildfire mitigation efforts, and when the position is expected to be filled by. If not, please describe what activities or changes will be made to these programs to ensure adequate staffing for mitigation measures.

LIBERTY CALPECO RESPONSE: Liberty CalPeco does not plan on creating additional staff positions to help with the mitigation activities described in its WMP. Liberty CalPeco will rely on additional contract personnel to perform the proposed mitigation activities.

Question 3

On page 20, *Chapter 4.4.1 Covered Conductor* states:

a. Pending a timely decision in this proceeding, the original schedule for the two projects should not be affected.

b. Liberty CalPeco took into account winter months when creating the schedule for the various phases of the projects.

c. Aging equipment is identified as capital assets in excess of 30 years old.

d. The WMP incorrectly stated Topaz line 1261 as a worst performing line in 2017. The Topaz line 1261 was the worst performing circuit in 2015 and 2016. The 201 and 7202 circuits surpassed the Topaz line 1261 line in 2017 due to the severe winter storms experienced in the Lake area, which did not impact the Topaz line1261 as severely.

Question 6

On page 21, *Chapter 4.4.1 Covered Conductor* states that Liberty proposes to reconductor 1-2 miles per year. On the same page, the list for prioritization of distribution lines to be evaluated approximates the circuit length of each line in miles.

a. Are the number of circuit miles equal to geographic miles, or the product of the miles of line and circuits per line?

b. Please provide the number of total geographic miles for each of the nine lines listed.

c. Please provide the number of geographic miles that will be reconductored for each of the nine lines listed.

LIBERTY CALPECO RESPONSE:

a. Geographic miles.

b.

Line	Miles
Tahoe City 7300	58
Topaz 1261	54
Meyers 3400	15
640	8
Meyers 3300	53
Squaw Valley 7201	12
Brockway 5100	2
Tahoe City 7200	5
609/Truckee 7202	10

c. Same as response to Qusetion 6.b.

Question 7

On page 22, *Table 4-3 Planned Circuit Reconductoring Start Date* implies that multiple projects will be started before previous lines are fully reconductored. Please provide the underlying assumptions and rationale for reconductoring multiple lines at the same time, compared to concentrating resources on the highest priority lines.

LIBERTY CALPECO RESPONSE: Liberty CalPeco has two main regions, North Lake Tahoe and South Lake Tahoe. Each region has multiple circuits that feed shorter primary taps for service to isolated Forest Service Summer Tracts. These tracts are in mountainous, heavily wooded areas with limited access during late Fall/Winter seasons. Liberty CalPeco considers these shorter taps as its highest priority, and the reconductoring can be easily completed by regional construction crews. Once these shorter taps are complete, Liberty CalPeco can combine the forces of the North and South Tahoe regions to complete the larger main line re-conductoring projects.

Question 8

Please provide Liberty' s fire risk threat maps overlaying the transmission and distribution lines that have been proposed for reconductoring in a file format readable by Google Earth or ArcGIS. Distinguish between transmission and distribution lines in your response. Please identify the specific portions of each line that will be reconductored and distinguish them by year.

LIBERTY CALPECO RESPONSE: The requested map files are attached in the Export zip folder.

Question 9

On page 23, *4.4.3 Fusing* states:

> "In order to mitigate fires, Liberty CalPeco proposes to replace conventional fuses with current limiting fuses on much of its system. Single phase, two phase and three phase lateral lines that are protected with conventional fuses will be replaced with current limiting fuse. In additional, pole mounted transformers that have conventional fuses will be replaced with current limiting fuses. There are specific locations and types of equipment, that based on operating requirements, where conventional fuses must still be used."

a. How many fuses on the total system in Liberty's s ervice territory will remain conventional fuses?
b. What percent of the total fuses on Liberty's s ystem is this?

LIBERTY CALPECO RESPONSE: Liberty CalPeco's g oal is to replace all conventional fuses with current limiting fuses or other non-expulsion isolating devices. However, the limitations of current limiting fuses do not allow for coordination above certain fuse sizes. Therefore, Liberty