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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

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

ADMINISTRATIVE LAW JUDGE'S RULING REQUESTING COMMENTS ON WORKSHOPS IN PHASE 2

Workshops in Phase 2 of this Wildfire Mitigation Plan proceeding occurred on September 17, 18 and 19, 2019. In accordance with the Scoping Memo issued for Phase 2, this ruling seeks comments on the following topics. Comments are limited to 25 pages and are due on October 30, 2019. Reply comments are limited to 15 pages and are due on November 13, 2019. See specific instructions for utilities below. Both sets of comments shall be filed and served in this proceeding.

The topics on which this ruling seeks comment relate to metrics to determine whether the utilities' wildfire mitigation measures are effective in reducing the risk of catastrophic wildfire; the process for handling future Wildfire Mitigation Plans pursuant to Assembly Bills (AB) 1054 and 111 (2019); the process for hiring and using an Independent Evaluator to track utilities' work pursuant to Wildfire Mitigation Plans; and in-language outreach to communities before, during and after wildfires. Parties may also address other topics – as long as they are contained in the scoping memo for Phase 2 of this proceeding and keep the comments within the foregoing page limits.

1. Background

Decision 19-05-036 authorized the Commission's Safety and Enforcement Division to convene one or more workshops during Phase 2. The June 14, 2019 Assigned Commissioner and Administrative Law Judge's Ruling laid out the goals of the workshop. The workshops took place September 17, 18 and 19, 2019.

In some cases, the utilities[1] presenting at the workshop promised to follow up on questions asked at the workshop. Those instances are listed here, and the relevant utilities shall respond. In other cases, topics arose that sparked the need for comment; all utilities shall respond, and all other parties may respond. Parties may combine questions in their comments.

2. Topics for Comment

A. Utility Plans

1. All utilities except SCE – Provide a color-coded chart showing Wildfire Mitigation Plan progress using the template included in slide 4 of SCE's workshop presentation. The utility workshop presentations are attached to this ruling and hereby incorporated into the record of this proceeding.
2. BVES' representative discussed a pilot program in which it wrapped existing overhead conductors with a synthetic material, and noted concerns with corrosion caused by moisture and other engineering concerns. If other utilities have wrapped lines rather than replacing them with covered conductor, give the mileage covered by such lines and describe any corrosion or other concerns with the wrapped lines.
3. All utilities – How do you measure the amount that wildfire risk is reduced by each Wildfire Mitigation Plan initiative? Which measure(s) (*e.g.*, covered conductors versus undergrounding, right-of-way clearance versus hazard tree removal, etc.) reduce wildfire risk the most? How do you account for and measure the aggregate impact on

[1] "Utilities" as used in this ruling are San Diego Gas and Electric (SDG&E), Pacific Gas and Electric (PG&E), Southern California Edison (SCE), Bear Valley Electric Service (BVES), PacifiCorp and Liberty Utilities (Liberty). The Transmission Owners identified in Phase 1 are excused from responding to this ruling, but not otherwise from the proceeding.

wildfire risk reduction when multiple mitigation measures are implemented on or around the same assets (*e.g.*, increased vegetation clearance in the same areas where covered conductors are installed)? What assumptions, data, and analytical models do you use to adjust this risk reduction by location-specific conditions (*e.g.*, High Fire Threat District (HFTD), housing density, vegetation density, etc.)?

4. All utilities - How do you monitor ignition and near-miss incidents in your service territory before versus after the implementation of each Wildfire Mitigation Plan initiative? What differences do you observe in those incidents or their occurrence after implementation of mitigation measures in your plans? What near-miss incidents do you monitor?
5. All utilities – How do you measure the effectiveness of both equipment and vegetation inspections? How do these measurements of effectiveness guide changes to inspection, maintenance and trimming guidelines, respectively?
6. What specific adjustments to the Wildfire Mitigation Plan guidelines would improve utility Wildfire Mitigation Plans and/or facilitate better evaluation and public input?

B. Metrics

7. List of proposed metrics. Parties shall meet and confer to revise the list of metrics the Commission's Public Advocates Office (Cal Advocates) compiled, served and filed on September 6, 2019, based on the workshops. Cal Advocates shall make the revised submission as an attachment to its reply comments. The list may include metrics beyond those in the September 6, 2019 submission, as long as the metrics comply with the Phase 1 decisions. For example, the Phase I decisions discussed "metrics" that are really program targets, such as trees trimmed or miles of power lines hardened. If Cal Advocates is unwilling or unable to make this filing, a representative of PG&E, SCE or SDG&E shall do so.
8. All utilities – Utilities should prepare a list of common definitions and measures for data and metrics (and, if any are irreconcilable, a list of those along with an explanation for that conclusion).
9. How could lessons learned from the General Order 174 best practices working group experience mentioned during the workshop by

PacifiCorp's representative inform the Wildfire Mitigation Plan process?

10. All utilities – If you have not already provided detail on where to find geospatial data about the location and size of all of your transmission and distribution assets, do so now. At the workshop, PG&E's representative discussed filings made in the Distributed Energy Resources context providing such data. PG&E and all other utilities shall provide cites and links to this information, as well as any other data sources as to size and/or location of power lines.
11. All utilities – Provide a service territory map with HFTD overlay and ingress/egress routes highlighted.
12. Should utilities develop Fire Potential Indices (FPI) that are comparable, rather than maintaining their own individual FPIs that govern what action they take to mitigate wildfire? Why or why not?
13. Should FPIs be vetted and verified by an independent third party? Why or why not? Should there be regional FPIs (*e.g.*, mountain, coastal, desert, Wildland Urban Interface (WUI), etc.) developed that can be used consistently across utilities? Why or why not?
14. Would a working group process similar to that used in the Safety Model Assessment Process (SMAP) context and described at the workshop be useful in the Wildfire Mitigation Plan context? Give specific recommendations.
15. All utilities – Describe which models or tools are used for making decisions related to wildfires (*e.g.*, FARSITE for wildfire spread, National Fire-Danger Rating System for risk level, ArcGIS for asset model) and decision-making processes? Which data (of what quality, timeliness, and format) are used? How are the models' results interpreted? Which other stakeholders have access to the models' results and their interpretation?

C. Outreach and Community Awareness

AB 1054 and Senate Bill (SB) 901 require that Wildfire Mitigation Plans include:

> Plans for community outreach and public awareness before, during, and after a wildfire, including language notification in English, Spanish, and the top three primary languages used in the state other than English or Spanish, as determined by the commission based on the United States Census data.

The Phase 1 decisions adopted the United States Census data requirement, but questions have been raised about outreach in other languages, including those of linguistically isolated communities such as farm workers that speak indigenous languages.

16. All utilities – how do the utilities assess the effectiveness of their "community outreach and public awareness before, during and after a wildfire" pursuant to Section 8386(c)(16)(B), whether conducted in English or other languages?
17. All utilities – how do the utilities evaluate whether additional or different outreach methods are needed to adequately inform communities?
18. Is it appropriate to require outreach in languages other than those adopted in Phase 1, including indigenous languages discussed at the workshops? (*e.g.*, Mixteco, Zapoteco, Triqui) How should such outreach occur?
19. All utilities – What outreach to linguistically isolated communities have you done, including in indigenous languages?
20. What kind of analysis should be done to understand language access needs in utility service territories? Who should do this analysis and how should it be done?
21. What tools and resources should utilities utilize to better understand language needs?
22. What kind of strategies should IOUs utilize in order to reach Limited English Proficient communities? What are suggested communication channels and community partners?

23. How should effective outreach to Limited English Proficient communities be measured? What are metrics for success, other than simply translating materials?
24. What strategies can IOUs employ to counteract misinformation in Limited English Proficient communities, and build trusted relationships?
25. All utilities – What coordination have you done with local communities to track and motivate customer buy-in and participation in the roll out of enhanced vegetation management programs (*i.e.*, beyond minimum regulatory requirements)?

D. Independent Evaluator

26. What steps should be taken to ensure the independence of evaluators?
27. If known, provide examples of successful models that could be leveraged and followed for implementation of the independent evaluator process.
28. What should be the primary focus of independent evaluator compliance reviews?
29. PG&E – What lessons learned from the federal court monitor experience can be leveraged to optimize the Wildfire Mitigation Plan independent evaluator process? What worked and what did not? Why?
30. What elements of the federal court monitor process related to PG&E's probation should be utilized for the Wildfire Mitigation Plan independent evaluator process and why?
31. How could government, utilities, and academic institutions work together to improve the development of qualified professionals?
32. Should there be training curriculum developed to expedite the learning curve for independent evaluators? If so, how should this be done and who should do it?
33. Should there be a certification process instituted for certifying qualified independent evaluators? If so, how should this be done and who should do it?
34. How could the Request for Innovative Ideas (RFI2) process described at the workshop be leveraged for the implementation and execution of Wildfire Mitigation Plan independent evaluator requirements?

35. How, if at all, should utility resource constraints related to the availability of qualified personnel be evaluated in the independent evaluator process?

E. Review Process/AB1054

36. Should future Wildfire Mitigation Plan filings be timed to coincide with or relate to utility General Rate Case and related filings? Provide a sample filing timeline.

37. Should the Commission order the utilities to respond to a standard data request with their Wildfire Mitigation Plan filings, or before they are filed? If so, how should the process work? There is a standard data request from Cal Advocates for rate cases and Energy Resource Recovery Account (ERRA) proceedings; describe that process and indicate whether it is workable for Wildfire Mitigation Plans.

38. Provide any recommendations you have about the process of reviewing future Wildfire Mitigation Plans, including your analysis of what AB 1054 and 111 permit or require.

39. Should future Wildfire Mitigation Plan filings be staggered? If so, how should they be staggered?

40. How long should the Wildfire Mitigation Plan review timeline be? During the review period, what should the detailed schedule (and deadlines) be for initial statutory review, requests for adjustment, data requests, data request responses, party comment, etc.?

41. By what date would Wildfire Mitigation Plan approval enable utilities to take advantage of lower-risk seasons to implement Wildfire Mitigation Plan measures (particularly for asset construction and maintenance)?

42. How should Wildfire Mitigation Plan review incorporate evaluation of Wildfire Mitigation Plan implementation reported as complete?

43. How can mechanisms for effective public input on Wildfire Mitigation Plans be improved?

44. How can the discovery process associated with Wildfire Mitigation Plans be improved?

IT IS RULED that:

1. Parties to this proceeding may file and serve comments on the foregoing matters limited to 25 pages by October 30, 2019, and reply comments limited to 15 pages by November 13, 2019.

2. Where questions are aimed at a specific utility or utilities, the utility/ies shall answer the questions. Their filings may exceed the page limits in paragraph 1 by 15 pages (opening) and 10 pages (reply) to accommodate these extra comments.

3. Parties may comment on other aspects of the workshops, within the timeframe and page limits set forth in this ruling.

4. The utility workshop presentations are attached to this ruling and hereby incorporated into the record of this proceeding.

Dated October 10, 2019, at San Francisco, California.

/s/ SARAH R. THOMAS
Sarah R. Thomas
Administrative Law Judge

ATTACHMENT A

Wildfire Mitigation Plan Update
R18-10-007 Workshop Phase 2

Bear Valley Electric Service

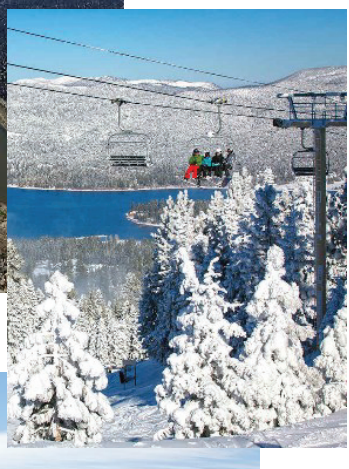
September 17, 2019

Paul Marconi, Director

Key Discussion Points

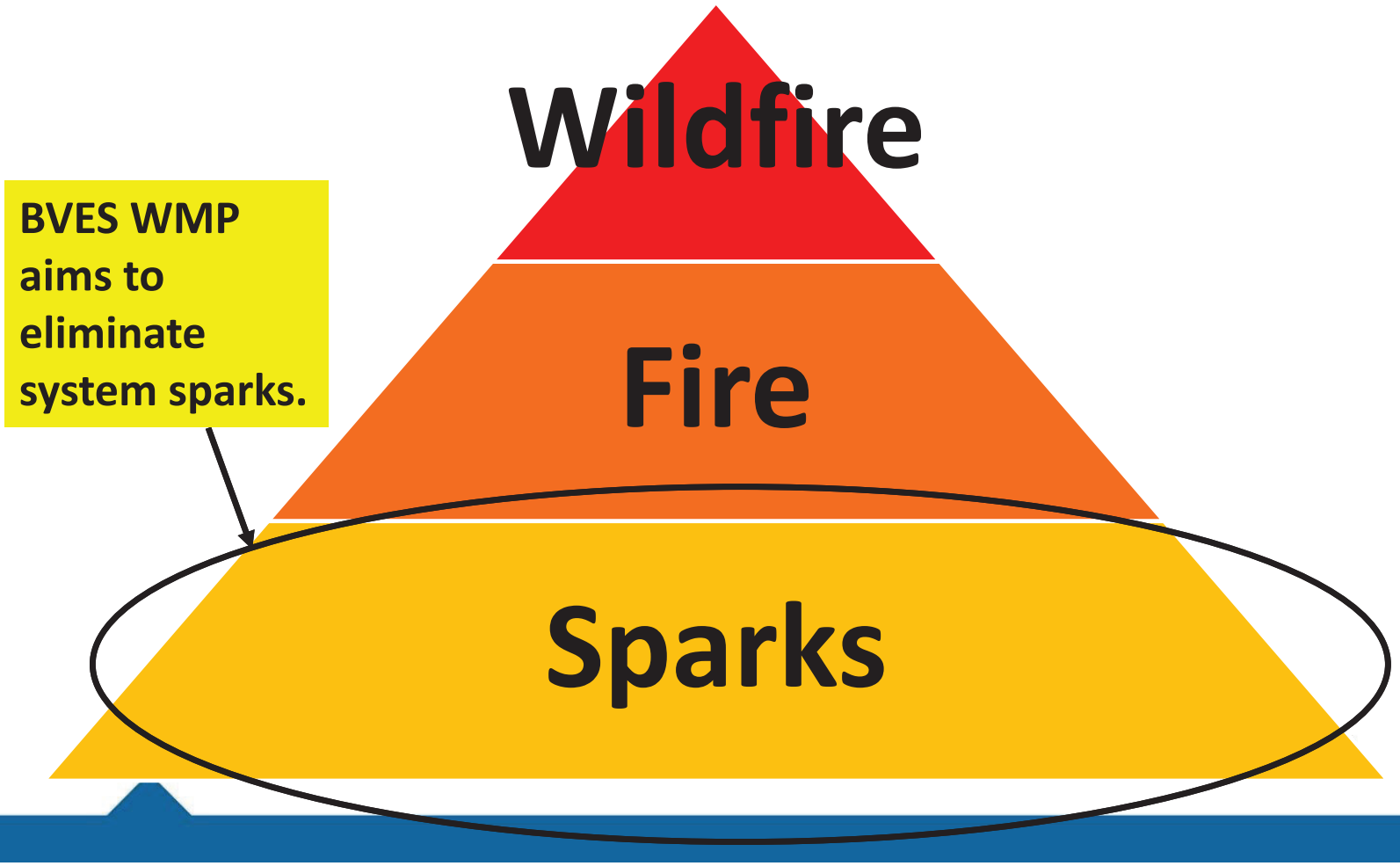
Bear Valley Electric Service
A Division of Golden State Water Company

- Where are we focused?
- What has been done so far?
- Working/not working?
- What Concerns/Problems/ Delays have Arisen?



Where We Are Focused?

Bear Valley Electric Service
A Division of Golden State Water Company



What Has Been Done So Far?

Design and Construction

Bear Valley Electric Service
A Division of Golden State Water Company

Mitigation Measure	Description	Status
Pineknot Substation Upgrades	Technical and safety upgrades to prevent equipment exposure to the elements and human contact	In progress. 23% complete. ECD November 2019.
Ute Undergrounding	Asset transfer from SCE; line undergrounding to mitigate proximity to forested areas	Conducting preliminary planning & discussions.
Fuse Upgrades	Conventional fuse replacements with current limiting fuses and electronic programmable (vacuum switch) TripSaver technology to limit potential sparking when faults occur WMP 2019-2020 Goal: Replace: 1,393 fuses	In progress. 9.9% complete.
Tree Attachment Removal Project	Removal of tree attachments to avoid proximity of fuel and ignition sources (5-year project to remove 1,207 tree attachments) WMP 2019-2020 Goal: Remove 242 tree attachments.	In progress. 22.2% complete.
Pole Loading Assessment & Remediation Program	Increase rate of pole assessments to identify pole issues sooner, which can result in wildfires (5-year project to asses 8,737 poles) WMP 2019-2020 Goal: Assess 1,747 poles.	In progress. 26.6% complete.
Covered Conductor Replacement Pilot Program	Pilot to determine the effectiveness of using covered tree wire conductor to test feasibility of a larger rollout	Received material. Planning project. ECD November 2019.
Covered Conductor Wrap Pilot	Pilot of a wire wrap for high-risk wires to test feasibility of a	As of this point, not considered

Radford Covered Conductor

Bear Valley Electric Service
A Division of Golden State Water Company

- 34.5kV Radford line is in the HFTD Tier 3
- BVES WMP 2019-2020
  - Convert Radford to covered conductors and hardened poles
  - Estimated cost $2,500,000
- Bids averaged 2x estimate
- Re-bid with design phase in 2019 and construction phase in 2020
- Implemented operational measures to mitigate wildfire risk

What Has Been Done So Far?

Bear Valley Electric Service
A Division of Golden State Water Company

Inspection and Maintenance

Mitigation Measure	Description	Status
First Annual On-Ground Inspection (GO-165)	One annual system patrol to inspect the condition of assets to avoid faults, which can result in fires	Completed.
Second Annual On-Ground Inspection	One more system patrol in addition to the annual GO-165 patrol to ensure all assets are in good condition to avoid faults, which can result in fires	Starting September 2019. ECD October 2019.
Predictive-Based Maintenance	System examination using infrared sensors and electromagnetic inference systems	Completed.
Electrical Preventative Maintenance Program	System examination using additional diagnostics on assets to further inspect the condition of assets	Starting September 2019. ECD November 2019.
LIDAR Inspection	Light Detection and Ranging (LIDAR) inspections of the overhead facilities in difficult-to-patrol areas to visualize vegetation growth proximity to the system for targeted maintenance	Starting September 2019. ECD November 2019.
GIS Data Collection & Sharing	Geographic Information System (GIS) database on system infrastructure for asset management and planning with key stakeholders	In progress.
Vegetation Management Plan	Vegetation maintenance program to avoid system proximity, which may cause wildfires	In progress.

What Has Been Done So Far?

Operational Practices

Mitigation Measure	Description	Status
Operational Considerations / Special Work Procedures	Protocols and procedures for staff during high-risk fire conditions	Completed.
Automatic Recloser Upgrades	Recloser replacement to reduce electrical sparking, while also helping mitigate power outages and equipment damage	In progress. ECD November 2019.
Emergency Reporting	Protocols and procedures for staff when third-parties (e.g. customers) report potential fires, including "arcing, sparks, smoldering, smoke, or fire"	Completed.
Wildfire Infrastructure Protection Teams	Roles and responsibilities for staff to respond to protect system infrastructure in case of emergencies	Completed.

What Has Been Done So Far?

Situational & Conditional Awareness

Mitigation Measure	Description	Status
Grid Automation	Grid automation (e.g. FLISR and SCADA) to improve system responses to prevent wildfires and enhance safety (4-year 4-phase project). WMP 2019-2020 Goal: Complete phase 1.	In progress. 22% complete.
GIS-Based Applications (e.g. Outage Management System)	Implementation of GIS-based systems, such as outage management systems and interactive voice response systems, which allow BVES to locate outages and respond to customers more promptly in the case of a wildfire or related emergency	Completed.
Web-Based Weather Resources	Monitoring of publicly available weather resources to evaluate forecasted weather and monitor for potential extreme fire conditions to prepare the system during high-risk events	Completed.
BVES-Owned Weather Stations	Monitoring of BVES-specific weather stations in strategic locations to evaluate forecasted weather and monitor potential extreme fire conditions	50% complete. ECD November 2019.
Weather Forecasting	Analysis of weather feeds to predict and respond to extreme weather events, which may result in wildfires. BVES currently analyzes this in-house but proposes to contract out the services on a weekly basis for additional analysis	Completed.
Remote Monitoring	Monitoring of system and assets in remote areas using HD cameras to improve situational awareness and maintenance of key assets	Not started.

What Has Been Done So Far?

Response & Recovery

Mitigation Measure	Description	Status
Public Safety Power Shut-Off (PSPS) Protocols	Protocols and procedures to respond to and recover from de-energization events, which proactively prevent wildfires	Completed.
Post Incident Recovery, Restoration & Remediation	Protocols and procedures to respond to and recover from any wildfire or related emergency events	Completed.

Working/Not Working?

Bear Valley Electric Service
A Division of Golden State Water Company

- **Exacter surveys useful**
  - Found problems that a regular GO-165 ground inspection would have missed

- **Vegetation management clearances above the minimum required**
  - 72” Clearance likely contributed to unprecedented zero tree-contact events
  - General public & local government very supportive of trimming efforts

- **Wrap covered wire pilot project**
  - Sourcing and engineering evaluations failed

What Concerns/Problems/ Delays have Arisen?

Bear Valley Electric Service
A Division of Golden State Water Company

- **Lead time on current limiting fuses and FuseTripSavers is long due to high demand.**
- **Lead time on covered conductor is similarly long due to high demand.**
- **T&D constructions costs are higher than originally projected due to high construction demand in California.**
- **Difficult to find available contractors to conduct construction work.**
- **Many vendors pushing technologies not ready for prime time.**

Bear Valley Electric Service
A Division of Golden State Water Company




Questions?

Bear Valley
Electric Service
A Division of Golden State Water Company

Powering The Mountain Since 1929

ATTACHMENT B

Liberty Utilities (CalPeco Electric) LLC

Wildfire Mitigation Plan Update

R.18-10-007 Workshop Phase 2

Eliot Jones

September 17, 2019

Liberty Utilities

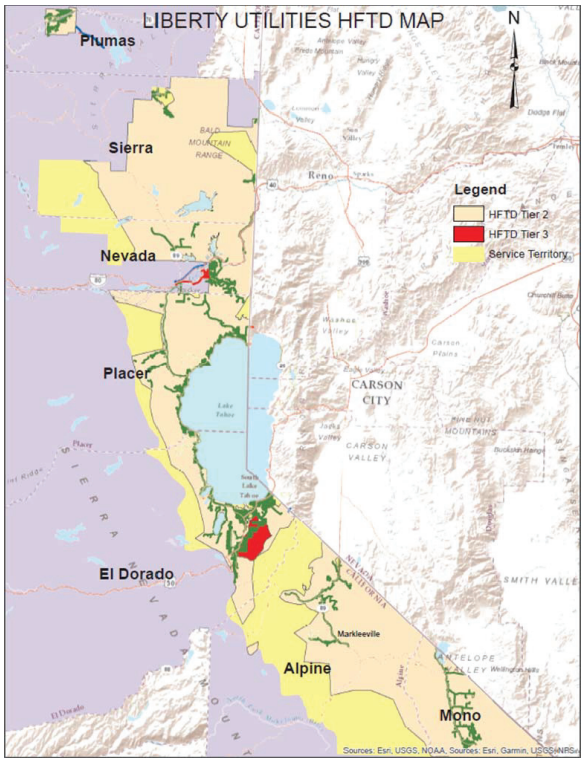
Liberty CalPeco Service Territory

Liberty CalPeco serves approximately 49,000 electric customers in California in and around the Lake Tahoe Basin.

Customers are located in portions of these counties:

- Placer
- El Dorado
- Nevada
- Sierra
- Plumas
- Mono
- Alpine

Almost 80% of customers are located in the Lake Tahoe Basin. The biggest population center is the City of South Lake Tahoe. The Liberty CalPeco service territory extends from Portola in the north to Markleeville and Topaz Lake in the south.



Liberty Utilities

Strategy and Program Overview

Existing and proposed wildfire preventative strategies can be categorized into five main mechanisms that align with utility best practices. Together, the five components create a comprehensive wildfire preparedness and response plan with a principal focus on stringent construction standards, fire prevention through system design, proactive operations and maintenance programs, and well-socialized operating procedures and staff training.

- **Design and Construction:** These strategies consist of system, equipment, and structure design and technical upgrades.
- **Inspection and Maintenance:** These strategies consist of assessment and diagnostic activities as well as associated corrective actions.
- **Operational Practices:** These strategies consist of proactive, day-to-day actions taken to mitigate wildfire risks.
- **Situational and Conditional Awareness:** These strategies consist of methods to improve system visualization and awareness of environmental conditions.
- **Response and Recovery:** These strategies consist of procedures to react to de-energization, wildfire, or other related emergencies.

Wildfire Prevention Strategy and Program Updates

Design and Construction

Mitigation item	Description	Status
7300 Covered Conductor	Pilot program to replace approximately two miles of conductor in High Fire Threat District (HFTD) Tier 2 area.	Design and permitting complete. Materials ordered. EDC December 2019.
Topaz Covered Conductor	Pilot program to replace approximately two miles of conductor in High Fire Threat District (HFTD) Tier 2 area.	In progress. EDC December 2019.
Fuse Replacement	Replacement of conventional fuses with current limiting fuses. 9 year program to replace 13,466 fuses.	Ordered 300 fuses in May. Expected delivery 9/9/19.
Brockway Substation	Relocate and upgrade substation to modern design and eliminate all aging infrastructure and construction.	In progress. ECD Fall 2020.
Stateline Substation Upgrade	Replace obsolete old wood box construction with modern design using steel. Replace Oil Circuit Breakers (OCB) with modern high-speed vacuum breakers.	Advice letter filed. In approval process.
Apache Avenue Undergrounding	Approximately 3,000 feet overhead to underground conversion in HFTD Tier 2.	In progress. 50% complete.
North Lake Blvd Undergrounding	Approximately 1,760 feet overhead to underground conversion in HFTD Tier 2.	Design complete. In permitting process.
Tree Attachment Removal	Removal of tree attachments to mitigate contact of ignition fuel sources by increasing distance between sources. 2019 WMP Goal: Remove 60 tree attachments.	In progress. Approximately 40% complete for 2019.

Wildfire Prevention Strategy and Program Updates

Inspections and Maintenance

Mitigation item	Description	Status
Vegetation Management Plan	Mitigate wildfire risk conditions by removing fuel source and patrolling lines.	In progress
Annual GO 165 Inspections	Patrol to identify infrastructure or equipment that poses a fire risk.	In progress
GIS Upgrade	Improvement of existing GIS system to improve data collection and tracking.	In progress
LIDAR Inspection	Inspections of overhead circuits to collect data regarding vegetation clearances and hazard tree analysis.	ECD Spring/Summer 2020

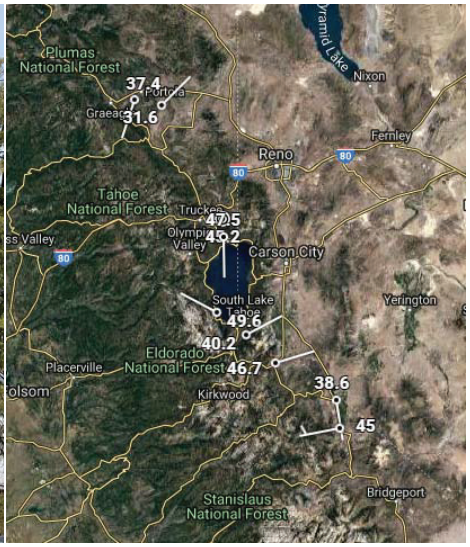
Operational Practices

Mitigation item	Description	Status
Infrastructure Protection Teams	Designed to ensure staff is prepared to mobilize in high-risk and emergency situations.	Completed with ongoing review
Emergency Preparedness and Response Protocols	Ensure protocols are up-to-date with the latest mandates and best practices.	In progress. ECD October 2019
Automatic Reclosers	Upgrade existing reclosers with modern reclosers using electronic supervisory controls.	In progress. ECD October 2019
Fire Mode	Mitigate downed wires and reduce energy at potential fault locations	Completed

Wildfire Prevention Strategy and Program Updates

Situational Awareness

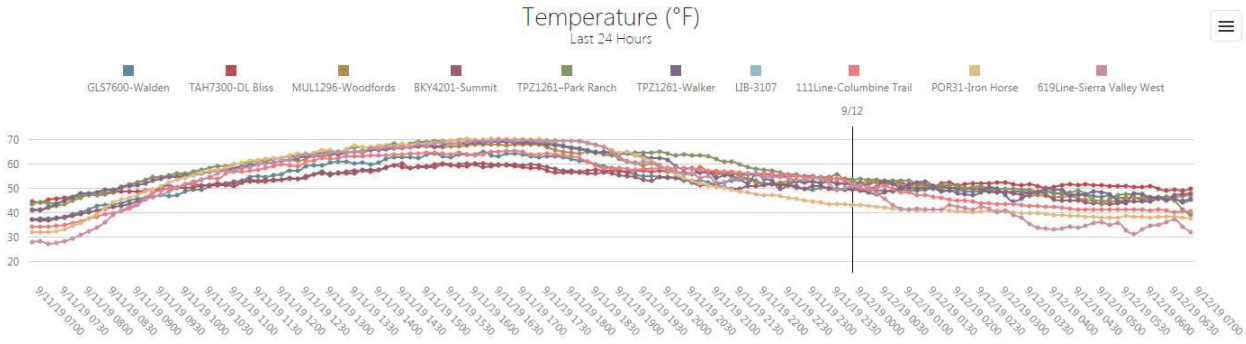
Mitigation item	Description	Status
Weather Station Installation	Improves forecasting and de-energization and restoration plans. 2019 Goal: Install 13 weather stations.	In progress. 77% complete. ECD December 2019.
Weather Monitoring and Forecasting	Develop tool for fire weather forecasting potential fire concerns to assist in operational and PSPS decision making.	Complete



Liberty Utilities

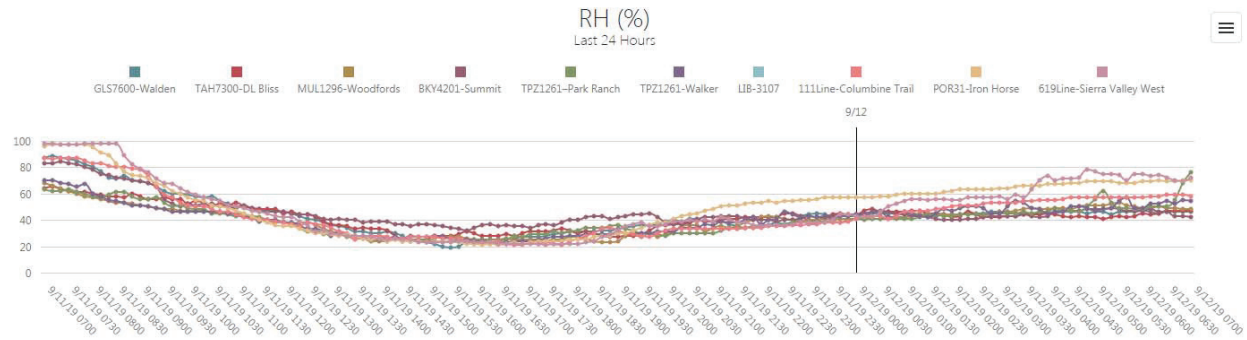
Wildfire Prevention Strategy and Program Updates

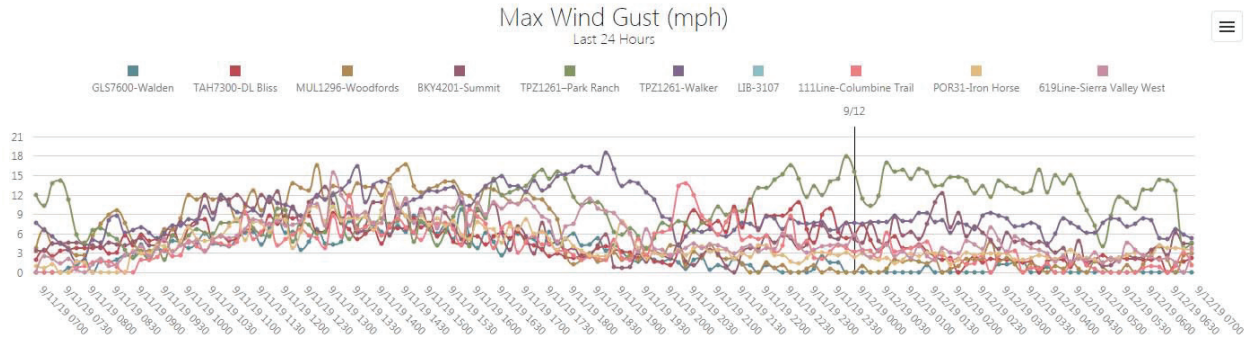
Station	Date	Time	Temp (°F)	RH (%)	Dew Pt (°F)	Wind Spd (mph)	Wind Dir (°)	Wind Gust (mph)	Wind Gst Dir (°)	Daily Min Temp (°F)	Daily Max Temp (°F)	Daily Max Wind (mph)	Max Wind Dir (°)
POR31-Iron Horse	9/12/19	0700	37.4 ▲5.6	70 ▼26	28.6 ▼2.2	1.6	SSW | 198	3.5 ▲2.5	SSW | 211	37.4 ▲5.7	41.2 ▲4.9	4.1 ▲0.4	SSW | 204
619Line-Sierra Valley West	9/12/19	0700	31.6 ▲3.9	72 ▼26	23.4 ▼3.7	0.8	NE | 45	3.7 ▲3.7	ENE | 63	30.6 ▲4.7	44.6 ▲5.6	7.0 ▲2.7	SSE | 159
GLS7600-Walden	9/12/19	0700	45.2 ▲8.3	46 ▼42	25.6 ▼7.9	0.0	N | 0	0.0 0.0	NNE | 24	44.4 ▲8.8	49.8 ▲8.5	1.5 ▲1.1	NE | 42
BKY4201-Summit	9/12/19	0700	47.5 ▲10.8	42 ▼41	25.7 ▼6.4	1.6	S | 179	4.5 ▲1.1	S | 188	43.2 ▲8.9	51.1 ▲13.4	12.2 ▲5.6	S | 180
TAH7300-DL Bliss	9/12/19	0700	49.6 ▲5.4	47 ▼17	30.0 ▼2.6	1.1	WNW | 298	2.2 ▲0.2	WNW | 302	48.5 ▲5.9	52.7 ▲7.7	4.3 ▼0.7	WNW | 298
111Line-Columbine Trail	9/12/19	0700	40.2 ▲6.3	58 ▼29	26.8 ▼3.6	0.1	ENE | 62	1.1 ▲1.1	ENE | 61	39.9 ▲6.4	48.9 ▲12.7	4.7 ▲0.5	SW | 217
MUL1296-Woodfords	9/12/19	0700	46.7 ▲6.4	48 ▼20	28.2 ▼2.4	0.3	ENE | 73	2.9 ▼0.9	SSE | 149	43.9 ▲5.6	51.6 ▲5.7	4.7 ▼3.7	NNE | 26
TPZ1261–Park Ranch	9/12/19	0700	38.6 ▼4.7	76 ▲13	31.7 ▲0.1	2.4	S | 171	4.6 ▼7.5	SSE | 167	37.3 ▼5.2	53.8 ▲3.8	16.0 ▲0.7	W | 263
TPZ1261-Walker	9/12/19	0700	45.0 ▲4.2	54 ▼16	29.2 ▼2.5	3.9	W | 259	5.3 ▼2.2	WSW | 255	41.2 ▲3.5	52.7 ▲5.0	9.2 ▲0.6	WSW | 258
LIB-3107	4/30/19	1150 ⚠	-	-	-	0.0	N | 0	0.0	E | 89	-	0.0	0.0	N | 0
Max			49.6	76	31.7	3.9	-	5.3	-	48.5	53.8	16.0	-
Avg			42.4	57	27.7	1.3	-	3.1	-	-	-	-	-
Min			31.6	42	23.4	0.0	-	0.0	-	30.6	41.2	1.5	-



Liberty Utilities

Wildfire Prevention Strategy and Program Updates



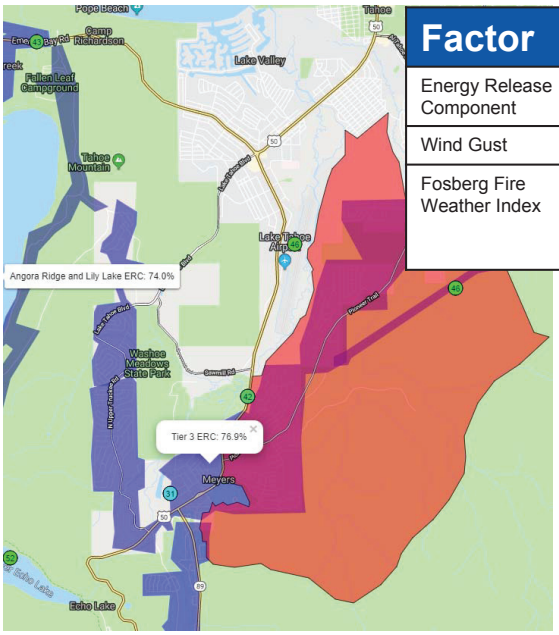


Liberty Utilities

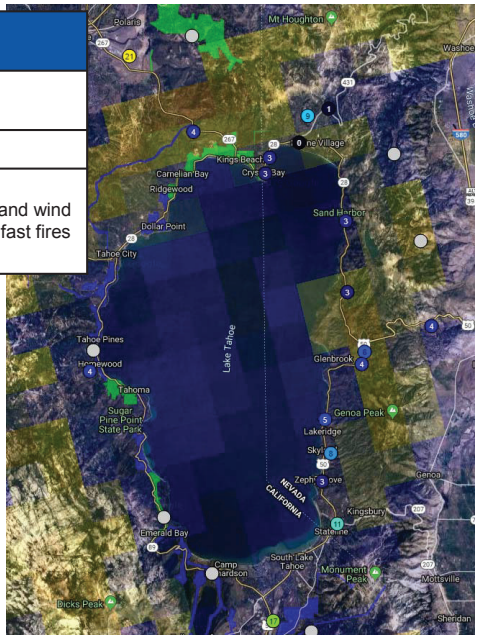
Wildfire Prevention Strategy and Program Updates

Response and Recovery

Mitigation item	Description	Status
Public Safety Power Shut-off (PSPS) Protocols	Protocols and procedures to mitigate wildfire risk conditions by shutting off the power and removing potential ignition source.	In progress. ECD October 2019.



Factor	Threshold
Energy Release Component	92nd Percentile
Wind Gust	40 miles per hour
Fosberg Fire Weather Index	>50 (combines relative humidity, temperature and wind into a measure of how fast fires spread)



Liberty Utilities

Program Successes

- Weather forecasting/monitoring tool is working well.
- Meetings with public safety partners and the general public have strengthened relationships, improved coordination, and created valuable learning opportunities. Liberty CalPeco has held 22 meetings since May regarding Wildfire Prevention and PSPS.
- Review and enhancement of operational protocols and procedures are strengthening Liberty CalPeco's daily operations.

Implementation Concerns

- Lead time on equipment is too long.
  - Fuses – 3+ months and still waiting for delivery
  - Covered conductor – 6-8 weeks

- Contract crews for construction and tree work are difficult to obtain and expensive.

- Permitting projects, especially on federal land, is a lengthy process with no mechanism to expedite the work.

ATTACHMENT C

PacifiCorp's California Wildfire Mitigation Plan Update
September 17, 2019
California Public Utilities Commission

PACIFICORP
POWERING YOUR GREATNESS

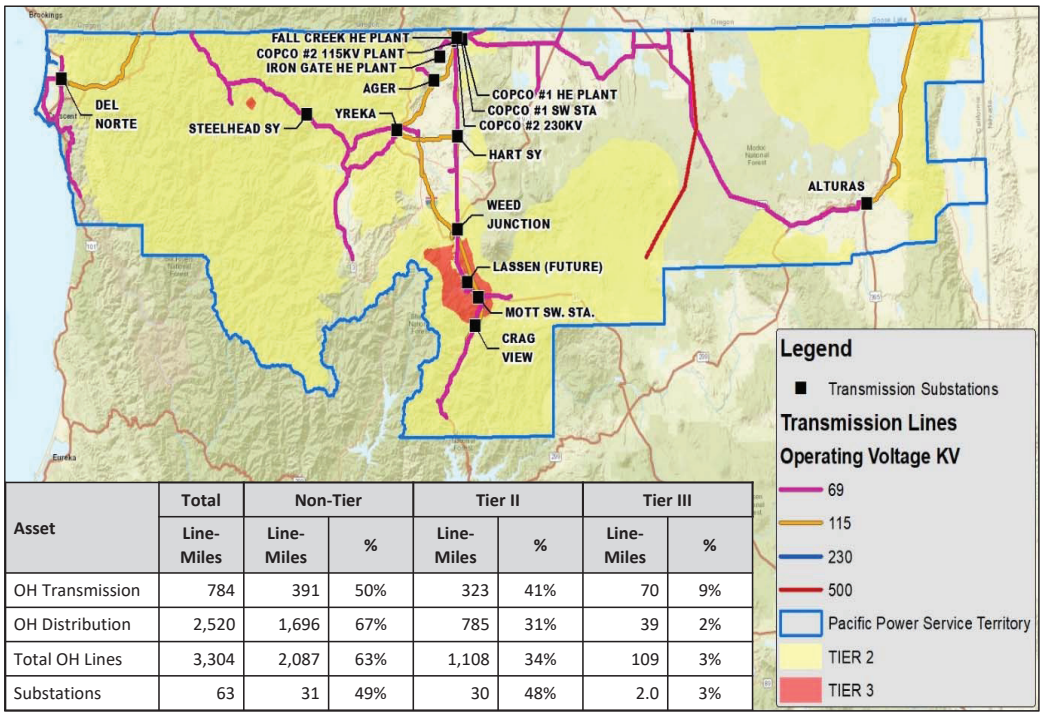
Agenda

- PacifiCorp's Objectives
- Identified Risk
- Plan Progress
- Challenges & Successes

Key Objectives of PacifiCorp's Plan

- More resilient systems with lower likelihood of fault events
- Better response when faults occur, including equipment and personnel plans to minimize scope and duration of the fault event
- Situational awareness and operational readiness designed to mitigate impacts to the system
- Maintenance of the plan, assessment of its effectiveness and review of impacts on stakeholders

PacifiCorp's California Service Territory



Asset	Total	Non-Tier		Tier II		Tier III	
	Line-Miles	Line-Miles	%	Line-Miles	%	Line-Miles	%
OH Transmission	784	391	50%	323	41%	70	9%
OH Distribution	2,520	1,696	67%	785	31%	39	2%
Total OH Lines	3,304	2,087	63%	1,108	34%	109	3%
Substations	63	31	49%	30	48%	2.0	3%

PacifiCorp provides electricity to approximately **45,000 customers** via **63 substations** and **2,520 miles** of distribution lines and about **800 miles** of transmission lines across nearly **11,000 square miles**

PacifiCorp's WMP Progress

	Completed	Underway
Sit'l Aware	Weather stations installed (10)	Lightning data in final stages of procurement
	Extreme weather forecast method developed	
	Develop method to share weather data collected with local weather and fire teams	Developing method to share weather analysis with scientific community
Operating Practices	Staff additions	Staff additions
	-Line patrol	-Fire data scientist
	Fire risk tools; water trailers, pulaski, chain saw, shovels, 10 gal extinguishers, retrofitting portions of fleet with fire shielding on undercarriage	-Risk data scientist
	Fire prevention training as well as reclosing practices during fire risk periods, also modified work hours during periods of elevated fire risk	Developing probabilistic fuse coordination software
Inspect / Maintai	Two enhanced transmission inspection using IR/corona completed; one pre-fire season, second during summer heavy loading conditions; one California condition found and corrected as of week of August 12, 2019	Evaluating radio frequency (RF) and LiDAR imaging for improving inspection and vegetation programs
	Begin additional detail device inspections, including downloading operational data	Enhance outage-initiated inspection within Tier 3
Asset Hardening	Pole replacement prioritization criteria developed	LiDAR pilot for strength modeling underway
	Hstorically butt clad and treat with fire proofing spray in targeted Tier 3 areas	10.8 miles of aerial cable is in design and will be constructed in advance of next fire season
	Detailed relay/recloser replacement plan and key delivery dates (largely completed fall/winter 2019 & spring/summer 2020)	25 modern reclosers with alternate settings being installed beginning this month
	Standard for composite and steel poles in place and able to be utilized as dictated by prioritization process	10 modern substation relays designed; construction beginning next month
	Standard for non-expulsion fusing installation developed & being used on all new construction	13 transmission line relays on 8 transmission lines designed; construction starting next month
		Fiber reinforced polymer (FRP) emergency stock quantities and combinations have been developed for use during pole replacements and post fires
Veg Mgmt	Tier 2 clearance deadline (6/30/2019) met (Tier 3 completed 9/1/2018)	Incorporating additional overhang removal into work plans during vegetation cycle work
	Conduct pre-fire season patrol evaluating for proper vegetation and conductor clearances	
	Fuel removal completed in limited areas	Began implementation of annual vegetation inspection for off-cycle facilities within HFTD
	Develop criteria for targeting higher risk tree removal during vegetation cycle work	Began implementation of additional risk tree removal in HFTD
Alt Tech		Leveraging asset health framework which includes HFTD, in addition to a variety of other factors, to prioritize asset replacement
		Piloting technologies including RF, LiDAR, drones and (in Oregon) use of HD cameras in collaboration with response personnel

Situational Awareness: Weather

SHORT TERM FORECAST

TODAY	KBDI	6HrMax FFWI6	Wind Spd	Wind Gust	Wind Dir	Max Temp	Min RH
Happy Camp	749	10	5	12	W	75	27%
Weed	642	15	9	18	NW	69	29%
Mt. Shasta	679	15	9	18	SE-SW	68	31%
Dunsmuir	717	12	6	15	SW	73	27%
Snowbrush	635	10	5	12	S-SE	65	30%

Synopsis:
A large trough across the West Coast will bring below average temperatures but only a slight chance of afternoon showers. Winds will be breezy at times for exposed areas around Weed & Mt Shasta City.

TONIGHT			Wind Spd	Wind Gust	Wind Dir	Min Temp	Min RH
Happy Camp	--	--	1	4	Var	47-53	55%
Mt. Shasta Area	--	--	2	5	NE-N	45-51	50%

Synopsis:
Cool with light winds.

Tuesday	KBDI	FFWI6	Wind Spd	Wind Gust	Wind Dir	Max Temp	Min RH
Happy Camp	750	9	6	14	W-NW	74	30%
Weed	644	16	10	20	NW	68	30%
Mt. Shasta	681	15	10	20	NW-SW	67	32%
Dunsmuir	718	10	6	14	SW	72	28%
Snowbrush	637	9	6	14	SW-SE	63	34%

Synopsis:
The trough will migrate more to the east Tuesday but keep cool temperatures around and the risk of some showers.

Tuesday Night			Wind Spd	Wind Gust	Wind Dir	Min Temp	Min RH
Happy Camp	--	--	1	4	Var	47-53	55%
Mt. Shasta Area	--	--	2	5	N	45-51	50%

Synopsis:
Cool & dry with light winds

Wednesday	KBDI	FFWI6	Wind Spd	Wind Gust	Wind Dir	Max Temp	Min RH
Happy Camp	750	11	5	12	W-NW	79	18%
Weed	644	18	9	18	NW-SW	74	21%
Mt. Shasta	681	15	9	18	W-NW	73	23%
Dunsmuir	718	12	5	12	SW	77	20%
Snowbrush	637	10	5	12	W-NW	68	25%

7 Day	Happy Camp		Weed		Mt. Shasta	
	KBDI	FFWI6	KBDI	FFWI6	KBDI	FFWI6
TODAY	749	10	642	15	679	15
Tuesday	750	9	644	16	681	15
Wednesday	750	11	644	15	681	15
Thursday	751	11	646			
Friday	752	11	647			
Saturday	753	15	648			
Sunday	754	13	647			
			AVG KBDI			

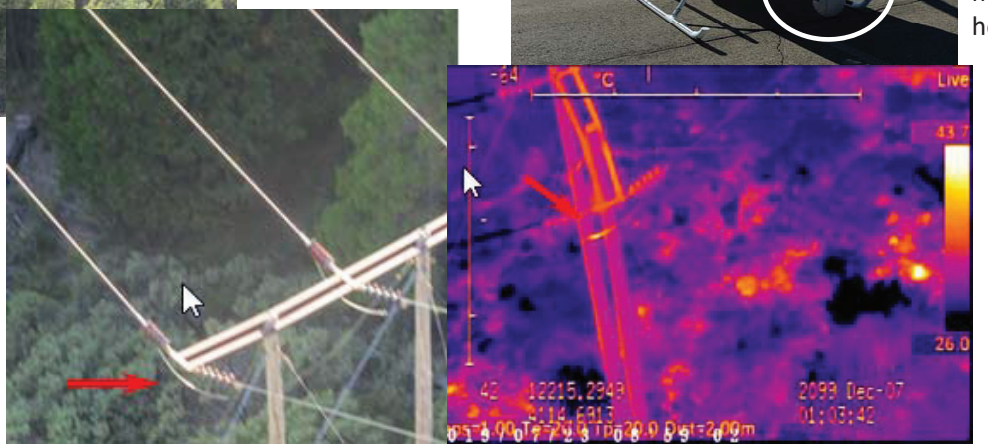
PacifiCorp Weather Station Network
Daily Meteorological Summary
Sunday, September 8, 2019

	Temperature				Rain		RH	Dew Pt	Fire Indices		WIND			Fuels	
	Max °F	Time occur	Min °F	Time occur	Today in	Seasonal in	Min %	Avg °F	6HrMax FFWI	KBDI	Avg mph	Gust mph	Gust Dir	Max Temp	Avg Moisture
Dunsmuir	76.3	15:01	55.3	06:47	0.00	0.00	30	44.8	4	750	1.8	17.8	N	102.1	6.8
Lake Siskiyou	73.0	15:36	51.1	07:10	0.00	0.00	35	44.2	3	649	1.5	13.7	W	-	-
Snowbrush	67.7	15:36	43.0	07:18	0.00	0.00	33	41.4	4	633	1.9	14.4	WSW	94.4	8.6
Pollard Flat															
North Mt Shasta City	70.4	15:12	51.0	07:00	0.00	0.01	35	42.5	8	679	7.0	24.0	NW	-	-
SW Weed	72.7	15:26	46.3	00:55	0.00	0.05	34	43.7	3	641	1.5	10.9	NW	105.8	6.1
West Weed	71.0	17:06	49.2	00:58	0.00	0.16	33	44.8	3	641	1.0	8.8	N	-	-
North Weed	72.5	16:09	50.3	00:54	0.00	0.07	31	43.2	14	641	4.5	18.0	N	-	-
Seiad	78.8	15:18	57.6	01:02	0.00	0.00	30	49.5	3	749	0.9	11.1	S	103.5	6.7
Happy Camp	78.1	14:55	56.2	01:01	0.00	0.01	29	49.4	12	749	3.7	19.5	SW	-	-

Inspect & Maintain: IR/Corona on Transmission Lines

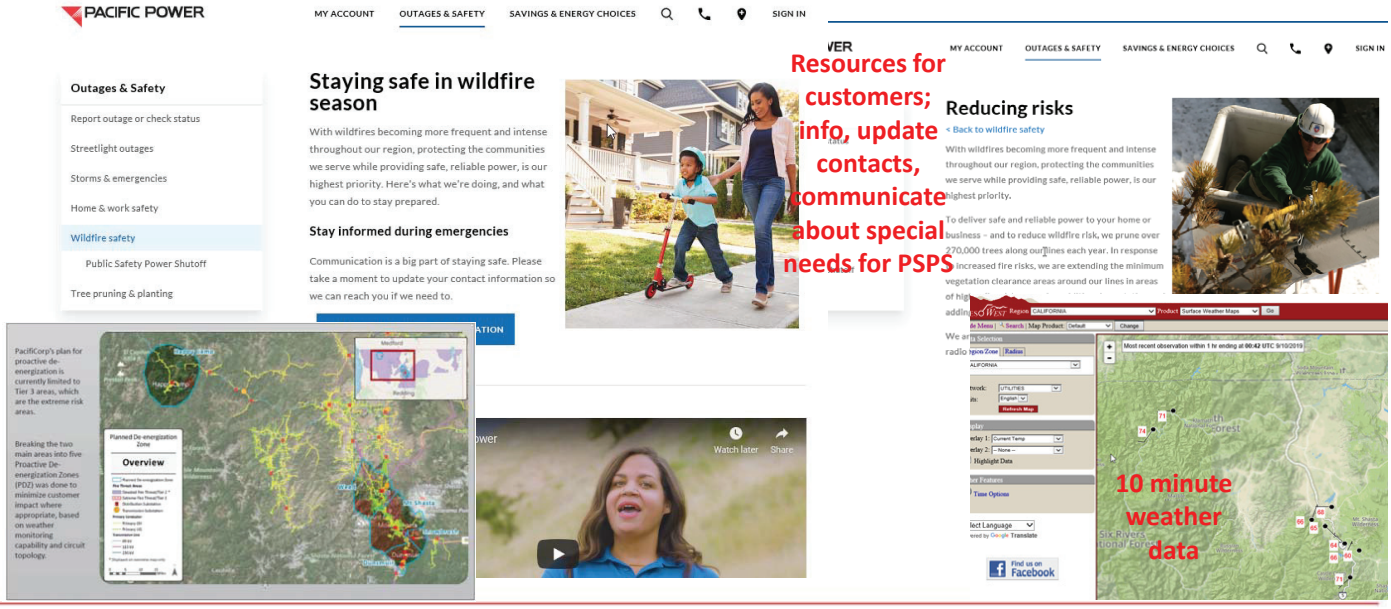
- Completed two infrared/corona aerial inspections on transmission lines
- One hot spot detected at a jumper sleeve connection with broken pole top on adjacent H structure; corrected week of August 12, 2019

Gimbal mounted on helicopter



Community/Public Safety Partner Outreach

- Held public meetings with emergency response and customer groups to review WMP and its various elements; targeted up-to-date contact information and soliciting input
- Developed wildfire webpage at https://www.pacificpower.net/outages-safety/wildfire-safety.html
- Posted updates to regulators, resources for customers, coordinated websites with public safety partners, sharing weather information broadly



PSPS Candidate Areas Available to Customers

Successes and Challenges

- Successes
  - Substantial planning, engineering and construction has begun and has provided benefits during this fire season and is expected to provide benefits in the future
  - Field teams continue to strengthen in their operational responses to wildfire mitigation
- Challenges
  - Resources are heavily leveraged
    - Supply chains for resources and materials have tightened, resulting in constraints and impacting the cost of WMP implementation
    - Internal teams, engineering and construction resources and materials are being maximized
    - Other organizations are challenged by our timeframes

Summary

- PacifiCorp appreciates the focus and guidance provided by legislators, regulators and other policy setters to address this important issue
- PacifiCorp recognizes it's at the beginning of a long journey but believes substantial progress has already been achieved
- PacifiCorp believes efforts it and others have made to make wildfire mitigation a top priority are making a difference for the better

ATTACHMENT D

Community Wildfire Safety Program

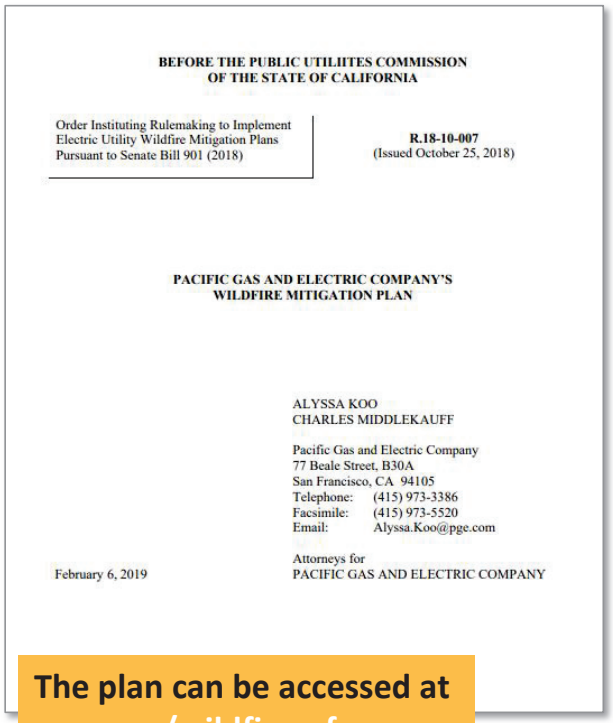
WILDFIRE MITIGATION PLAN

September 17, 2019

2019 Wildfire Safety Plan

PG&E's 2019 Wildfire Safety Plan was submitted on February 6 to the California Public Utilities Commission (CPUC) as part of our ongoing commitment to reducing wildfire risk. The Plan was further corrected on February 12 and amended February 14.

- The objective of PG&E's Plan is to act with urgency to **reduce the risk of electrical lines and equipment causing potential catastrophic wildfires.**
- **The plan describes forecasted work and investments in 2019** to help further reduce the potential for wildfire ignitions associated with our electrical equipment in high fire-threat areas.
- **The safety plan builds on our comprehensive Community Wildfire Safety Program,** launched in March 2018.
- **The plan is subject to open and transparent public review** and annual approval by the CPUC.



BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018)

R.18-10-007
(Issued October 25, 2018)

PACIFIC GAS AND ELECTRIC COMPANY'S
WILDFIRE MITIGATION PLAN

ALYSSA KOO
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Email: Alyssa.Koo@pge.com

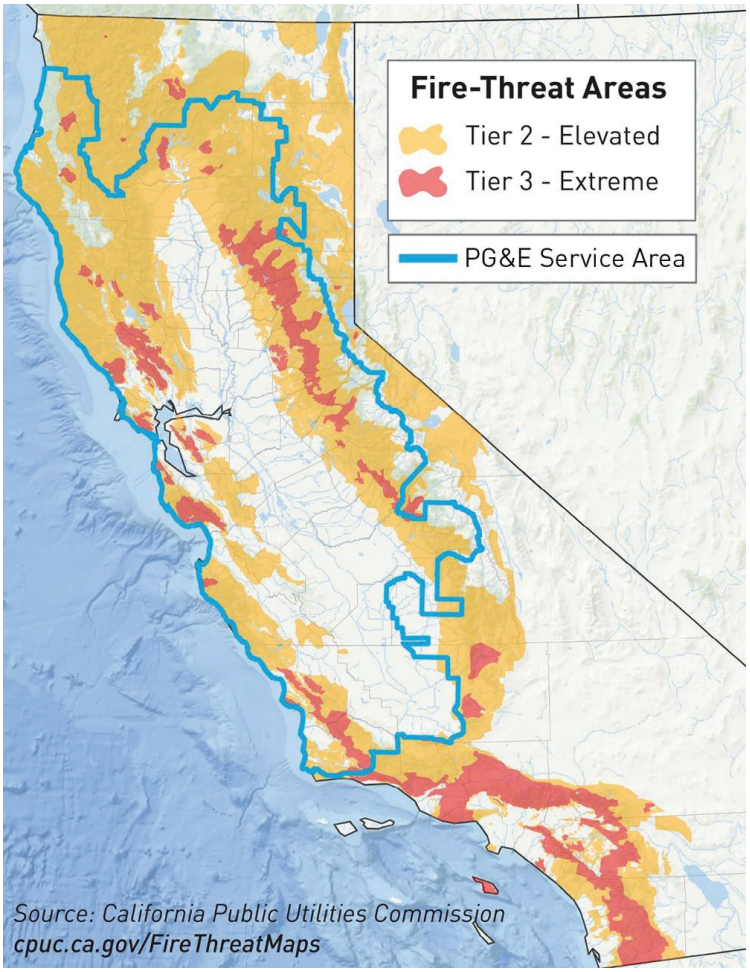
Attorneys for
PACIFIC GAS AND ELECTRIC COMPANY

February 6, 2019

The plan can be accessed at pge.com/wildfiresafey

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 Threats in PG&E's Service Area



The Wildfire Safety Plan reflects the unique size and geography of PG&E's 70,000-square-mile service area.

More than half of PG&E's service area is in extreme or elevated fire-risk areas as designated by the California Public Utilities Commission's High Fire-Threat District map.

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.

Program Risks and Challenges

PG&E recognized that there would be significant execution risks, arising from sources both external and internal to PG&E, to accomplishing the expanded and accelerated scope of planned work including:

- **Inclement weather**
- **Availability of equipment, materials, and qualified personnel**
- **Scheduling of transmission outages** (customer impacts and clearance process)
- **Access/permitting delays** (e.g., objections from property owners or governmental agencies and environmental permitting requirements)

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.

Community Wildfire Safety Program

REAL-TIME MONITORING AND INTELLIGENCE

- Coordinating prevention and response efforts by monitoring wildfire risks in real time from our **Wildfire Safety Operations Center**
- **Expanding our network of PG&E weather stations** to enhance weather forecasting and modeling
- Supporting the **installation of new high-definition cameras** in high fire-threat areas

NEW AND ENHANCED SAFETY MEASURES

- Further enhancing vegetation management efforts to **increase focus on vegetation that poses a higher potential for wildfire risk**
- **Conducting accelerated safety inspections** of electric infrastructure in high fire-threat areas
- **Disabling automatic reclosing of circuit breakers and reclosers** in high fire-risk areas during wildfire season
- **Proactively turning off electric power for safety (Public Safety Power Shutoff)** when gusty winds and dry conditions combine with a heightened fire risk

SYSTEM HARDENING AND RESILIENCY

- Installing **stronger and more resilient poles** and **covered power lines**, along with **targeted undergrounding**
- **Upgrading and replacing electric equipment and infrastructure** to further reduce wildfire risks
- **Working with communities to develop new resilience zones** to provide electricity to central community resources during a Public Safety Power Shutoff event

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 Progress and Scope

CATEGORY	MITIGATION	YEAR-TO-DATE COMPLETE	SCOPE	PERCENT COMPLETE
Wildfire Safety Inspections (Data as of 8/31)	**Transmission** (Visual Inspections)	**39,703** structures*	**39,805** structures*	**99.7%**
	Transmission (Aerial Inspections)	**49,321** structures	**49,760** structures	**99%**
	Distribution	**694,250** poles	**694,250** poles	**100%**
	Substations	**222** substations	**222** substations	**100%**

*9,955 structures inspected in 2018

CATEGORY	MITIGATION	YEAR-TO-DATE COMPLETE	SCOPE	PERCENT COMPLETE
Wildfire Safety Repairs (Data as of 7/31)	**Transmission** (A and B Tags)	**3,623** tags	**5,350** tags	**67.7%***
	Distribution (A and B Tags)	**4,793** tags	**4,946** tags	**96.9%**
	Substations (A and B Tags)	**735** tags	**738** tags	**99.6%**

*The remaining A-tags on transmission are on deenergized lines and have been made safe.

Note: Results from our inspections are subject to an ongoing review and quality assessment process and may change.

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 Progress and Scope

CATEGORY	MITIGATION	YEAR-TO-DATE COMPLETE	SCOPE	PERCENT COMPLETE
Enhanced Vegetation Management (EVM)	**EVM Tree Work**	**639** miles	**2,455** miles	**26%**
	Catastrophic Event Memorandum Account (CEMA) Inspections	**39,386** trees	**50,253** trees	**78%**
	CEMA Tree Work	**18,984** trees	**50,253** trees	**38%**
Situational Awareness	**Weather Stations**	**393** stations	**400** stations	**98%**
	High-Definition Cameras	**75** cameras	**71** cameras	**105%**
Operational Practices	**Recloser Operations**	**287** reclosers	**287** reclosers	**100%**
	Safety and Infrastructure Protection Teams (SIPT)	**28** trucks + **63** employees	**25** trucks + **60** employees	**100%**
	Aviation Resources (heavy-lift helicopters)	**4** helicopters	**4** helicopters	**100%**
System Hardening	**System Hardening**	**75** miles	**150** miles	**50%**
	Equipment (non-exempt fuses/cutouts)	**0**	**625** fuses	**0%**
Public Safety Power Shutoff	**Resilience Zones**	**0** zones*	**1** zone	**0%**
	System Sectionalizing (locations installed)	**181** locations	**N/A**	**N/A**

*Pre-installed interconnection hub complete. Grid hardening near completion. Resilience Zone expected operational by October.

Data as of 8/31

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 Inspection Program (WSIP)

INSPECTIONS

We conducted accelerated safety inspections of electric infrastructure in areas of higher wildfire risk

- This includes **comprehensive inspections of electric towers, poles and substations** in high fire-threat areas through **ground, climbing or helicopter inspections** and, in some cases, by using **drones**

INSPECTIONS OF DISTRIBUTION POLES

100% COMPLETE
of **~700,000 structures**
over **25,000+ miles**

INSPECTIONS OF TRANSMISSION STRUCTURES

99.7% **VISUAL INSPECTIONS**

99% **AERIAL INSPECTIONS**

of **~50,000 structures** over **5,500+ miles**

INSPECTIONS OF SUBSTATIONS

100% COMPLETE
of **222 substations**

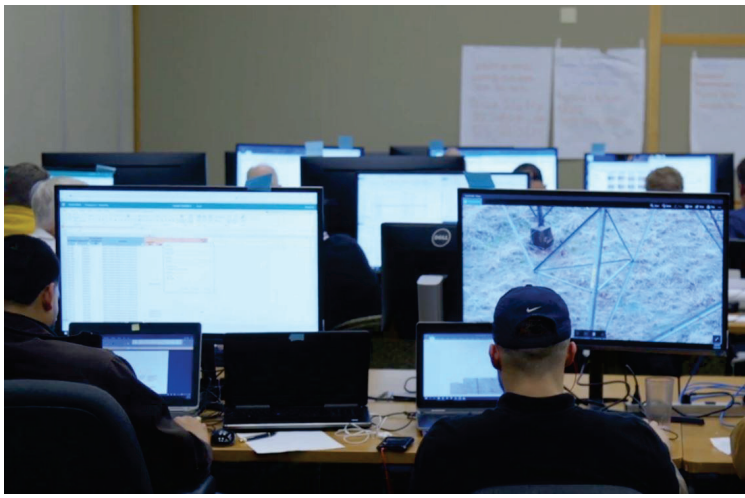
Following the wildfires in 2017 and 2018, some of the changes included in this presentation are contemplated as additional precautionary measures intended to further reduce future wildfire risk.

Wildfire Safety Inspection Program (WSIP)

CENTRALIZED INSPECTION REVIEW TEAM (CIRT)

Inspection findings are reviewed by the Centralized Inspection Review Teams (CIRT), composed of individuals with experience in system maintenance and engineering to evaluate conditions for necessary repairs and timing.

- The CIRT helps to further **improve prioritization while establishing a greater level of consistency and accuracy.**
- The CIRT **evaluates the identified conditions** applying the guidance from the Electric Transmission Preventative Maintenance (ETPM) Manual (TD-1001M) and Electric Distribution Preventative Maintenance (EDPM) Manual (TD – 2305M) and associated job aids to **prioritize repairs and associated corrective actions.**



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 Inspection Program (WSIP)

REPAIRS

To date, 100% of the highest-priority conditions have been repaired or made safe.

- When inspections determine that repairs are needed, but **there is not an immediate safety risk, preventative maintenance procedures, consistent with state guidelines** for high fire-threat areas, will guide repair time.
- **Repairs range** from installing new electrical components to replacing poles or towers and are dependent on field observations.

TRANSMISSION

TYPE	IDENTIFIED	RESOLVED	% COMPLETE
A	113	97*	85.8%
B	5,237	3,526	67.3%

***Note:** the remaining A-tags on transmission are on deenergized lines and have been made safe.

DISTRIBUTION

TYPE	IDENTIFIED	RESOLVED	% COMPLETE
A	1,000	1,000	100%
B	3,946	3,793	96.1%

SUBSTATIONS

TYPE	IDENTIFIED	RESOLVED	% COMPLETE
A	101	101	100%
B	637	634	99.5%

Data as of 7/31

To see this information broken out by city and county, and for a more detailed breakdown including descriptions of the conditions, please visit pge.com/wildfireinspections and click on the "What We're Doing in Your Community" tab.

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 Inspection Program (WSIP)

Challenges

- **Access to infrastructure –** This includes snow levels in high elevations, road access, and property owner refusals
- **Permitting –** Delays due to timing of local government and environmental permits
- **Data –** Identified inaccuracies to pole database that delayed field inspections and repair work
- **Resources –** Limited qualified personnel. The inspections program created a high volume of repair work and many of the available resources were already involved in other important wildfire risk reduction programs

Improvements

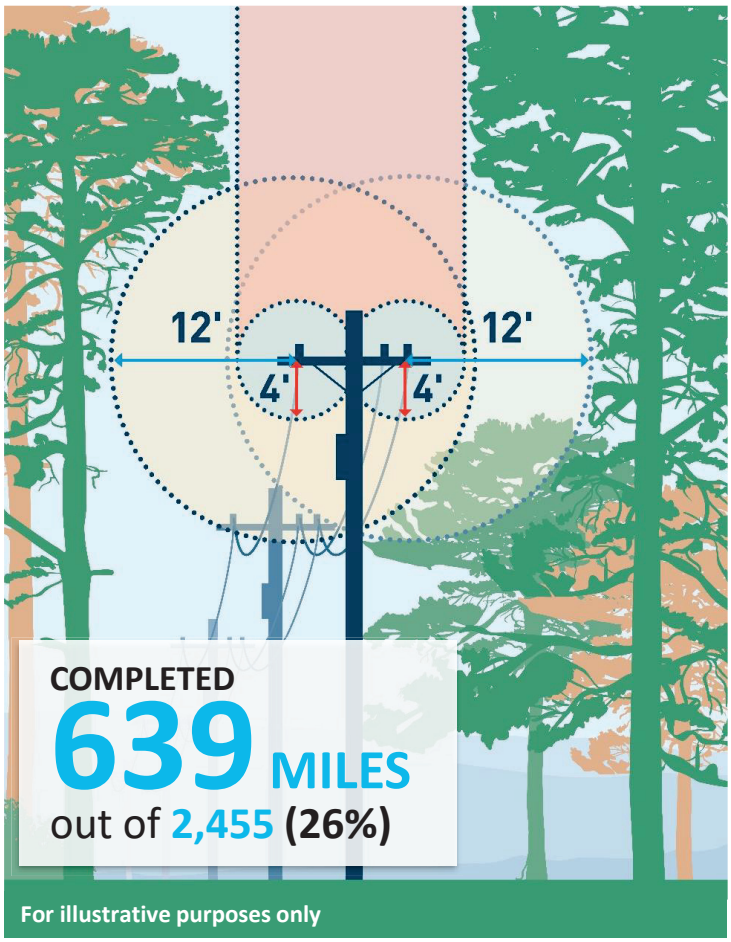
- **Developed More Intuitive, Risk-based and Advanced Inspection Tools –** (ex. Pronto forms) informed by an analysis of fire ignition risk factors to ensure consistency across inspectors
- **Implemented Helicopter Inspections –** To support drone inspections
- **Ensured Every Structure Received At Least One Method Of Inspection –** Includes via ground/climbing, drone or helicopter
- **Stood Up an Incident Command Structure –** To support the urgency and magnitude of the inspections and repairs
- **Identified and Brought on Additional Out-of-state Resources –** Supported by In-depth Training

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.

Enhanced Vegetation Management

We are expanding and enhancing vegetation management to further reduce wildfire risk. Efforts include:

- **Meeting state standards** for minimum clearances around power lines
- **Addressing overhanging limbs and branches** directly above and around the lines
- **Removing hazardous vegetation such as dead or dying trees** that pose a potential risk to the lines
- **Trimming around lower voltage secondary lines**, when needed
- **Evaluating the condition of trees that may need to be addressed** if they are tall enough to strike the lines



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.

Drought and Tree Mortality Response (CEMA)

PG&E's service area includes an estimate of **more than 100 million trees** with the potential to grow or fall into our overhead power lines

INSPECTED

~78% **OF CEMA AREAS**

planned for **2019**

COMPLETED REMEDIATION OF

18,984 **DEAD OR DYING TREES**

out of **50,253** **(38%)** forecasted in 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.

Enhanced Vegetation Management

Challenges

- **Resources –** Limited qualified resources available to support all wildfire risk reduction priorities (including, vegetation work for WSIP, system hardening and Paradise reconstruction)
- **Magnitude –** Significantly increased scope of inspection and tree work over prior years
- **Certified Arborist Requirement –** Issued with the Wildfire Mitigation Plan approval, this requirement created the need for program scope to be approved by a certified arborist, which required additional training and instruction and delayed work timeline
- **Weather –** Prolonged winter storm season
- **Property Owner Refusals**

Improvements

- **Recalibrated the Entire Program:**
  - Leveraged process redesign
  - Identified greater efficiencies across programs (ex. Routine Veg)
  - Deployed enhanced operational technology and alternate tools
  - Onboarded additional qualified personnel and field resources
  - Brought on additional PG&E field oversight and leadership
- **Scope Change –** Readjusted scope to target all trees with strike potential and ensure greater consistency in implementation
- **Risk-Based Schedule –** Realigned the schedule to target highest-priority circuits

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.

Situational Awareness

We are **expanding our network of PG&E weather stations** to enhance weather forecasting and modeling and **installing new high-definition cameras** in high fire-threat areas

INSTALLED
393 **WEATHER STATIONS**
out of **400** **(98%)**
Data available at **pge.com/weather**

INSTALLED
75 **HIGH-DEFINITION CAMERAS**
out of **71** **(105%)**
Images available at **pge.com/weather** or **alertwildfire.org**

Data as of 8/31/19

Additional Situational Awareness Measures

- Deployed enhanced **PG&E Operational Mesoscale Modeling System (POMMS)**
- Operationalized **Fire Spread Modeling**, to allow improved understanding of catastrophic fire risk
- Deployed a **Satellite Fire Detection Toolset** to detect and track new fires as they occur, issue alerts and simulate potential spread of new and existing fires; next phase of modeling is underway
- Operationalized **Storm Outage Prediction Model (SOPP)**
- Integrated multiple technological tools, data sources, and human resources into the **Wildfire Safety Operations Center (WSOC)** to increase situational awareness to respond more effectively to wildfires

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.

Situational Awareness

Challenges

- **Ability to Share Data Externally –** High public interest in sharing of weather and camera data and insights in formats that all users can easily access
- **Refining Methodology –** Incorporating changing weather patterns into system asset analysis and standards
- **Equipment Availability –** Increased demand for weather stations resulted in delays by third-party vendor

Improvements

- **Launched Public-facing Website –** Providing weather and camera data in real-time alongside a PSPS 7-Day Forecast
- **Updated methodology:**
  - **Weather Stations –** Revisiting the pole selections for weather stations
  - **Satellite Fire Detection Systems –** Working on incorporating with the next phase of more sophisticated fire spread modeling
- **Technology Updates / Increase Staffing (WSOC) –** Updating tools and increasing resources to increase situational awareness to respond more effectively to wildfires

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.

Operational Practices

COMPLETED SCADA-ENABLING OF
287 LINE RECLOSERS
out of 287 **(100%)**

SECURED 28 TRUCKS and **HIRED 63 EMPLOYEES**
for **Safety and Infrastructure Protection Teams (SIPT) (100%)**

PROVIDING
4 HEAVY-LIFT HELICOPTERS
to aid in **fire suppression** and **restoration efforts**

Personnel Work Procedures
in Conditions of Elevated Fire Risk

- PG&E has **updated the standard (TD-1464S) regarding operational practices** during elevated fire risk conditions and is **actively training field crews**
- As of June 30, 2019, PG&E has begun the process of **implementing the updated standard with operational teams** throughout the company, including through **in-person Wildfire Season Readiness Kick-off Meetings**

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.

Operational Practices

Challenges

- **Resources –** Limitations with identifying, testing and onboarding available qualified personnel
- **Equipment Availability –** Experienced delays in the delivery of trucks and pumps, as well as the need for additional vehicle preparation before fully operation
- **Government Reviews (Aviation Resources) –** The extended government shutdown delayed FAA inspection and issuance of the certifications need for the helicopters

Improvements

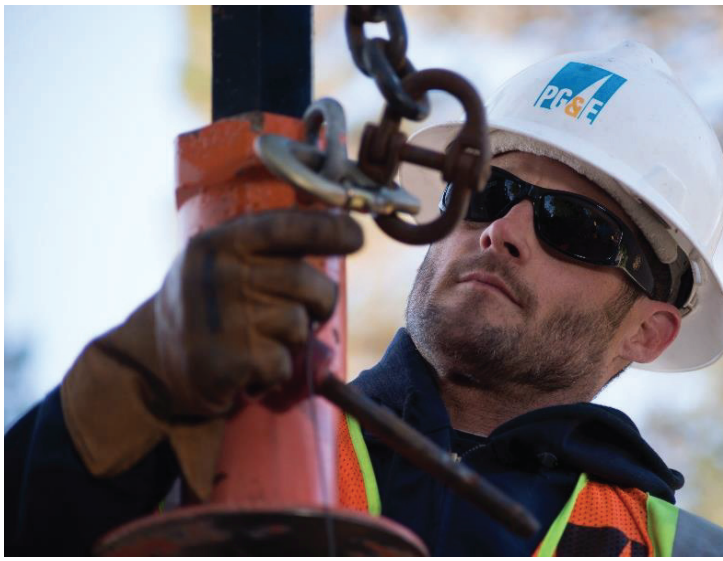
- **Resources –** Identified and onboarded 63 field personnel and continuing to build in longer lead time for the employee onboarding
- **Safety and Infrastructure Protection Teams (SIPT) –** Challenges have been worked through and teams are operational

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.

System Hardening and Resiliency

Installing stronger and more resilient poles and covered power lines across approximately **150 line miles** of highest fire-risk areas

Replacing ~625 non-exempt fuses/cutouts to further reduce risk to our system and tailoring upgrades based on terrain and weather conditions using more granular analysis of fire-prone regions



COMPLETED

75 LINE MILES

of **system hardening** out of **150 (50%)**

DESIGN COMPLETED FOR

625 NON-EXEMPT FUSES/CUTOUTS

construction planning underway

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.

System Hardening and Resiliency

Challenges

- **Permitting –** Delays due to timing of local government and environmental permits
- **Resources –** Limited qualified resources (e.g., Construction, Estimating, Project Management) available to support competing wildfire risk reduction priorities

Improvements

- **Reducing Cycle Times –** Working on parallel paths to clear dependencies alongside design completion
- **Engage with Federal and State Agencies –** Early engagement with key agencies regarding approval and leveraging of programmatic permits
- **Contracting Resources –** Leveraging multiple contracting resources, including estimators, to reduce cycle time and support increase in demand
- **Process Redefined –** Streamlined design preparation of fuses for replacement

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.

Public Safety Power Shutoff (PSPS)

We **monitor conditions** across our system and evaluate whether to proactively turn off electric lines for safety **when gusty winds and dry conditions combine with a heightened fire risk**

While no single factor will drive a Public Safety Power Shutoff, some factors include:

A RED FLAG WARNING
declared by the National Weather Service

LOW HUMIDITY LEVELS
generally 20% and below

FORECASTED SUSTAINED WINDS GENERALLY ABOVE 25 MPH AND WIND GUSTS IN EXCESS OF APPROXIMATELY 45 MPH, depending on location and site-specific conditions such as temperature, terrain and local climate

CONDITION OF DRY FUEL
on the ground and live vegetation (moisture content)

ON-THE-GROUND, REAL-TIME OBSERVATIONS
from PG&E's Wildfire Safety Operations Center and field observations from PG&E crews

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.

Public Safety Power Shutoff (PSPS)

Piloting new resilience zones to allow us to provide electricity to central community resources serving local customers during a Public Safety Power Shutoff (PSPS) event; **Construction is underway in Angwin and targeting completion by October**

Installing sectionalizing devices to reduce PSPS impacts to customers where de-energizing the line will not result in a realized wildfire risk reduction

INSTALLED
181 **TOTAL LOCATIONS**

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.

Public Safety Power Shutoff

Challenges	Improvements
• **Land Rights (Resilience Zones)** • **Change in Design Standard –** Modifications to resilience zone design strategy including undergrounding the majority of distribution conductors resulted in delays in operational readiness • **Advanced PSPS information to Public Safety Partners –** After the June event, PG&E identified lessons learned, such as working together with public safety partners to determine the information needed in advance of and during an event (ex: format of maps)	• **More Advance Coordination with Government Agencies –** To align on optimal resilience zone locations and design • **Improvements Made to PSPS Processes Including Notifications –** Being discussed in further depth through the PSPS OIR

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.

Additional Technologies and Initiatives

Rapid Earth Fault Current Limiter Pilot Project: Developing pilot project for operational deployment; anticipated for 2020.

Enhanced Wires Down Detection Project: Phase 1 complete; SmartMeter Partial Voltage (PV) alert functionality was deployed on **4.5M single-phase SmartMeters** to provide situational awareness of single-phasing conditions that may indicate the occurrence of a wire-down event. Phase 2 will expand to three-phase SmartMeters.

Post Incident Recovery, Restoration, and Remediation Activities: PG&E's Service Planning department has a dedicated team and documented processes in place to support rebuilds as necessary.

Plan Performance and Evaluation

Quality of Transmission and Distribution Inspections: 98% transmission and 93% distribution

Quality of the Miles of System Hardening HFTD Areas: All miles reported as complete have been 100% quality reviewed and internal audit verified

Vegetation Management Quality Assurance Results in HFTD Areas: ~50% EVM quality performance YTD; 100% of EVM work is being verified, all trees identified as missed or improperly completed will be reworked before miles are reported as complete

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 Preparedness and Outreach

CITY/COUNTY OUTREACH

888 MEETINGS COMPLETED
with cities, counties, agencies, first responders and participation in community events

287 CITIES/ COUNTIES INFORMED
OUT OF 287
about CWSP and PSPS

COMMUNITY RESPONSES

252 RESPONSES TO STAKEHOLDERS
with up to **30** QUESTIONS per response

MAIL/EMAIL SENT

18.8M+
PSPS-RELATED DIRECT MAIL PIECES

17.7M+
PSPS-RELATED EMAILS

OPEN HOUSE/WEBINARS AND WORKSHOPS

26 OPEN HOUSES/ WEBINARS COMPLETE
~5,340 total attendees

18 WORKSHOPS COMPLETE
~990 total attendees

WEBSITE HITS
(MARCH 2019 TO PRESENT)

WILDFIRE SAFETY	WILDFIRE ALERTS
638,772 ALL TRAFFIC	192,488 ALL TRAFFIC

BACKUP GENERATION	PG&E MARKETPLACE
35,329 UNIQUE VISITORS	5,516 UNIQUE VISITORS

CUSTOMER CONTACT UPDATES

226,334
CUSTOMER CONTACT INFO UDPATES

9,987
MEDICAL BASELINE CUSTOMER CONTACT INFO UDPATES

CUSTOMER CONTACT INFORMATION ON FILE

~5.4M
TOTAL CUSTOMER ACCOUNTS

95% PHONE ON FILE

60% EMAIL ON FILE

~193,900
TOTAL MEDICAL BASELINE ACCOUNTS

99.9% CONTACT INFORMATION ON FILE

Note: Additional webinars and workshops are being held with critical service providers, education stakeholders and representatives of Access and Functional Needs communities.

Data as of 8/31

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.

Lessons Learned

As we begin to develop our wildfire safety plan for 2020, the following are key takeaways from this year that will inform our overall planning.

Key Takeaways	
Prioritization	• Continued need to prioritize across wildfire risk reduction initiatives • Utilizing the "three pillars" as a framework for developing work plan • Aligning plan and initiatives with total resources available
Logistics and Planning	• Build more flexibility into work plan to incorporate lessons learned • Establish a better understanding of available resources at the onset • Factor in external dependencies such as weather, customer refusals and permits • Work with key permitting agencies on opportunities to streamline the process
Benchmarking	• Continue to coordinate with other IOUs and utilities to build on best practices • Continue to leverage experiences throughout the industry (ex: Australia)
Stakeholder Outreach	• Continue broad outreach and engagement campaign regarding wildfire preparedness • Gather and incorporate feedback from communities and stakeholders • Look for opportunities to partner on shared initiatives (ex: defensible space)
Third-Party Partnerships	• Leverage third-party partnerships to develop better statewide forest management practices • Coordinate with environmental agencies re: permitting

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.

ATTACHMENT E

SCE's 2019 Wildfire Mitigation Plan (WMP) Progress Update

CPUC WMP Phase 2 Workshop

September 17, 2019

(Data through July 2019)

Energy for What's Ahead℠

SOUTHERN CALIFORNIA EDISON®

Overview

01
Summary Status
Slides 3 – 6

- Background
- Activities Summary
- Lessons Learned

02
Activity Status
Slides 7 – 16

- Operational-related Activities
- Inspection-related Activities
- System Hardening Activities
- Vegetation Management Activities
- Situational Awareness Activities
- Alternative Technology Activities
- Emergency Preparedness Activities
- Conclusion

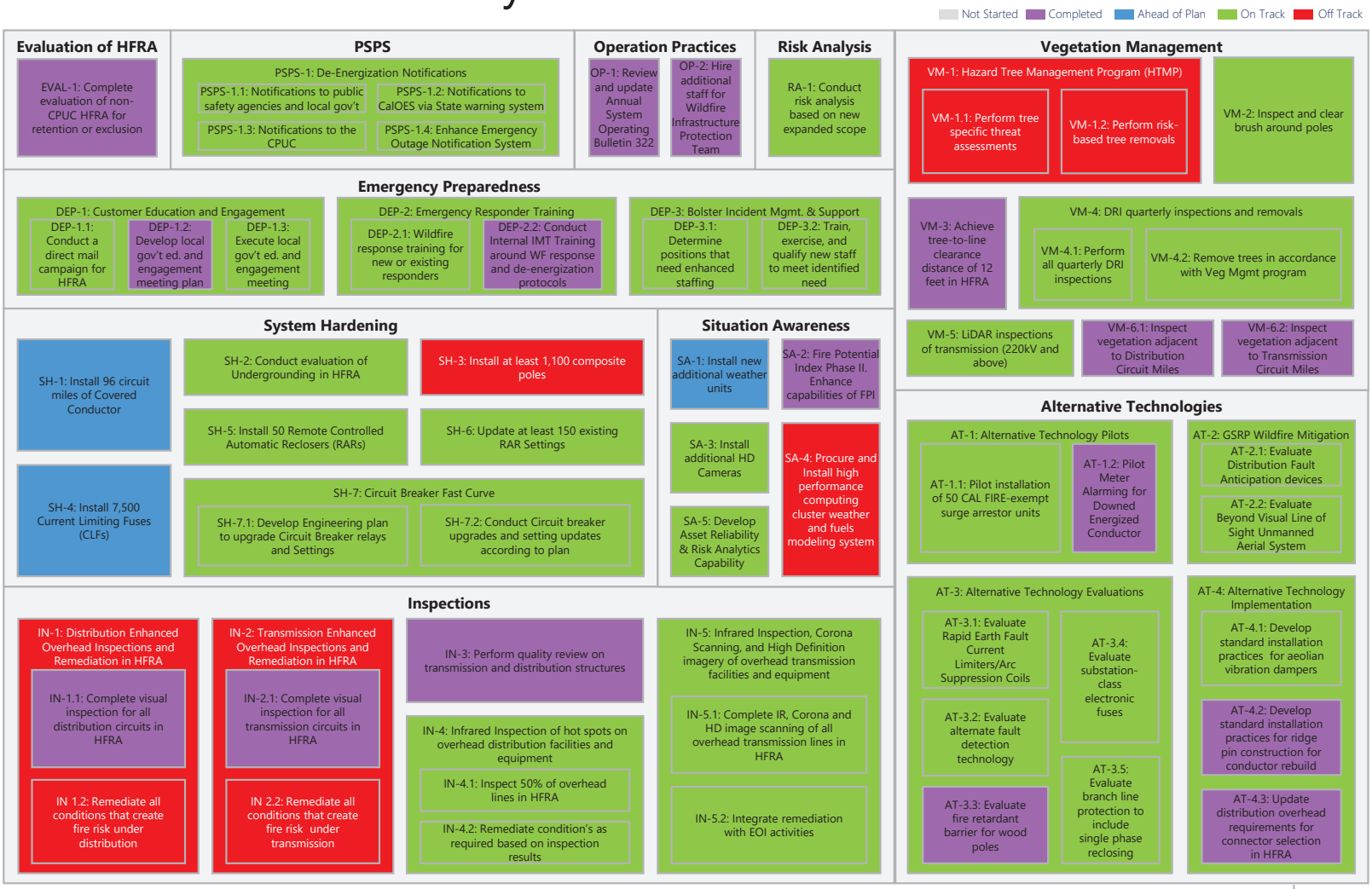
03
Appendix
Slides 17 – 26

- Off-Track or Other Notable Activities
- PSPS
- External Stakeholder Outreach
- Aerial EOI Findings

SCE's 2019 WMP Scope Background

- SCE is tracking 58 specific wildfire-related mitigation activities included in its 2019 WMP
  - SCE's WMP filing described 34 Activities (several have subparts, which adds 22 activities) and 8 metrics (6 of which are identical to the Activities)
  - Given Guidance Decision direction and for purposes of this status update, the additional 2 Metrics will be referred to as activities
  - Since filing its WMP, SCE has also commenced additional wildfire risk reduction mitigations including, for example, aerial EOI, community resource centers, and fuel sampling
- Statuses tracked for each Metric/Activity
  - Completed, Ahead of Plan, On Track, Off Track
  - Used to monitor performance and reflects current status not year-end outlook
  - Majority of Off Track activities' goals anticipated to be met by end of year absent exogenous events such as a major storm or earthquake

WMP Activities Summary



WMP Lessons Learned

Enhanced Overhead Inspection(EOI): Accelerated ground-based enhanced inspections for all structures in SCE's High Fire Risk Areas	• Moving from compliance-based to risk-based approach enhances ability to identify and remediate conditions that could lead to ignitions • Acceleration of ~450,000 inspections typically performed over 5-year cycle into 5-month plan enabled faster identification of findings but created challenges for meeting remediation compliance timeframes that are time-based vs. risk-based • Utilizing Incident Command System structure enabled rapid program development and execution • Adoption of digital tools (iPads, electronic reporting dashboards, etc.) using fast software development approach and close partnership with end users enabled speedy implementation • Improved EOI effort by initiating aerial EOI to identify conditions not visible from the ground (see Appendix for sample images)
EOI Remediation: Remediate EOI-identified inspection findings	• Significant amount of notifications requiring remediation work were created due to larger volume of inspections over shorter time period (on a per-structure-inspected basis, the number of notifications are similar to historical rates) • Having a consistent risk-based prioritization scheme across the entire HFRA was an important success factor to address all the higher priority findings • Establishing processes to manage large datasets (inspection findings, remediations, risk information) critical to effectively plan, prioritize, and manage work • Data cleanup and reconciliation is a significant effort due to high volume of notifications produced during EOI against pre-existing notifications generated from other inspection programs • Additional analytical and project management resources were need to track and manage across all aspects of the remediation work cycle, from Initiate, Plan, Schedule, Execute to Close • Use of temporary laydown yards located in strategic locations enabled greater efficiency in the flow of materials and allocation of work to field crews • Use of specialized planning teams are needed to address the high volume of remediations needing design work
Vegetation Management: Expanded program with greater volumes and new activities	• Increased vegetation work across California is driving scarcity and competition for resources • Challenges gaining customer and government agency support – customers and agencies are confused by the different activities occurring, do not agree with the value/efficacy of vegetation management for wildfire mitigation, or perceive potential environmental/aesthetic impacts as outweighing that value • Significant program expansion causing internal "growing pains" to develop systems, processes, and oversight
Human Resources: Contractor, SCE field workers, design/planning, etc. resource issues	• Internal resource constraints in planning, design, permitting, environmental and SCE field workers • External resource constraints with contractors: design resources, electrical crews, tree crews, and arborists • Public agencies such as Caltrans, cities, counties, etc. are also resource-constrained when processing large volumes of work in concentrated areas

WMP Lessons Learned (continued)

System Hardening: Hardening grid infrastructure to reduce ignition sources	• Despite slow start to covered conductor construction due to resource constraints and competing priorities with EOI effort, SCE is securing multiple suppliers and expediting work and expects to significantly exceed the 2019 goal • Surpassed branch line protection goal by completing current limiting fuses at 7,441 locations; Additional installations are underway and have learned that certain projected locations are not viable due to different field conditions • Success in securing multiple covered conductor vendors early – leveraged existing relationships with multiple suppliers (three currently approved, with others not yet approved but ready to provide product) to ensure planned capacity could be achieved recognizing that other IOUs may require the same production resources • Held technical conferences with multiple covered conductor suppliers, performed benchmarking with other utilities and industry organizations, and contracted with multiple consultants to ensure design standards are industry best practices • Early communication with field workers helps ensure construction standards are timely developed, tools are available, and proper work methods are followed
Risk Considerations: Improved risk analytics to identify and prioritize mitigation measures	• Improved granularity in risk modeling has been able to identify localized areas within Tier 2 that are higher risk than Tier 3 • Fire simulation studies provide understanding of risk exposure for localized areas such as segments of circuits • Revisions to HFRA boundaries are necessary to reflect changing conditions but significant resources and time required to conduct thorough analysis and change operational processes
Material Supply: Challenges with volume of work and lead times for certain materials	• Stockpile historical key materials in the event of shortages • Identify backup vendors in the event of unforeseen vendor circumstances • Explore creative alternative solutions to expand material supply options and address capacity constraints (e.g., fire wrapping of wood poles to address limited manufacturing capacity for fire-resistant composite poles) • Account for material shortages by establishing a materials gatekeeper team to ensure areas are addressed in priority order
Situational Awareness:	**Weather Stations** • Consider inclement weather, remote terrain and accessibility issues (e.g. snow, mud, etc.) when establishing installation schedule for weather stations. **HD Cameras** • Partnering with UCSD and working in close coordination with local fire agencies has been effective at identifying HD Camera locations and completing their installments • Perform siting early and encourage vendors to negotiate tower agreements early to avoid schedule delays • It is very important to coordinate locations with county and state fire agencies to identify optimal placement • Integrate cameras into internal GIS capabilities to provide common operating picture against IOU infrastructure

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Operational-related Activities

PSPS: De-Energization Notifications (PSPS-1):

Local Govt and Agency PSPS Notifications
On Track

Notifications to Public Safety Agencies and Local Government (PSPS-1.1)

Volume vs 2019 Goal: Sent notifications for each of the 7 events to date in 2019
Key Actions: This Activity is triggered by a PSPS event where SCE is required to submit ESRB-8 documentation to confirm it met the requirements outlined by the CPUC.

State PSPS Notifications
On Track

Notifications to CalOES via State Warning System (PSPS-1.2)

Volume vs 2019 Goal: Sent notifications for each of the 7 events to date in 2019
Key Actions: This Activity is triggered by a PSPS event where SCE is required to submit ESRB-8 documentation to confirm it met the requirements outlined by the CPUC.

CPUC PSPS Notifications
On Track

Notifications to the CPUC (PSPS-1.3)

Volume vs 2019 Goal: Sent notifications for each of the 7 events to date in 2019
Key Actions: This Activity is triggered by a PSPS event where SCE is required to submit ESRB-8 documentation to confirm it met the requirements outlined by the CPUC.

Emergency Notification Enhancements
On Track

Enhance Emergency Outage Notification System (PSPS-1.4)

Volume vs 2019 Goal: PSPS messaging will be delivered in English plus the 5 primary additional languages within SCE's service area
Key Actions: All work tracks for this goal have begun. SCE.com Team is in in process of creating landing pages for In Language PSPS notifications. Translation vendor is in process of voice and text translations into the 5 additional languages. PSPS notification vendor ready to begin work to integrate voice messaging into their platform as soon as translation recordings delivered.

HFRA Boundary Evaluation
Complete

Evaluation of HFRA (EVAL-1)

Volume vs 2019 Goal: Evaluation complete; PFM filed on 8/19/2019
Key Actions: The technical review of non-CPUC HFRA evaluation results was completed and the non-CPUC HFRA boundary Petition for Modification (PFM) was submitted.

Wildfire Risk Analysis
On Track

Expansion of Wildfire Risk Analysis (RA-1)

Volume vs 2019 Goal: On track to conduct risk analysis incorporating 2018 fire ignition data, additional system information, and consequence modeling to evaluate wildfire risk at a circuit segment level.
Key Actions: SCE is developing and testing revisions to its wildfire risk modeling methodology that include segment-level probability of ignition calculations that incorporate system characteristics, fault / fire history, and local conditions, as well as localized ignition consequence risk.

SOB Review and Update
Complete

Review and Update Annual System Operating Bulletin 322 (OP-1)

Volume vs 2019 Goal: Review and update to non-CPUC HFRA complete
Key Actions: System Operating Bulletin (SOB) 322 was revised to include additional details on operating restrictions during elevated fire weather threats, blocking subtransmission reclosers, fast curve settings, and operations during PSPS events.

Hire Additional Meteorologist
Complete

Hire Additional Staff for Wildfire Infrastructure Protection Team (OP-2)

Volume vs 2019 Goal: Hired one additional meteorologist
Key Actions: Completed hiring of one additional meteorologist for the Wildfire Infrastructure Protection Team.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Inspection-related Activities

EOI

Dist.	Trans.
100%	100%
Inspected	
80%	40%
Remediated	

Enhanced Overhead Inspections (IN-1 & IN-2)

Volume vs 2019 Goal:
Distr. 100% of structures inspected
Distr. 80% of notifications remediated
Trans. 100% of structures inspected
Trans. 40% of notifications remediated

Key Actions: All EOI P1 notifications have been remediated within compliance dates and the top 2% of REAX scored P2's have also been remediated. Remaining P2 notifications are being remediated based on required compliance dates.

QC HFRA Inspections

228%

Structures Inspected

QC HFRA Inspections (IN-3)

Volume vs 2019 Goal: 17,080 of 7,500 structures inspected
Key Actions: Performed quality reviews on transmission and distribution structures in HFRA based on EOI inspections, more than doubled the goal amount, no further actions expected.

Overhead Line Inspections

15%

IR Scans Completed

Infrared Inspection of Hot Spots on Overhead Distribution Facilities and Equipment (IN-4)

Volume vs 2019 Goal: Approximately 15% completed of goal
Key Actions: Distribution IR Scanning encountered a slow start due to GIS system data discrepancies; however, data issues have been resolved and production will increase significantly in September. The program has identified several severe hotspot conditions in Redlands District (switches, splices, connectors) and several hot connectors in Arrowhead district

Infrared Inspections & HD Imagery

On Track

Infrared Inspection, Corona Scanning, and High Definition Imagery of Overhead Transmission Facilities and Equipment: Complete IR, Corona and HD Image Scanning of All Overhead Transmission Lines in HFRA (IN-5.1)

Volume vs 2019 Goal: 5,716 of 6,513 miles planned of overhead transmission lines have been flown utilizing IR and Corona scanning. 452 miles were loaded above 40% of rated capacity.
Key Actions: Data collection was temporarily restarted in June to collect IR/Corona data on generation ties coming out of Big Creek and Bishop. That data has been provided to Transmission Engineering for analysis and has since been received back. All data collection is currently on hold until ground temperatures decrease.

Integrate Remediation w/EOI Activities

On Track

Infrared Inspection, Corona Scanning, and High Definition Imagery of Overhead Transmission Facilities and Equipment: Integrate Remediation with EOI Activities (IN-5.2)

Volume vs 2019 Goal: Collaborating with Transmission Engineering to integrate remediation with their EOI work.
Key Actions: Any Priority 1 conditions or notification items are immediately provided to Transmission for evaluation and remediation. Priority 2 and 3 notifications will go through gate keeping and are entered into SAP with a completion date based on fire tier compliance timelines

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

System Hardening Activities

WCCP

84%

Circuit Miles Installed

WCCP (SH-1)

Volume vs 2019 Goal: 81 of 96 (84%) circuit miles installed
Key Actions: 324 circuit miles of non-Grid Resiliency overhead conductor work has been redesigned for covered conductor in HFRA. Some of this work will be executed in 2019. Advancing a portion of work scheduled to begin construction in 2020 to 2019.

Composite Poles

13%

Poles Installed

Composite Pole Installation (SH-3)

Volume vs 2019 Goal: 145 of 1,100 (13%) poles installed
Key Actions: The current plan to meet the 1,100 composite pole installations is more heavily weighted with installations in Q4 2019 as compared to the original goal plan created in 2018. Work orders including approximately 900 composite poles are in construction and are expected to be complete by year-end. In addition, construction of two circuits have been advanced from 2020 to 2019. Current outlook is Activity is expected to meet goal by year-end.

Underground work in HFRA

On Track

Evaluation of Undergrounding in HFRA (SH-2)

Volume vs 2019 Goal: On track to conduct assessment of undergrounding for HFRA
Key Actions: SCE has identified high risk circuit segments in HFRA for internal evaluation and consideration as a potential wildfire risk mitigation. SCE has assembled cross-functional teams including engineering, risk, and local district personnel to further evaluate potential underground scope at a local level for mitigation effectiveness, construction feasibility, and conditions/attributes that support undergrounding of overhead lines to mitigate wildfire risk.

Fuses

99%

Fuse locations completed

Current Limiting Fuses (SH-4)

Volume vs 2019 Goal: 7,441 of 7,500 (99%) fuse locations completed
Key Actions: Contractors on track to meet targets.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

System Hardening Activities

RARs

8%

RARs Installed

Install 50 Remote Controlled Automatic Reclosers (RARs) (SH-5)

Volume vs 2019 Goal: 4 of 50 (8%) RARs installed. Although the goal plan assumed 10 installations per month from August through December, the current plan accelerates RAR installations and will result in being ahead of plan each month until the goal is met.

Key Actions: Additional RARs are being accelerated from 2020 to help ensure the successful 2019 outcome for RAR installations

Circuit Breaker Fast Curve

On Track

Circuit Breaker Fast Curve: Develop Engineering Plan to Upgrade Remaining Circuit Breaker Relays and Update Settings (SH-7.1)

Volume vs 2019 Goal: CB relays and update settings
SH-7.1.A: 60 Substations with 300 circuits scoped
SH-7.1.B: 45 Substations with 68 circuits being scoped

Key Actions: 7.1.A Projects scoped and handed off for design. 7.1.B Job walks scheduled for scoping activities to be completed by year-end.

RAR Settings

93%

RARs Updated

Update At Least 150 Existing RAR Settings (SH-6)

Volume vs 2019 Goal: 139 of 150 (93%) existing RAR settings

Key Actions: Install remaining 11RAR settings in substations by year end to meet 2019 goal.

Circuit Breaker Fast Curve

On Track

Circuit Breaker Fast Curve: Execute Circuit Breaker Relay and Settings Upgrades according to plan (SH-7.2)

Volume vs 2019 Goal: All projects have commenced engineering design, engineering contracts have been issued to the regional engineering vendors who are currently working on the design. Construction dates are being scheduled.

Key Actions: SH-7.2.A Engineering Milestone - Complete engineering for 22 stations by 3/25/2020, SH-7.2.B Major Materials – Complete procurement of major material for 22 stations by 9/7/2020, SH-7.2.C Construction Complete – In-Service 22 stations by 12/31/2020

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Situational Awareness Activities

Weather Stations
88%
Weather Stations

Weather Stations (SA-1)
Volume vs 2019 Goal: 277 of 315 (88%) Weather stations complete
Key Actions: Preparing crews for more rural areas; install pace will slow due to accessibility challenges with remote locations of remaining sites

FPI Phase 2
Complete

Fire Potential Index Phase 2: Enhance Capabilities of FPI (SA-2)
Volume vs 2019 Goal: Enhanced capabilities of FPI by increasing granularity, adding historical climatology data, and expanding to cover all of SCE's service territory.
Key Actions: Fire Potential Index (FPI) Phase 2 consisted of the FPI being calculated at the circuit level across its HFRA below 6,000 feet.

HD Cameras
90%
Cameras Installed

HD Cameras (SA-3)
Volume vs 2019 Goal: 56 of 62 (90%) HD cameras installed
Key Actions: SCE and UCSD working in close coordination with local fire agencies for new camera locations. SCE working closely with local fire agencies and SCE fire management team to site the remaining locations.

Modeling System
0%
Operational HPCCs

Procure and Install High Performance Computing Cluster Weather and Fuels Modeling System (SA-4)
Volume vs 2019 Goal: 0 out of 2 HPCCs operational
Key Actions: Continue to support vendor in operationalizing HPCC at primary site, expected Q3. Backup site expected to be operational in Q4. Expecting to meet goal by year end.

Analytics
On Track

Develop Asset Reliability & Risk Analytics Capability (SA-5)
Volume vs 2019 Goal: Complete implementation of advanced analytics platform and tools.
Key Actions: SCE has completed an initial prototype of its in-house analytics capabilities to assess the structures/poles and associated conductor with the highest probability for wildfire ignition. SCE will continue to develop and mature its ignition modeling and the ability of wildfire mitigations to reduce risk at a structure/pole/conductor level.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Vegetation Management Activities

Enhanced Veg. Mgmt
41%
Trees Assessed

Perform Tree Specific Threat Assessments (VM-1.1)

Volume vs 2019 Goal: 50,845 of 125,000 trees (83% of YTD target)
Key Actions: Continue weekly discussions with Assessment contractors regarding status of resource commitments for certified arborists..

Enhanced Veg. Mgmt
13%
Trees Removed

Perform Risk-based Tree Removals (VM-1.2)

Volume vs 2019 Goal: 1,006 of 7,500 trees (44% of YTD target)
Key Actions: Address roadblocks for 9,400+ removal prescriptions in inventory. Streamline process for obtaining environmental clearance and permission from private and public property owners. Continue to strategize locations for assessment based on risk posed by tree density and patrol frequency in addition to wildfire potential. Likely will not meet goal due to lack of agency approvals.

Poles
49%
Poles Cleared

Inspect and Clear Brush Around Poles (VM-2)

Volume vs 2019 Goal: 49,265 of 100,000 poles (99% of YTD target)
Key Actions: Contractor continues to add resources needed to complete work on increased pole population.

Annual Pruning
New Clearance Distance Implemented

Achieve Tree-to-line Clearance Distance of 12 Feet in HFRA (VM-3)

Volume vs 2019 Goal: Obtain clearance distance of 12' as achievable
Key Actions: New standard (12' at time of trim) for distribution voltages piloted in Q1 and Q2. Implemented across HFRA for pruning taking place in June and beyond. Tree-specific exceptions evaluated to ensure regulatory clearance distance maintained. Hired "notification consultants" to provide direct customer interaction and address local opposition to deeper pruning. Working with local governments that have imposed additional restrictions/approvals to deeper cuts.

DRI Inspection
7,793
Trees Identified

Perform All Quarterly DRI Inspections (VM-4.1)

Volume vs 2019 Goal:
- Quarterly DRI Inspections on track
- 7,793 trees identified for removal in 2019 YTD

Key Actions: Continue historic continuous inspections (repeating approximately every 3 months) of areas identified by the CA Tree Mortality Task Force to identify trees that are dead, diseased, or dying.

DRI Removals
97%
% Active Inv. <180 days

DRI Tree Inspections & Removals (VM-4.2)

Volume vs 2019 Goal: >96% of active inventory removed less than 180 days old
- 7,793 trees identified for removal in 2019 YTD
- 6,970 trees removed in 2019 YTD
- Year-end outlook tracking to ~50% of ~30,000 WMP metric forecast

Key Actions: Continue historic removal of trees identified as dead, diseased, or dying. Easing of drought conditions has reduced the volume of trees requiring removal (30,000 originally forecast based on historic average).

LiDAR
29%
Circuit Miles Inspected

LiDAR Inspections of Transmission (220kV and above) (VM-5)

Volume vs 2019 Goal: 290 of 1,000 circuit miles flown (174% of YTD target)
Key Actions: Executed four contracts to obtain LiDAR data on all bulk transmission lines and select sub-transmission lines. Vegetation data received in Q2 is being used to identify trimming locations in Big Creek area to ensure sufficient clearance under maximum conductor sag and sway conditions.

QC HFRA Inspections

Dist.	Trans.
106%	128%

Circuit Miles Inspected

Inspect Vegetation Adjacent to T&D Circuit Miles (VM-6.1 & VM-6.2)

Volume vs 2019 Goal: Inspected vegetation adjacent to 476 of 450 distribution circuit miles and 511 of 400 transmission circuit miles
Key Actions: Independent QC of annual pruning implemented across territory. Evaluates clearance distance obtained and prioritizes higher QC volume in HFRA. Work is ongoing in accordance with annual cycle.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Alternative Technology Activities

Surge Arrestor Units
50%
Units Installed

Alternative Technology Pilots: Pilot Installation of 50 CAL FIRE-exempt Surge Arrestor Units (AT-1.1)
Volume vs 2019 Goal: 25 of 50 pilot units installed
Key Actions: Pilot units being installed in Victorville District and plan to have all pilot units installed by end of year.

Meter Alarming
Complete

Alternative Technology Pilots: Pilot Meter Alarming for Downed Energized Conductor (AT-1.2)
Volume vs 2019 Goal: Completed pilot meter alarming for downed energized conductor
Key Actions: Pilot is now operational system wide

Fault Devices
On Track

GSRP Wildfire Mitigation: Evaluate Distribution Fault Anticipation Devices (AT-2.1)
Volume vs 2019 Goal: Evaluate fault technology and complete pilot installation of at least 10 DFA devices. Engineering design is complete for 60 DFA devices to be installed at 7 substations. 0 installations have been completed as of August 2019.
Key Actions: Install all devices per plan prior to year-end. First device will be installed October 2019.

Unmanned Aerial Systems
On Track

GSRP Wildfire Mitigation: Evaluate Beyond Visual Line of Sight Unmanned Aerial System (AT-2.2)
Volume vs 2019 Goal: Develop statement of work, issue RFP , select vendor, and perform demonstration flights
Key Actions: Next steps include issuing the purchase order, conducting UAV patrol flights, and drafting a final report on successes, lesson-learned, and suggestions for operationalization

Fault Current Limiters/ Arc Suppression Coils
On Track

Alternative Technology Evaluations: Evaluate Rapid Earth Fault Current Limiters/Arc Suppression Coils (AT-3.1)
Volume vs 2019 Goal: Conduct assessment by end of 2019
Key Actions: Candidate substations/circuits identified and engineering models for pilot substation built. Simulation testing targeted for late September.

Fault Detection
On Track

Alternative Technology Evaluations: Evaluate Alternate Fault Detection Technology (AT-3.2)
Volume vs 2019 Goal: Conduct technology assessment by end of 2019
Key Actions: Open Phase Protection - 12 units installed in alarming mode for monitoring. Pilot radio deployment targeted for October. Lab testing of isolation banks targeted for late September.

Fire Retardant Pole Wraps
Complete

Alternative Technology Evaluations: Evaluate Fire Retardant Barrier for Wood Poles (AT-3.3)
Volume vs 2019 Goal: Evaluate use of wood pole with protective barrier
Key Actions: Completed evaluation of new fire-retardant wrap for wood poles as an alternative to fire-resistant composite poles; published associated design standards. Implementing fire-retardant wrap based on positive testing.

Fuses
On Track

Alternative Technology Evaluations: Evaluate Substation-class Electronic Fuses (AT-3.4)
Volume vs 2019 Goal: Conduct technology assessment by end of 2019
Key Actions: In process of hiring vendor to complete assessment. Anticipate completing assessment by year-end.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Alternative Technology Activities (Cont.)

Branch Line Protection
On Track

Alternative Technology Evaluations: Evaluate Branch Line Protection to Include Single Phase Reclosing (AT-3.5)
Volume vs 2019 Goal: Complete evaluation
Key Actions: Published pilot FuseSaver standards. Material being finalized for pilot unit installs. Targeting 4th quarter installation of 8 pilot units in Menifee. Evaluation expected to be completed by year end.

Vibration Dampers
On Track

Alternative Technology Implementation: Develop Standard Installation Practices for Aeolian Vibration Dampers (AT-4.1)
Volume vs 2019 Goal: Evaluate need for aeolian vibration dampers publish standards for use. Standards published for use of aeolian dampers with existing conductor.
Key Actions: SCE is working with vendors on product evaluation for need and use of aeolian dampers with covered conductor.

Conductor Rebuild Standards
Complete

Alternative Technology Implementation: Develop Standard Installation Practices for Ridge Pin Construction for Conductor Rebuild (AT-4.2)
Volume vs 2019 Goal: Standards published and operational
Key Actions: Installation practices updated for inclusion of ridge pin construction in high wind areas and is operational.

Dist. Overhead Requirements
Complete

Alternative Technology Implementation: Update Distribution Overhead Requirements for Connector Selection in HFRA (AT-4.3)
Volume vs 2019 Goal: Design and Construction standards published for connector selection for use in HFRA
Key Actions: The connector selection standards updated to require the use of CAL FIRE exempt bolted wedge connectors when working in HFRA.

WMP Activities Status vs. WMP Activity Goals

Not Started | Completed | Ahead of Plan | On Track | Off Track

Emergency Preparedness Activities

Direct Mail Campaign
On Track

Customer Education and Engagement: Conduct a Direct Mail Campaign for HFRA (DEP-1.1)
Volume vs 2019 Goal: On track to reach approximately 1.5 million customers in HFRA through 2019 direct mailer
Key Actions: SCE's Dear Neighbor letter to be sent to each customer in HFRA commenced on 9/5. Dear Neighbor Letter for customers in non-HFRA is under review and the target mail date by early October.

Develop Local Meeting Plans
Complete

Customer Education and Engagement: Develop Local Government Education and Engagement Meeting Plan (DEP-1.2)
Volume vs 2019 Goal: Develop meeting plan
Key Actions: Local Government Education and Engagement Community Meeting Plan has been developed and is the framework for SCE's execution.

Execute Local Meeting Plans
72%
Cities Engaged

Customer Education and Engagement: Execute Local Government Education and Engagement Meetings According to Plan (DEP-1.3)
Volume vs 2019 Goal: 105 of 145 (72%) community meetings
Key Actions: On track. Of the 145 cities in HFRA, SCE has met with 105 cities as of 9/5/2019

WF Response Training
On Track

Emergency Responder Training: Wildfire Response Training for New or Existing Responders (DEP-2.1)
Volume vs 2019 Goal: Wildfire response training for new or existing responders
Key Actions: Currently conducting training sessions for PSPS Incident Management Teams; On track to meet year-end goal

IMT De-Energization Training
Complete

Emergency Responder Training: Conduct Internal IMT Training Around Wildfire Response and De-energization Protocols (DEP-2.2)
Volume vs 2019 Goal: Conduct internal IMT Training around wildfire response and de-energization protocol
Key Actions: Conducted initial training of 175 persons on PSPS Incident Management Teams; Have continued to train additional persons as needed and identified and will continue trainings as needed.

Enhance Staffing
On Track

Bolster Incident Mgmt. & Support: Determine Positions That Need Enhanced Staffing (DEP-3.1)
Volume vs 2019 Goal: Currently expanding teams to enable additional scalability and additional training sessions will be held for new personnel being added to the teams; On track to meet year end goal
Key Actions: Stood up dedicated PSPS IMT and Task Force effective June, 2019. Provided specialized training and exercises for all PSPS IMT and Task for members.

Train New Staff
On Track

Bolster Incident Mgmt. & Support: Train, Exercise, and Qualify New Staff to Meet Identified Need (DEP-3.2)
Volume vs 2019 Goal: Currently expanding teams to enable additional scalability and additional training sessions will be held for new personnel being added to the teams; On track to meet year end goal
Key Actions: Stood up dedicated PSPS IMT and Task Force effective June, 2019. Provided specialized training and exercises for all PSPS IMT and Task for members.

Conclusion

- Overall, SCE is making good progress on meeting its 2019 WMP Goals
- Activities that are off-track are monitored closely and majority are expected to meet their goals by end of year
  - VM-1.2 Risk Based Tree Removals impacted by delays in obtaining property owner permissions
- Significant learning has triggered improvements in processes, structure, systems, and has led to new Activities
- Resource constraints continue to be a challenge across key Activities
- SCE will continue to make improvements and refinements to its wildfire mitigation programs as lessons are learned and new information is obtained

Appendix

WMP Activities Status

Off-track or other notable activities

Current Goal	Narrative
SH-3: Install at least 1,100 composite poles **145 of 1,100 composite poles installed (13%)**	**Summary:** Slow start in construction is due to resource constraints and competing priorities with the EOI effort. Execution plan is backloaded in Q3 and Q4 to coincide with the covered conductor work. Expecting to meet the goal at year-end. **Progress/Challenges:** Current process of reporting completions has a 30- to 60-day lag from when the work is completed and when the poles are recognized as complete in SCE's record-keeping system. In addition, the current plan to meet and exceed the goal is more back-end loaded in Q3 and Q4 than originally anticipated when the goal's monthly plan was established. **Actions to Improve or Sustain Performance:** SCE is improving its record-keeping systems to more timely capture completed work and is advancing construction on two circuits from 2020 into 2019.
VM-1.1: Perform tree specific threat assessments **50,845 of 125,000 trees complete (41%)**	**Summary:** Short of plan by 11,480 (18%). Goal is to meet 125,000 tree-specific threat assessments in HFRA. An accelerated plan for assessment has been defined: new assessor resources have been obtained and productivity is anticipated to increase. Expecting to meet the goal at year end. **Progress/Challenges:** SCE has instituted a new system for daily and weekly assessment productivity quotas and has recently hired additional contractor resources. **Actions to Improve or Sustain Performance:** Accelerate tree assessment volume to meet plan target.

WMP Activities Status

Off-track or other notable activities

Current Goal	Narrative
VM-1.2: Perform risk-based tree removals **1,006 out of 7,500 complete (13%)**	**Summary:** Short of YTD plan by 2,744 (73%). 7,500 tree removal goal may not be met due to lack of agency approvals. **Progress/Challenges:** 5,400 removals scheduled as of 7/30. SCE has instituted a new system for daily and weekly assessment productivity quotas and has recently hired additional contractor resources. SCE is improving its customer notification and consent processes which is expected to accelerate the tree removal volumes. The ratio of removal recommendations to assessments remains lower than originally forecast. **Actions to Improve or Sustain Performance:** SCE has recently streamlined its internal land ownership review processes and has accelerated certain planned areas into 2019.
IN 1.2: Remediate all conditions that create fire risk under distribution	**Summary:** Distribution EOI remediation is currently off track due to outstanding "Priority 2" notifications. Currently, there are a total of 2,660 notifications requiring remediation. Expected to have all 8 SCE regions in compliance by year-end 2019. **Progress/Challenges:** Year-to-date, SCE has completed ~52,000 distribution remediation notifications. There are a total of 2,660 notifications requiring remediation and an additional 4,029 notifications due by year-end. SCE is closely monitoring additional work scope that could be identified through other mitigation programs such as aerial inspections and infrared scanning. **Actions to Improve or Sustain Performance:** SCE is developing additional tactical reporting and tracking for adherence to work execution plans, ensuring that various internal organizations consult and coordinate on strategy-related decisions and changes in work scope. SCE continues to monitor in-flight inspection and data cleanup efforts.

WMP Activities Status

Off-track or other notable activities

Current Goal	Narrative
IN 2.2: Remediate all conditions that create fire risk under transmission	**Summary:** Transmission EOI remediation program is currently off track due to 1,849 outstanding past due notifications. Expected to have all 8 SCE regions in compliance by year-end 2019. **Progress/Challenges:** Transmission inspections of approximately 57,000 structures are 100% complete as of 5/31. Transmission past due (including EOI and weed abatement): 1,849. Some past due notifications are known to be field completed but are not yet reflected in SCE's system (SAP). **Actions to Improve or Sustain Performance:** SCE has developed enhanced reporting capabilities to streamline processing, prioritizing, scheduling, and completion of remediation work. SCE has also tasked its aerial inspection contractor to address challenges that may impact target completion dates.
SA-4: Procure and Install high performance computing cluster weather and fuels modeling system	**Summary:** The first High-Performance Computing Cluster (HPCC) in Irvine (Orange County) is on track to be fully operational by Q3. Backup HPCC is 2 months behind in being delivered to Alhambra (Los Angeles County) and the new target move date is late September / early October 2019 **Progress/Challenges:** SCE continues to make process improvements that should streamline the online dates of the two systems. **Actions to Improve or Sustain Performance:** SCE continues to operationalize the Irvine HPCC and is working with its third-party vendor to fast-track its final implementation. SCE will use lessons learned from the first installation to facilitate the completion of the second. -

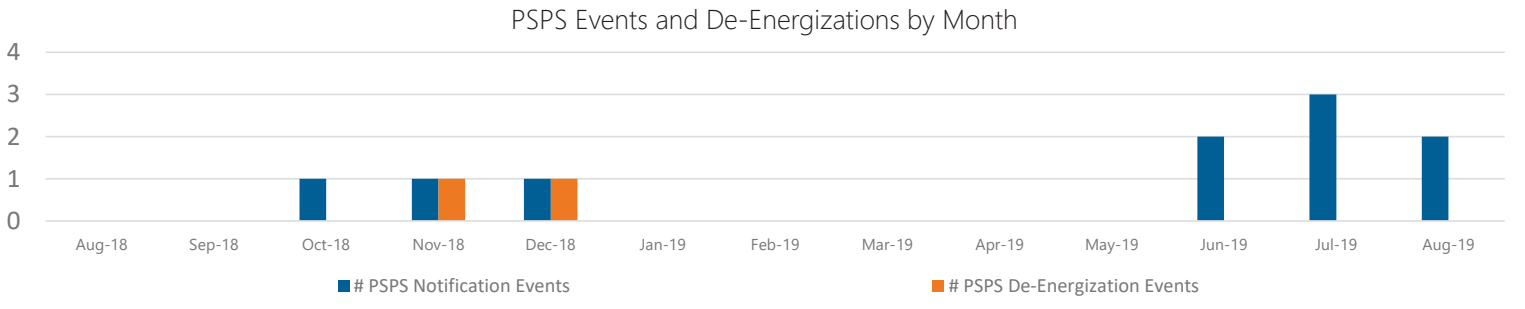
Public Safety Power Shutoff (PSPS)

Key Takeaways:

- 7 PSPS Notifications and 0 PSPS De-energizations YTD through July 2019
- 2019 Fast Curve Enabled/Blocked Recloser Events:
  - January to March – 0
  - April – 2
  - May – 3
  - June/July/August – 1 (same event has been ongoing since 6/1 and is forecasted to remain active between now and the end of the year, with a rotating list of circuits that are activated depending on local conditions)
  - The 6 events have affected a total of 80 days in 2019
- Actively engaging municipal utilities that may be potentially affected by a PSPS event

Lessons Learned:

- Refining PSPS monitoring triggers based on new, circuit level wind speed data, and expanding Fire Potential Index to account for unique fuel loading characteristic in respective fire climate zones
- Individual circuit exception process was established to address areas with low fuel loading
- IMT staffing is being increased to address team fatigue and extended activations
- 16 high Priority 2 notifications were remediated as a result of pre-patrol findings

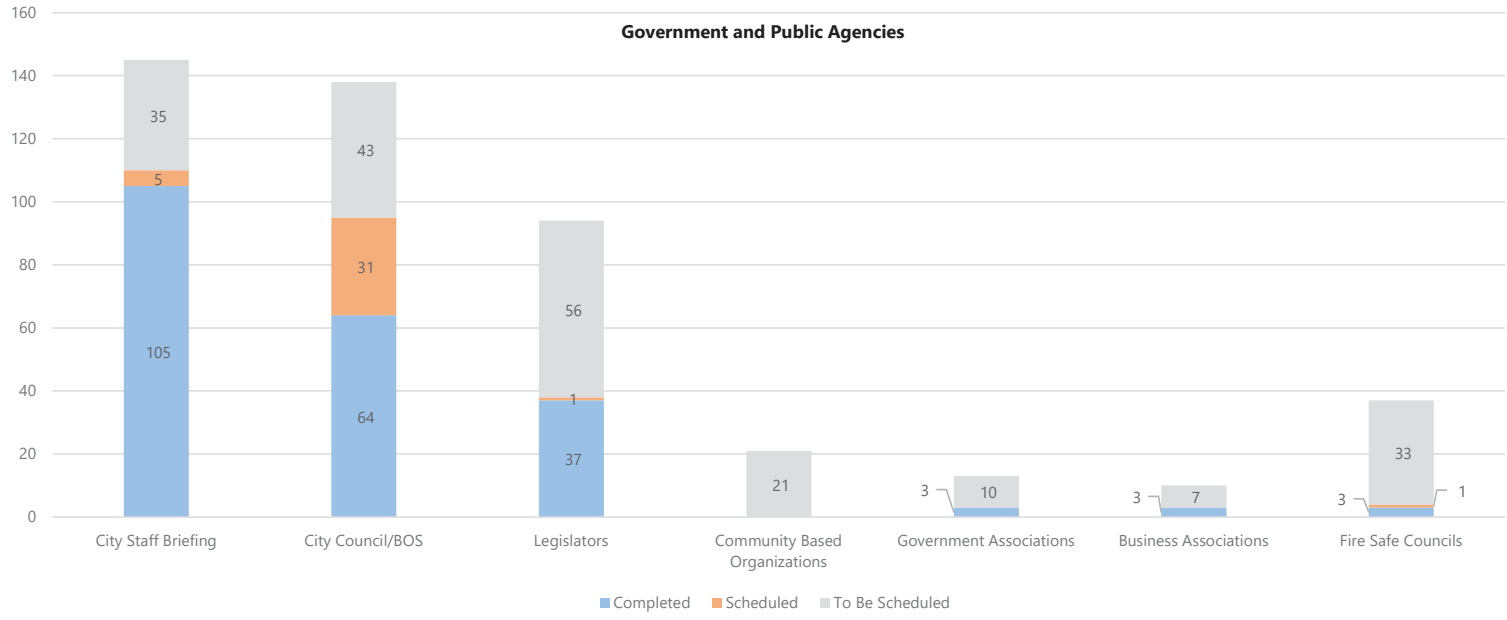


External Stakeholder Outreach

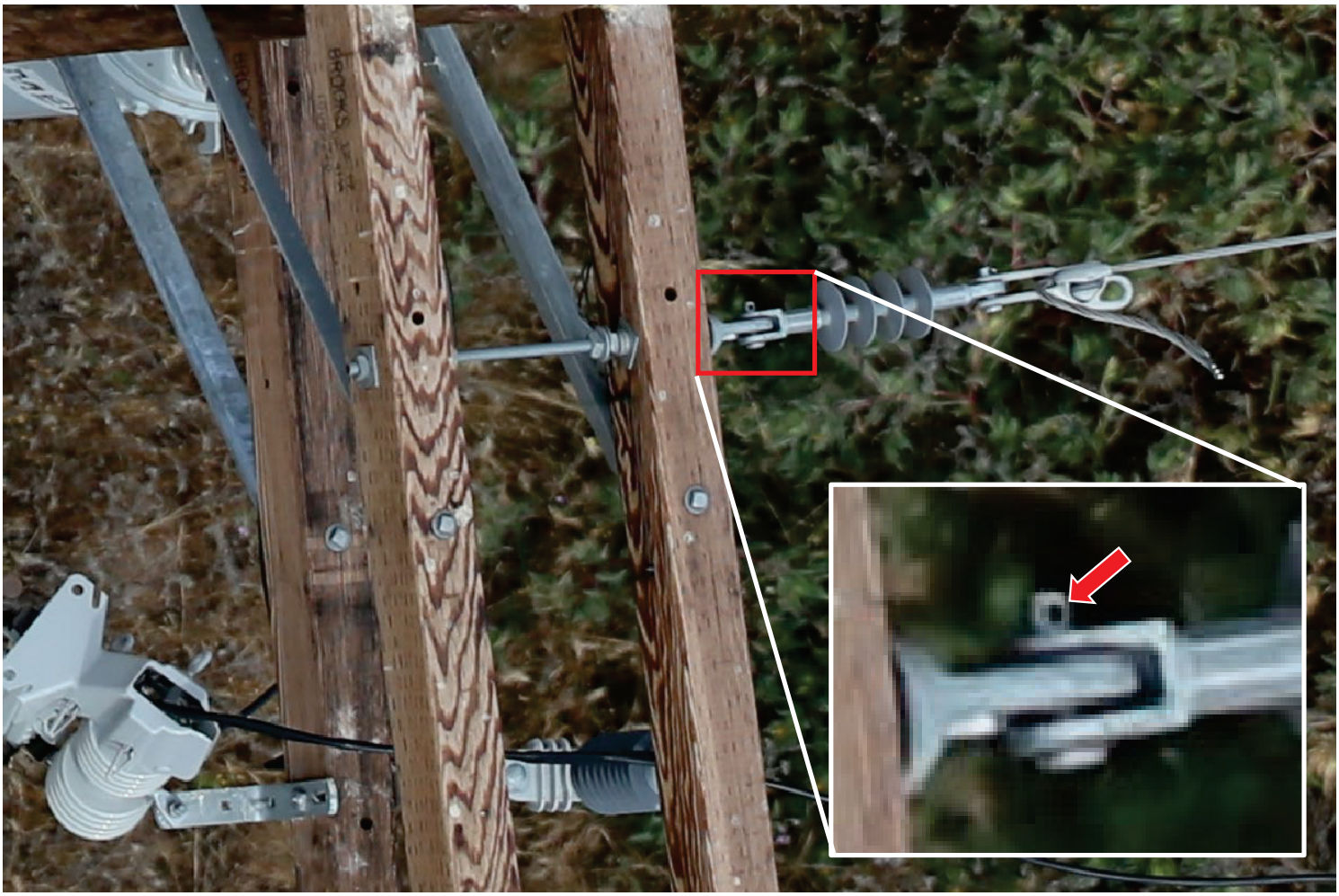
Overview:

- 72% of the outreach to cities and counties has been completed
- 8 community meetings have been held, with 4 to 5 more still to be scheduled
- Letters to all customers in HFRA began mailing on Sept. 5
- All PSPS and Vegetation Management communications materials have been updated and are posted on sce.com
- Several PSPS ad campaigns have been running since May 2019 – we are currently running radio and digital spots in the service territory through November 2019

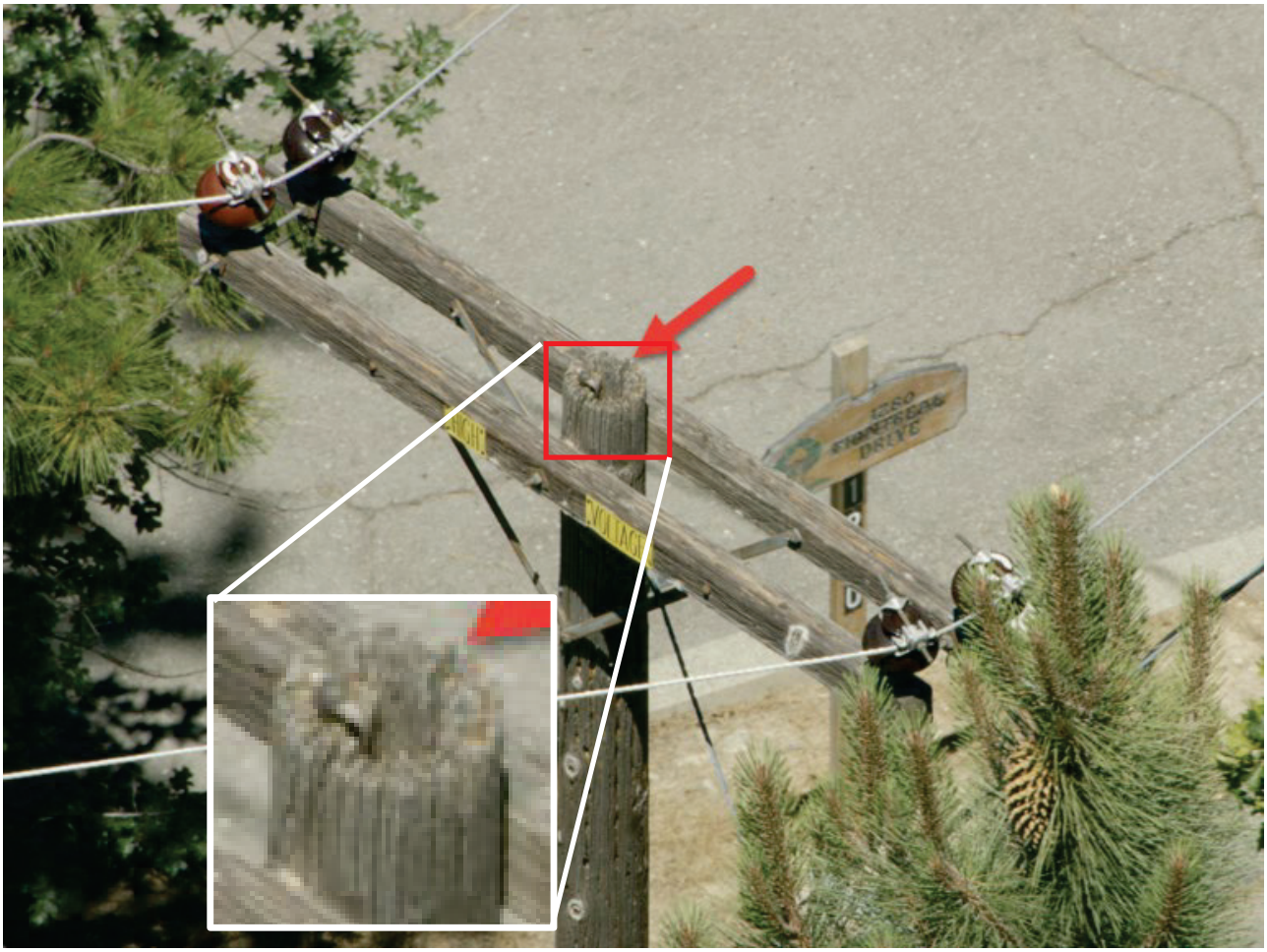
Community Meetings (Public)	Date	Complete
Joshua Tree/Yucca Valley	6/19	✓
Coachella Valley	6/20	✓
Wrightwood	6/25	✓
Tulare County	7/9	✓
Mono County/Inyo County	7/17	✓
Windsor Hills/Ladera Heights/Culver City	7/23	✓
High Desert	7/24	✓
Santa Paula/Fillmore/Ojai/Ventura	8/28	✓
Lake Arrowhead	9/19	
Bishop	10/2	
Kernville	10/10	



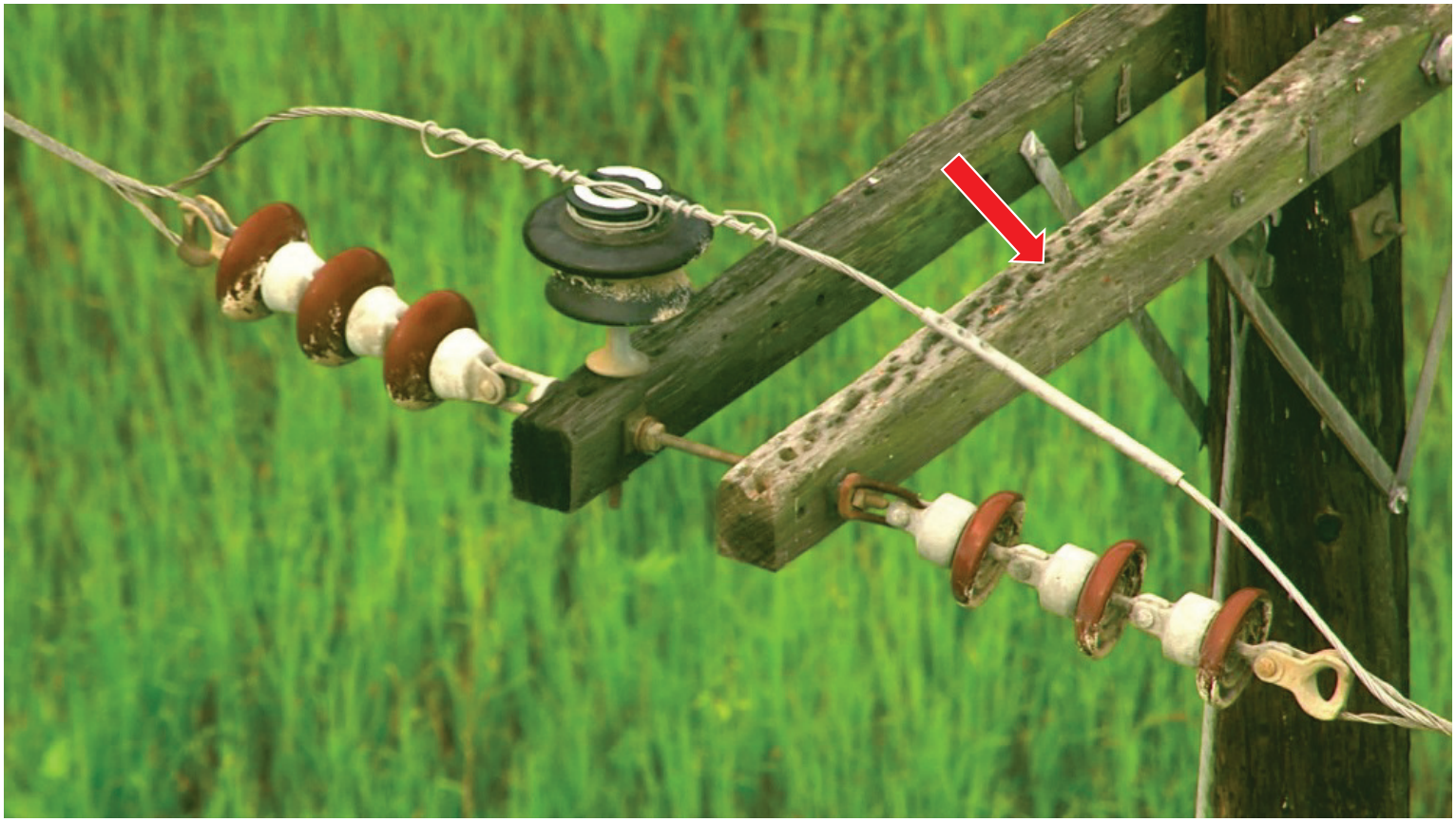
Aerial EOI Finding - Missing Cotter Pin



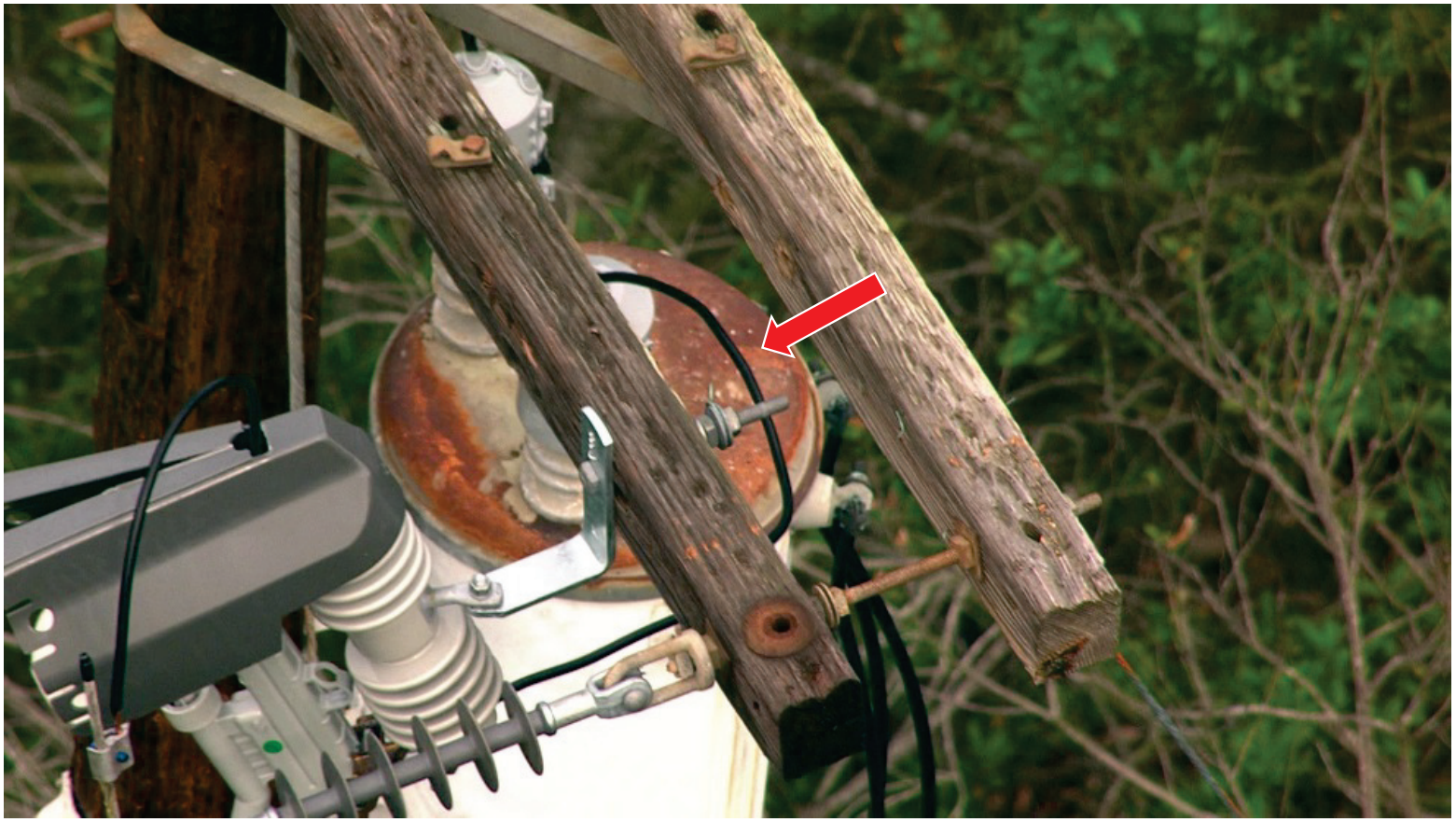
Aerial EOI Finding - Hollow Pole Top



Aerial EOI Finding - Deterioration on Top of Cross Arm



Aerial EOI Finding - Corrosion on Top of Transformer



ATTACHMENT F

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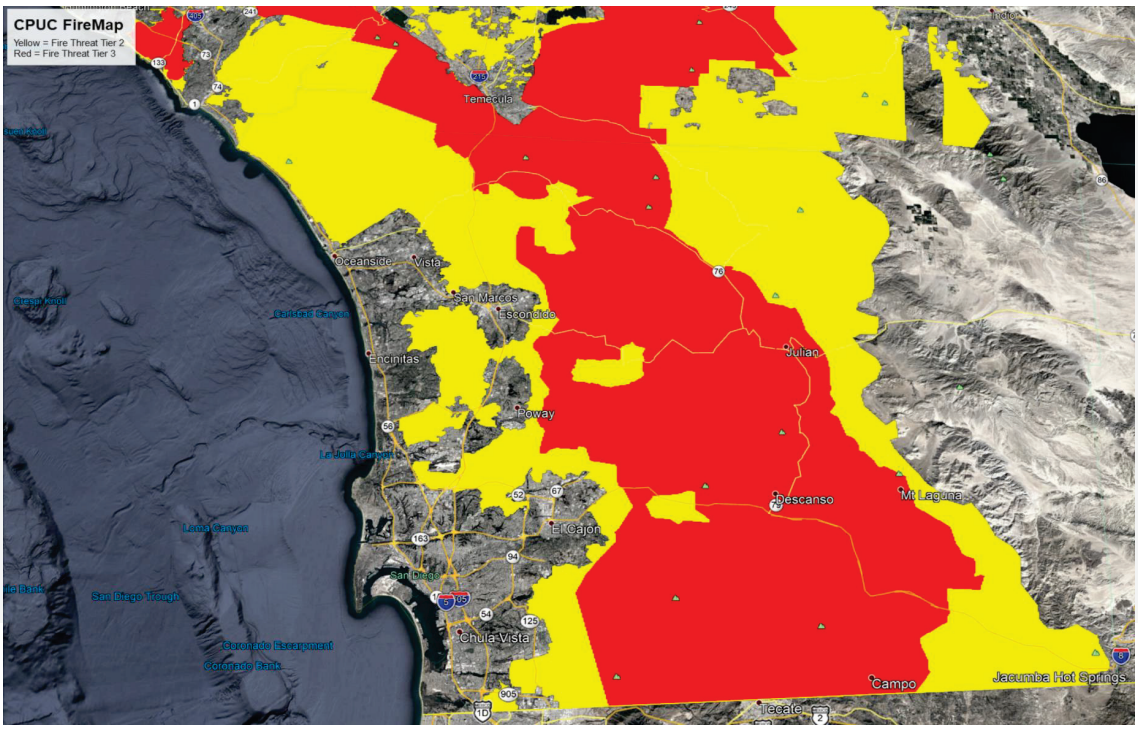
Wildfire Mitigation

September 17, 2019

High Fire Threat District (HFTD)

- 54% of SDG&E's Overhead Circuit Miles are in HFTD
- 80,623 Structures in HFTD
- Yellow = Fire Threat Tier 2
- Red = Fire Threat Tier 3



Evolution of Wildfire Preparedness

2003 Fires	2007 Fires	Today	Future
Focused on **compliance** with CPUC regulations related to design, construction and maintenance of powerlines and facilities	Focused on **improving the integrity and reliability** of the transmission and distribution systems, emphasis on rural areas	**Core Goal: No wildfire ignitions from SDG&E facilities** Focus on **effective and innovative risk management** necessary to minimize the risk of utility-related wildfires	
• Meeting standards & regulations • Aggressive Vegetation Management • Emergency Operations Center serves as command center	• First dedicated Fire Coordinator • Partnership with firefighting agencies • Increased customer communication • Recipient of Reliability Award (13 consecutive years)	• Aggressive infrastructure hardening programs • Advanced situational awareness • Dedicated contract firefighting resources • Aerial fire suppression support • De-energization to ensure public safety	• Active leadership role in shaping policy and standards • Enhancing Vegetation Management • Expand infrastructure hardening

Compliance **Effective Risk Management**

Wildfire Mitigation Programs

SDG&E is minimizing the risk of its electrical infrastructure causing wildfires by using an integrated three-pronged approach:

- **Operations and Engineering -** how SDG&E builds, maintains, and operates its electric system to be fire safe.

- **Situational Awareness and Weather Technology -** focuses on SDG&E's ability to monitor and understand the fire environment.

- **Customer Outreach and Education -** concentrates on SDG&E's communication and collaboration with regional stakeholders and customers.

Wildfire Mitigation Programs
Program Summary

Category	Mitigation	YTD Complete	Scope	% Complete	Program to Date	Program Targets	% Complete
Fire Hardening	FiRM	36 miles	80 miles	45%	357 miles	1450 miles	24%
Fire Hardening	Transmission Fire Hardening	3 miles	10 miles	30%	159 miles	290 miles	55%
Fire Hardening	CNF	35 miles	68 miles	51%	80 miles	160 miles	50%
Fire Hardening	PRiME	427 poles	700 poles	61%	427 poles	16,000 poles	3%
Fire Hardening	WiSE	3.62 miles	5.7 miles	64%	3.62 miles	TBD	TBD
Fire Hardening	Expulsion Fuse Replacement	872 fuses	2250 fuses	39%	872 fuses	7000 fuses	12%
Fire Hardening	Hotline Clamp Replacement	115 HLC	500 HLC	23%	115 HLC	4522 HLC	3%
Fire Hardening	PSPS Engineering Enhancements	1 switch	7 switches	14%	110 switches	TBD	TBD
Fire Hardening	Underground Circuit Line Segments	0 miles	1.25 miles	0%	0 miles	TBD	TBD
Fire Hardening	FTZAP	6 circuits	8 circuits	75%	6 circuits	73 circuits	8%
Inspections	Distribution QA/QC	10,000 poles	10,000 poles	100%	Ongoing	Ongoing	Ongoing
Inspections	Distribution Detailed	42,212 poles	47850 poles	88%	Ongoing	Ongoing	Ongoing
Inspections	Transmission	6,730 OH Structures	6,730 OH Structures	100%	Ongoing	Ongoing	Ongoing
Inspections	Substation	242 subs	300 subs	81%	Ongoing	Ongoing	Ongoing
Situational Awareness	Weather Stations	12 stations	13 stations	92%	190 stations	225 stations	84%
Vegitation Mangement	Off Cycle Patrols and Trimming	28 circuits	28 circuits	100%	Ongoing	Ongoing	Ongoing
Vegitation Mangement	25' Enhanced Clearance	5000 trees	11,000 trees	45%	5000 trees	55,000 trees	9%

Operations and Engineering
Inspection Plan

Corrective Maintenance Program (CMP)

- CPUC-governed prescriptive program of inspection and repair

QA/QC inspection of HFTD area

- Annually one third of the HFTD Tier 3 is inspected
- Above and beyond routine compliance program

Proactive inspections

- In advance of high-risk events focus on areas forecast to receive the strongest winds including coastal canyons and wildland urban interface

Update

- New distribution inspection program using drones in progress in HFTD
- 100% of QA/QC Inspections complete

Operations and Engineering
System Hardening Plan

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Design Criteria

- Leverages the wind and meteorology data to design to known local conditions of the area

Installation of Stronger Conductor

- To prevent structural failure and reduce possibility of wires coming down

Increase Conductor Spacing

- To reduce the risk of a flash at all conductor levels

Install Steel Poles

- More reliable material attributes and resiliency

Install Covered Conductor

- In close proximity to dense vegetation

Strategically Underground Lines

- Where small amounts of undergrounding leads to significant benefits

Operations and Engineering
System Hardening Plan

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FiRM (Fire Risk Mitigation)

- Multi-year distribution program (2014-2025)
- Replace two types of copper conductors
- Replace wood poles to steel poles
- Install overhead SCADA sectionalizing switches and more advanced protection
- Reinforce or shorten spans over 500ft
- Replacement of wire spans
- Install CA Fire approved fuses
- **Update – 45% complete. 36 miles of miles hardened YTD**

Transmission Fire Hardening

- Addressing all 69kV transmission lines located in the HFTD
- **Update - On track to fire harden 10 miles of 69kV by December 2019**

Cleveland National Forest

- Multi-year fire hardening program involving 20 transmission and distribution lines.
- Includes12kV and 69kV facilities located in Tier 3 fire areas in and around the Cleveland National Forest.
- Scope includes wood pole to steel pole replacement, underground conversion of select distribution lines and removal of one transmission line.
- **Update – 35 miles completed so far this year.32 miles in construction to complete by December 2019. YTD 60% complete.**

Pole Risk Mitigation & Eng. (PRiME)

- Program to assess and remediate the highest risk poles in the HFTD
- The highest risk poles are those most likely to cause failure during a weather event.
- Designs to all current G.O. 95 standards and known local wind conditions to significantly reduce fire risk of the pole
- **Update – The PRiME program has remediated 427 poles in the Tier 3 area of the HFTD**

Operations and Engineering
System Hardening Plan

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WiSE (Wire Safety Enhancement)

- Multi-year distribution program to replace small copper conductors
- Fire harden circuits in the coastal canyons
- Fire harden circuits within the wildland urban interface
- **Update - Several miles completed; additional locations under construction.**

Expulsion Fuse Replacements

- Multi year program to replace branch expulsion fuses within the HFTD
- Install CAL FIRE approved power fuses
- **Update - Roughly 25% of the locations forecasted to be completed in 2019 are completed.**

Hotline Clamp Replacements

- Multi-year maintenance program to replace connectors within the HFTD
- Clamp failures have lead to downed conductor
- **Update - Roughly 25% of the locations forecasted to be completed in 2019 are completed.**

Public Safety Power Shutoff

- Engineering Enhancements
- Multi-year program to install sectionalizing devices reducing customer impact of PSPS events
- **Update - All locations forecasted for 2019 are in construction.**

New Cal Fire Approved Fuse

Remote Sectionalizing Device

Fire Hardening
Challenges / Opportunities

Challenges	Opportunities
• Qualifying and training design and construction resources • Material Delays with Steel Pole Manufacturers • Land Rights Issues and Permits	• Leveraging data to prioritize highest risk areas with hardening programs

Operations and Engineering
Enhanced HFTD Vegetation Management Plan

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Update

- Implementation of 25-feet post-trim clearance
  - 200,000 trees in HFTD down to 55,000 targeted trees (e.g., eucalyptus, oak, sycamore, pine)
  - 5837 trees pruned to 25 feet
  - 624 of targeted trees removed
- Community outreach events in impacted communities
- 100% audit of all completed tree work within HFTD
- Redundant hazard tree inspections in HFTD

Operations and Engineering

Enhanced HTFD Vegetation Management Plan - New

SDG&E's Fire Scientists and Vegetation Managers have developed a new Vegetation Risk Index (VRI) to support emergency operations during periods of high fire danger

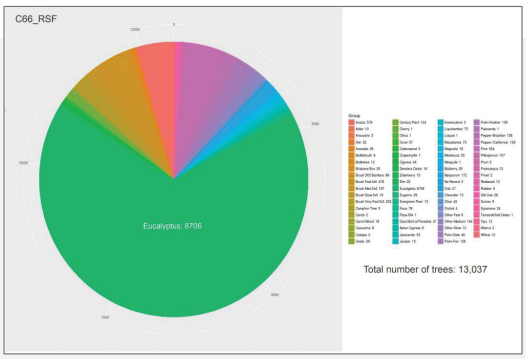
New VRI quantifies the risk associated with vegetation along high risk fire areas by analyzing:

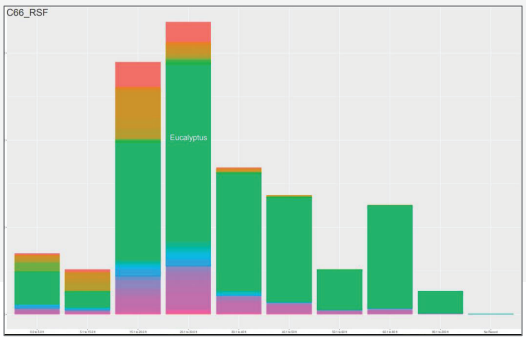
- Total number of trees in the vicinity of a circuit
- Height of trees
- Tree species
- Historical tree related outages

Key Benefits:

- Assist in operational decision during fire weather events
- Prioritize vegetation management efforts
- Provide justification for enhanced vegetation management program

Vegetation Risk Index (VRI)





Operations and Engineering
Fuels Management & Ignition Management

Fuels Management Program

- In partnership with fire departments, fire safe councils, and other stakeholders
- Lowers risk of catastrophic wildfires by reducing and removing wildland fuel accumulations
- Assessing 4,000 acres of SDG&E right of ways, easements, and fee-title lands for hazardous fuel reduction

Enhanced Ignition Management Program

- Gathers data from ignitions and near ignitions; performs root cause analysis of data to detect patterns or correlations
- Conclusions used to address and mitigate risk

Update

- Initiated wildland fuel reduction on BLM-owned land in June – 30% complete
- Identified top 13 high fire risk distribution circuits outside BLM
- Fuel reduction in progress

Vegetation Management
Challenges / Opportunities

Challenges	Opportunities
• Customers challenges • Qualifying and training resources • Land and Environmental Agencies	• Leveraging Species Data to target highest risk trees for additional clearance • Development of vegetation risk index to support real time operational decision making and to provide input parameters for covered conductor scoping

Operations and Engineering
Advanced Electric System Protection

Protection Philosophy

- Three types of protection functions in SDG&E's automated reclosers:
  - **Normal Profile**: Protects circuits under normal conditions
  - **Sensitive Profile**: Relay is very fast and highly sensitive to isolate faults faster than normal profile
  - **Sensitive Ground Fault**: This setting detects high impedance faults resulting from downed conductors.

Protective Devices

- **Sensitive Profile** and **Sensitive Ground Fault** Protection
  - Over 330 distribution circuit automated reclosers in the HFTD have the capability
- ***Falling Conductor Protection (FCP)***
  - Developing technology to de-energize conductors prior to hitting the ground
  - As *part of SDG&E's fire hardening efforts, devices are being installed employment of falling conductor technology*

Update

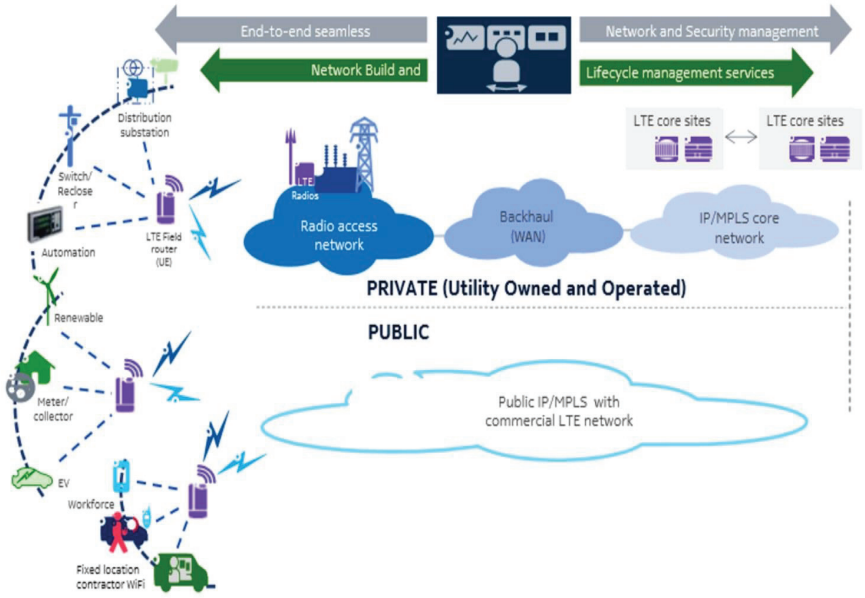
Falling Conductor Protection (FCP)

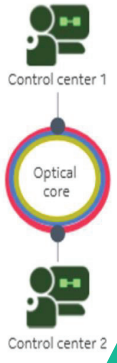
100% Complete - Six circuits placed in service with FCP in test mode to monitor performance prior to enabling in production

Rapid Earth Fault Current Limiting (REFCL) Technology

SDG&E is currently researching a new protection technology designed to reduce fault current levels down to near-zero levels. This technology may be feasible for our system and may reduce wildfire risk.

Operations and Engineering
Private Long Term Evolution (LTE) Communications





Builds a communication network to enable:
- Improved mobile network during emergency events
- Expanded network coverage within the HFTD
- Enhanced cyber security capabilities

Update:
Push-to-Talk Voice Comms Design
- Georedundant Radio Core at Data Center
- WMP Radio Site Design
- 40% Complete

Operations and Engineering
Aviation Firefighting

Implementation of a 365 day aerial program to enhance fire suppression

Agreement with the County of San Diego, CAL FIRE, and the Orange County Fire Authority for aerial fire suppression support

Additional aerial asset secured, Sikorsky S-60 helo, which unlike the Aircrane, has night fly capability

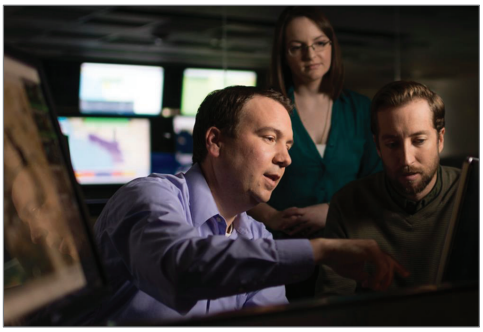
Update:

- **Aircrane operations: 14**
- **Sikorsky operations: 4**
- **Year to date water drops: 158,434 Gallons**

Situational Awareness
Fire Science & Climate Adaption

In 2018, SDG&E established a Fire Science and Climate Adaption (FS&CA) department comprised of meteorologists, community resiliency experts & fire coordinators. The department's purpose is to respond & strategize for the ever-changing utility industry's fire preparedness activities & programs.

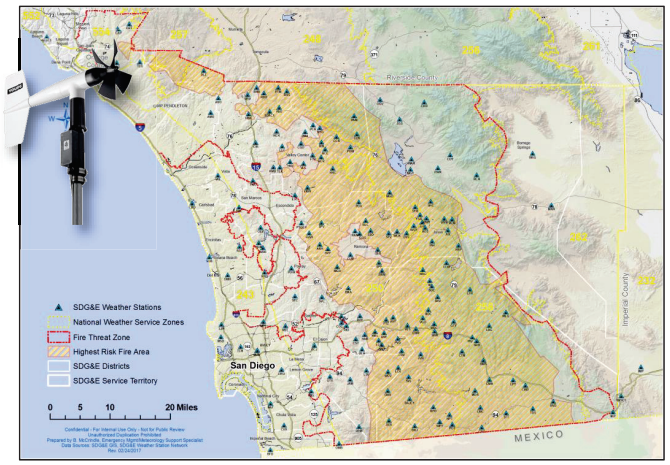
- Five full-time degreed and experienced meteorologists on call 24/7/365
- Five former firefighters with over 150 years of fire experience who serve as Fire Coordinators 24/7/365
- Fire Mitigation and Community Resilience Outreach division



Wildfire Prevention Strategy and Programs

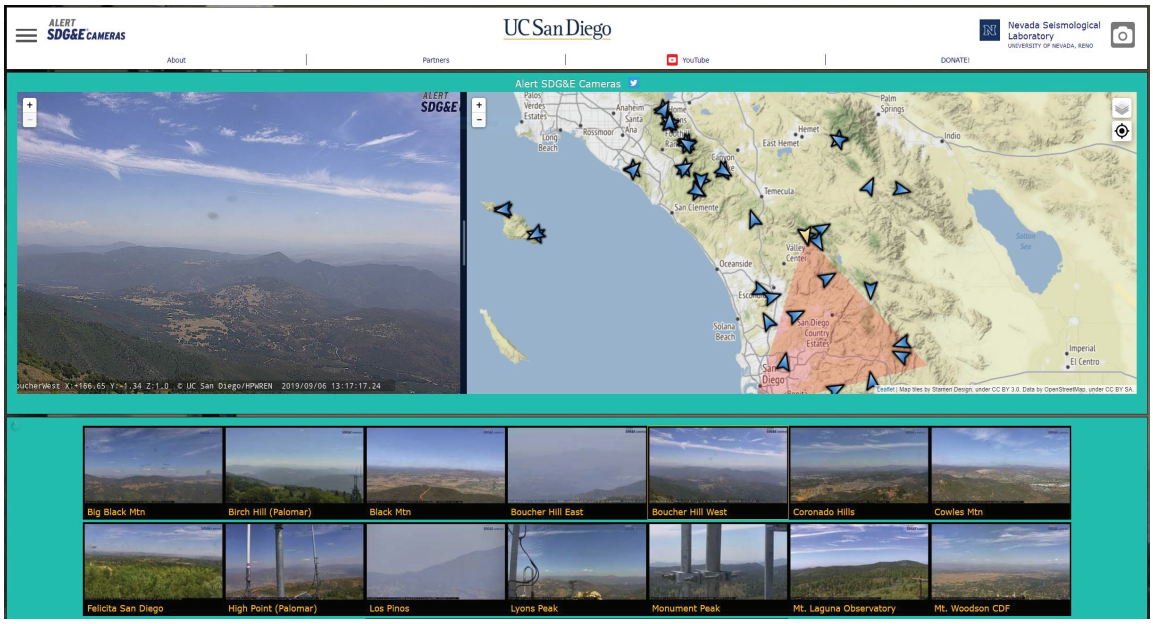
Situation Awareness Protocols & Determination of Local Conditions

- SDG&E owns & operates a network of 190 weather stations
  - Located on electric distribution and transmission poles
  - Provide temperature, humidity & wind observations every 10 minutes.
- Update - Weather network upgrades
  - Added stations in the Wildland Urban Interface (WUI)
  - Enabled 30-second data to support emergency operations



Wildfire Prevention Strategy & Programs

Situational Awareness Protocols & Determination of Local Conditions



- Over 100 high definition cameras improve fire detection.
- 16 pan-tilt-zoom Alert SDG&E cameras installed in 2017.
  - CAL FIRE and other fire agencies have priority to control cameras.
  - Triangulation of cameras allows agencies and SDG&E to accurately determine wildfire location.
  - Infrared capabilities for night vision.

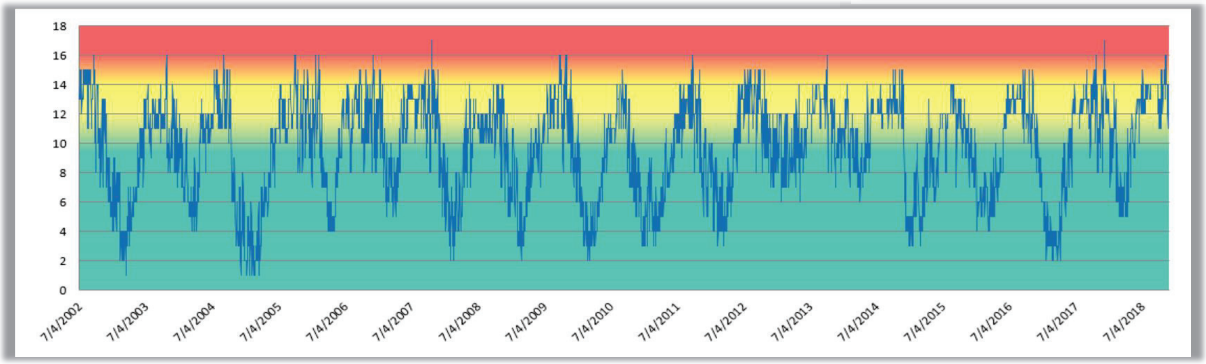
Update: Additional cameras were installed in the coastal canyons & wildland urban interface areas

Wildfire Prevention Strategy & Programs

Situational Awareness Protocols & Determination of Local Conditions

- The Fire Potential Index (FPI) is a seven-day planning and decision support tool, developed to communicate the wildfire potential, classifying the fire potential within each of SDG&E's 8 operating districts.
- Used to inform operational decisions, work restrictions, resource allocation.
- The FPI has been back-tested and validated against historical wildfire occurrences.
- ***2019 enhancements include integration of artificial intelligence into the fuels modeling.***

	Thu 10/25	Fri 10/26	Sat 10/27	Sun 10/28	Mon 10/29	Tue 10/30	Wed 10/31	Thu 11/01
ME	Normal 11	Extreme 15	Elevated 13	Elevated 12	Normal 11	Normal 11	Normal 11	Normal 10
RA	Normal 11	Extreme 15	Elevated 13	Elevated 12	Normal 11	Normal 11	Normal 11	Normal 10
EA	Normal 10	Elevated 14	Elevated 12	Normal 11	Normal 11	Normal 10	Normal 10	Normal 10
NE	Normal 10	Elevated 14	Elevated 12	Normal 11	Normal 11	Normal 10	Normal 10	Normal 10
OC	Normal 10	Elevated 13	Normal 11	Normal 11	Normal 10	Normal 9	Normal 9	Normal 9
NC	Normal 10	Elevated 13	Normal 11	Normal 11	Normal 10	Normal 9	Normal 9	Normal 9
BC	Normal 10	Elevated 13	Normal 11	Normal 11	Normal 10	Normal 9	Normal 9	Normal 9
CM	Normal 10	Elevated 13	Normal 11	Normal 11	Normal 10	Normal 9	Normal 9	Normal 9



Wildfire Prevention Strategy & Programs

Situational Awareness Protocols & Determination of Local Conditions

Santa Ana Wildfire Threat Index (SAWTI)

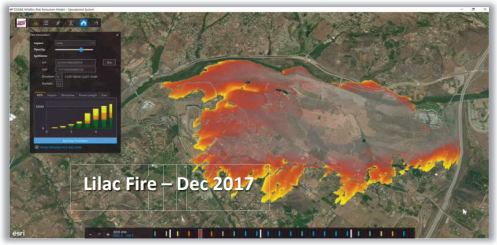
SDG&E collaborated with U.S. Forest Service and UCLA to provide this decision support tool to fire agencies & the general public

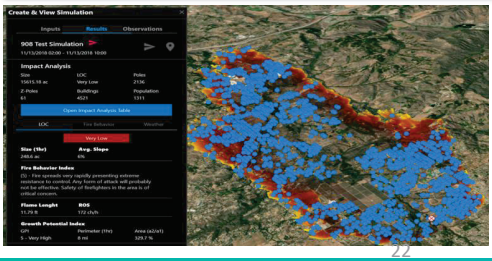
- Calculates the potential for large wildfire activity based on the strength, extent, and duration of the wind, dryness of the air, dryness of the vegetation, and greenness of the grass. Scale from "Marginal" to "Extreme"
- Similar to the Hurricane "Category" Rating Scale

Wildfire Risk Reduction Modeling (WRRM)

Two models have been developed by SDG&E and are the first of their kind in the nation:

- **The WRRM model** for risk assessment and prioritization of projects
- **The WRRM-Ops model** assesses the areas of highest fire danger before a blaze begins
  - Uses simulations generated from weather conditions, historical fire and outage history, and vegetation data to assess the wildfire risk to every component of our electric system
  - Synched with census data to further define the highest risk areas with respect to population density and structures



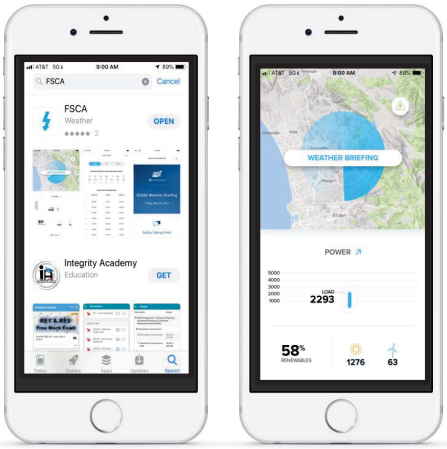


Wildfire Prevention Strategy & Programs

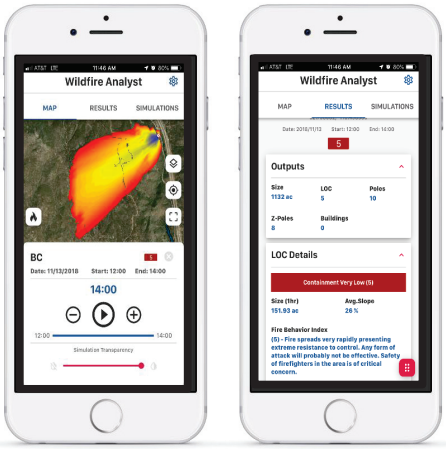
Situational Awareness Protocols & Determination of Local Conditions

SDG&E continues to integrate mobile applications into its situational awareness platform to better monitor system safety and performance

- **Fire Science & Climate Adaptation Application |** Provides access to weather information and enables push notifications



- **WRRM-Ops Application |** Provides SDG&E Fire Scientists and Fire Fighters to ability to share real-time intel with operational leadership



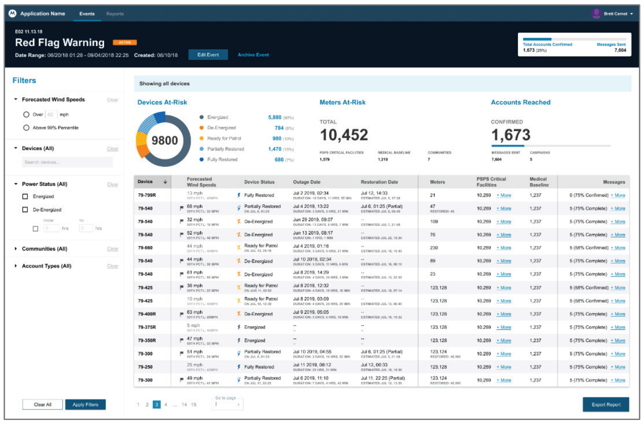
Wildfire Prevention Strategy & Programs

Situational Awareness Protocols & Determination of Local Conditions

SDG&E
A Sempra Energy utility®

Upgraded Situational Awareness Dashboards have been developed to support decision making

- Situational Awareness Dashboards include:
  - Circuit-level vegetation risk
  - Historical wind information including the identification of the 95th and 99th percentile wind speeds
  - Customer communication analytics



ID Data					Cust Impacts	Wind Data		
Anemometer	VRI	Circuit	Tie Line	Sub/Dist/FPI	Cust # / % Out	Forecast	90/95/99 Percentile	Gust
Santa Ysabel North	X	220,221,222	625	ST/NE/14	5678 / 3%	78	60/65/70	25
School House Canyon	X	67,68,69	625	ST/NE/14	5678 / 3%	78	60/65/70	25
West Rancho Bernardo	N	220,221,222	625	ST/NE/14	5678 / 3%	78	60/65/70	25
School House Canyon	X	67,68,69	625	ST/NE/14	5678 / 3%	78	60/65/70	25
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Customer Outreach & Education —

Public Safety Power Shutoff (PSPS)

Notification processes significantly refined

- Outbound dialer now capable of faster dialing and larger volumes of calls including medical baseline customer communication
- Authorized to call cell phone numbers for emergency outreach
- Expanded use of social media
- SDG&E website serves as resource platform during high wind events
- External communications are initiated to customers, elected officials, agency representatives, first responders, **and newly required notifications to Cal OES, CALFIRE, CPUC,** etc

2019 Enhancements

- Adding two-way texting capabilities and synching the Enterprise Notification System (ENS) with our GIS and weather network
- SDG&E conducts extensive customer outreach and education campaigns

SDG&E is expanding and developing new programs and strategies

- Leveraging backup power for resilience to mitigate the risk associated with Public Safety Power Shutoffs
- Internet connectivity at fire stations
- Expanded Community Resource Center Network
- Communication in multiple languages
- Workshops and exercises with essential service providers (e.g., telecommunications and water) to address and augment PSPS preparedness
- Development of a portable generation grant program directed at residential medical baseline customers on life support

Increased Stakeholder Awareness

SDG&E has conducted several community events to promote wildfire preparedness, resiliency and safety

- **Open Houses |** Six events across high risk fire areas to educate customers and promote community preparedness
- **Wildfire Resiliency Fairs |** Three events with several community partners:
  - Feeding San Diego
  - Fire Safe Councils
  - SD County Animal Services
  - San Diego Food Bank
  - SD Humane Society
  - Sheriff Departments
  - Sunrise Power Link Grant Program (Alpine Fair)
  - 2-1-1 San Diego
  - American Red Cross
  - Cal-Fire
  - California Highway Patrol
  - Community Emergency Response Team
  - Cleveland National Forest
  - County of San Diego OES
- **Operation Fire Safe |** A company and community-wide event to enhance wildfire preparedness

New CPUC Requirements I Customer Notifications

New requirements have been incorporated into processes and technologi

Notifications for the following audiences:

- Affected Customers
- Access and Functional Needs (AFN) Populations
- Critical Businesses + Utilities
- Public Safety Partners + First Responders
- Cal OES, CAL FIRE + CPUC

SDG&E Website

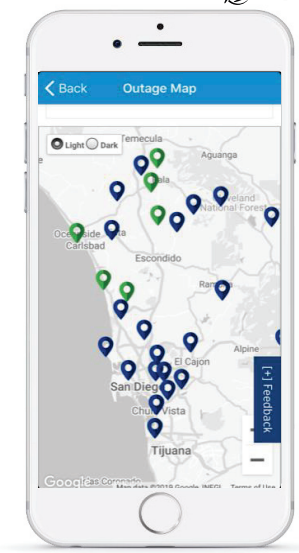
- Public Safety Power Shutoff dedicated web page during events

Communication Channels in Multiple Languages

- Email
- Text
- Phone

Joint IOU Message Coordination with Cal OES

- Direct GIS feed made available sharing PSPS information with Cal OES



Outage notifications delivered in 8 languages

- English
- Mandarin
- Cantonese
- Korean
- Vietnamese
- Tagalog
- Spanish
- Russian

Questions?