SCE's 2020-2022 Wildfire Mitigation Plan

Senate Oversight Hearing

June 4, 2020

Overview

- Wildfire Mitigation Plan (WMP) Objectives
- 2019 WMP Accomplishments
- 2020-2022 WMP Strategy & Programs

Wildfire Mitigation Plan Objectives

SCE is dedicated to the safety of the communities we serve

- The primary objective of SCE's WMP is to **protect public safety**
- SCE's **second comprehensive WMP**
  - Covers years 2020-2022
  - Builds on 2019 plan accomplishments and lessons learned
  - Retains foundational strategy for wildfire mitigation, and
  - Is a natural extension and refinement of our 2019 WMP and 2021 GRC filing
- Our WMP includes an **actionable**, **measurable**, and **adaptive** plan to:
  - Reduce the risk of potential wildfire causing ignitions associated with SCE's electrical infrastructure in High Fire Risk Areas
  - Reduce the impact of PSPS to our customers and communities
  - Incorporate risk analysis to guide planning and prioritization
  - Improve coordination between utility, state, and local emergency management personnel
  - Advance new technologies and data analytics capabilities
  - Effectively engage the public about how to prepare for, prevent, and mitigate wildfires

SCE has made significant progress in 2019 to reduce wildfire risks and to enhance community engagement

Community Meetings

Conducted **over 350 meetings** and presentations with local government, tribal officials, **community organizations, & general public**

Covered Conductor

Installed **372** circuit **miles of covered conductor**

Over 650 circuit miles installed

Composite Poles

Installed **1,421 Fire-Resistant Poles**

HD Cameras

91 HD Cameras installed

Total of 161 cameras installed providing 90% coverage of SCE's HFRA

Enhanced Veg Mgmt

129,485 tree specific **threat assessments completed**

5,917 Hazard Trees removed

Install Sectionalizing Devices

Installed and commissioned 55 additional sectionalizing devices

Branch Line Protection

7,765 Current Limiting Fuse locations installed

Over 10,000 fuse locations installed

Enhanced Overhead Inspections

100% of Distribution & Transmission **structures inspected in high fire risk area**

Weather Stations

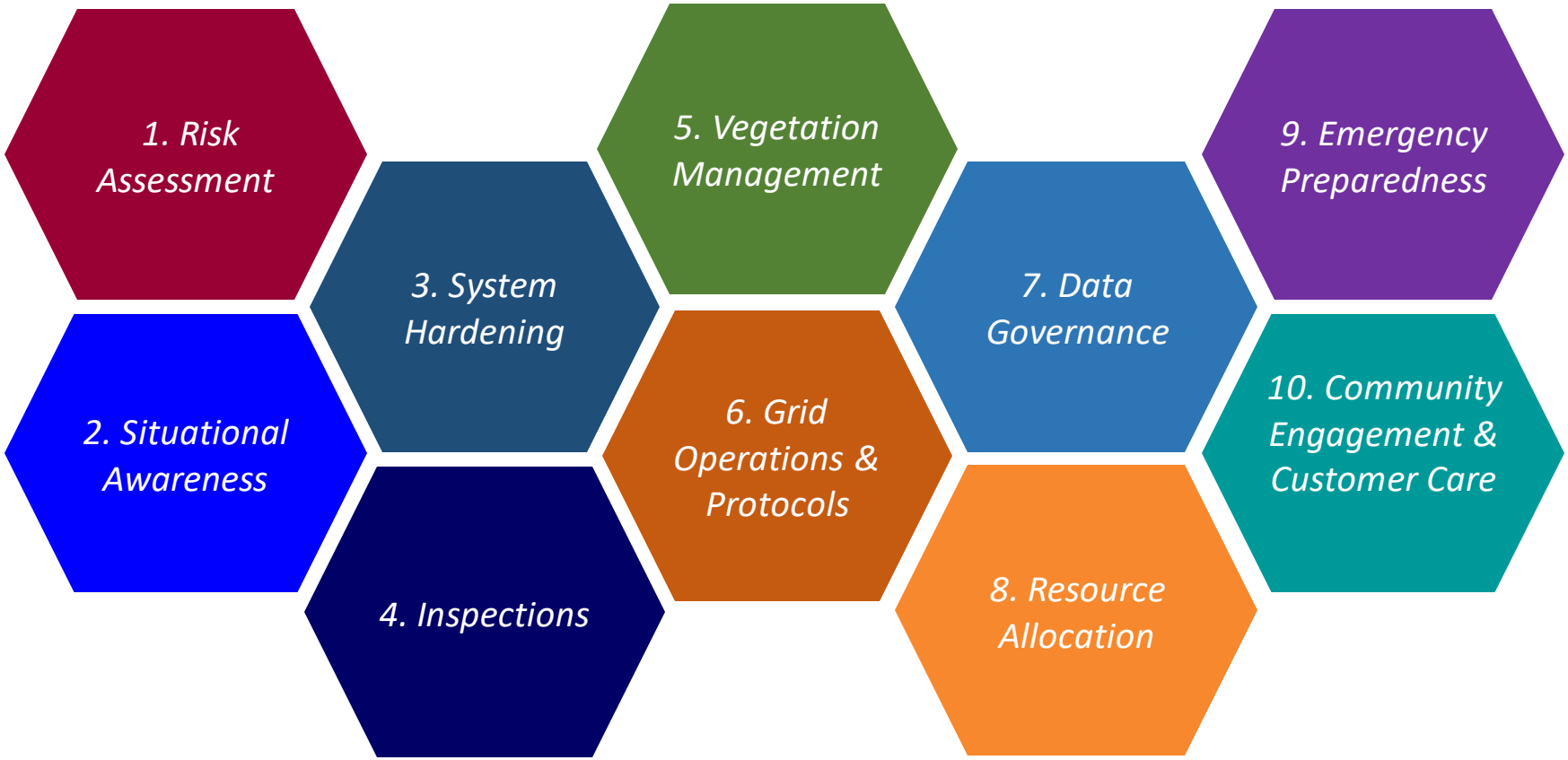
Installed **357 weather stations**

Over 700 weather stations installed

Pole Brushing

Inspected and cleared brush around **159,485 poles**

2020-2022 Wildfire Mitigation Strategy & Programs



SCE's 2020-2022 WMP Programs are further described in Tables 21-30.

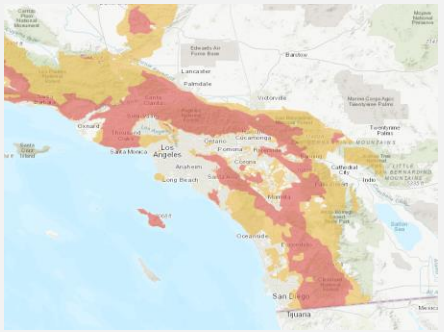
Risk Assessment

1. Risk Assessment and Mapping

SCE's wildfire risk model continues to evolve to more granular and accurate representation of fire risk (probability of ignition & consequence)

GSRP

- Fault-to-Fire Mapping
- Mitigation-to-Fault Mapping
- Mitigation Effectiveness / Cost Mitigation Ratios
- High Fire Risk Area (HFRA) Definition



SMAP / RAMP

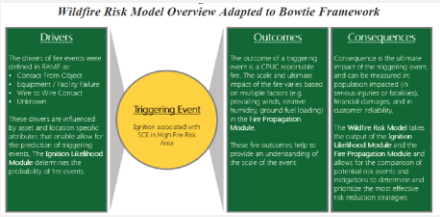
- Bowtie (Drivers, Outcomes, and Consequences)

2019 WMP

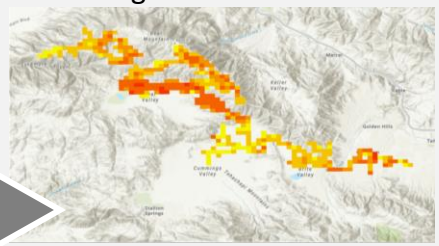
- Probabilistic Modeling
- Multi Attribute Risk Score (MARS)
- Mitigation Risk Spend Efficiency (RSE)

2021 GRC

- Wildfire Risk Model Development
  - Probability of Ignition
  - Fire Propagation (Reax)
  - Fire Consequence (Reax+)



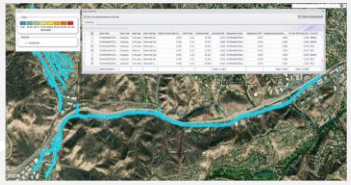
- Risk Prioritization at a Circuit and Segment Level



2020 WMP

- Ignition Analysis for Distribution and Transmission
- Enhanced Multi-Mitigation Assessments
- RSE Calculation Enhancements
  - Asset Useful Life
  - Discount Rates
  - Annual/Incremental RSE
- Evolving Fire Propagation Modeling (i.e., Technosylva)

technosylva



Sept 2018 | Nov 2018 | Feb 2019 | Aug 2019 | Feb 2020

Situational Awareness

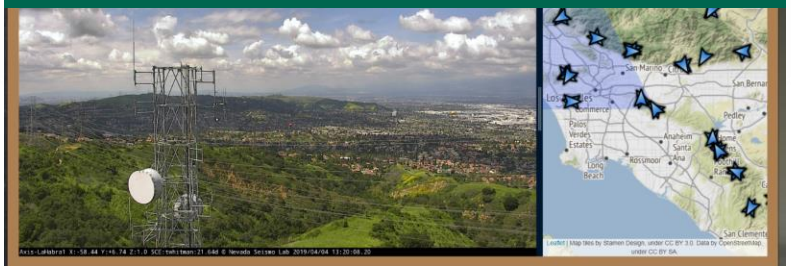
2. Situational Awareness and Forecasting

- **Deploy 375-475 weather stations per year**
- **Improve Weather Modeling** through:
  - Installation of additional weather stations Installation of 2nd High Performance Computing Cluster in 2020 and a 3rd after 2021
  - Performing updated fuel sampling in HFRA areas every two weeks (weather permitting)
- **Improve PSPS Operations** through:
  - Installation of additional weather stations
  - Fire Potential Index Enhancements
  - Deployment of Technosylva's FireCast & FireSim
  - Continuation of Pre & Post patrols
- **Detect and prevent potential faults** that could cause ignitions through:
  - Distribution Fault Anticipation
  - Early Fault Detection
  - Open Phase Detection

Weather Station

HD Camera

Weather Models



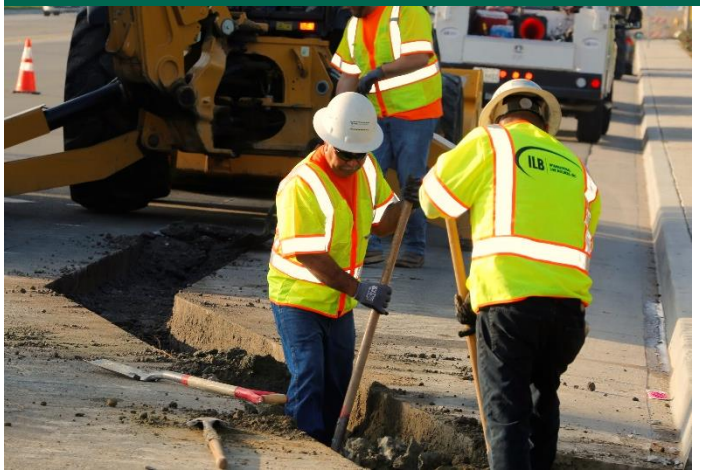
System Hardening

3. Grid Design and System Hardening (1/2)

- Ramp up covered conductor deployment efforts – install at least **700 circuit miles in 2020**
- Aggressive plan to **deploy up to 4,500** circuit miles of covered conductor by end of 2022
- **Targeted undergrounding** evaluation
- Continue to **target deployment** in the **highest risk and PSPS-impacted areas** based on risk-informed analysis

Covered Conductor

Targeted undergrounding evaluation



System Hardening

3. Grid Design and System Hardening (2/2)

- Other **infrastructure hardening** efforts in HFRA:
  - Composite poles and fire-resistant wraps
  - Fast-acting fuses
  - Remote-controlled sectionalizing devices
  - Circuit breaker relay for fast curve
- Advancing various **detection and sensing technologies**
  - Deploy Rapid Earth Fault Current Limiter (REFCL) pilots
  - Open Phase down wire detection
  - Assess Distribution Fault Anticipation performance

Post Fire Event
Wood vs. Composite Poles

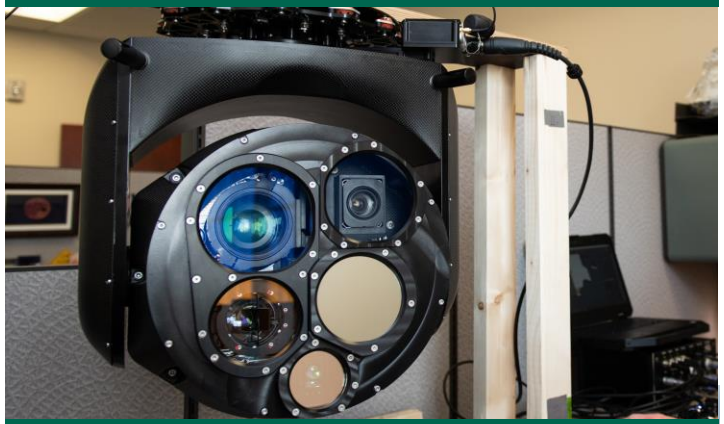
Fast-acting Fuses

Remote Controller for RAR with Fast-Curve

Inspections

4. Asset Management and Inspections

Sensor Technologies



Aerial Inspections

Ground Inspections

- Utilize both ground and aerial inspections to obtain **360° views** of structures and equipment
  - ❖ Lessons learned from crossarm failure in 2019
- Aerial inspections on **165,000** distribution and **33,500** transmission structures
- Deploy various sensors and collect data (**infrared**, **corona scanning**, **LiDAR** and **HD images/videos**)
  - ❖ Leverage **Unmanned Aerial Systems**
- Redesigned inspection program to perform more frequent inspections of higher risk structures (**105,000** distribution & **22,500** transmission structures)
- Leverage detection technologies using **artificial intelligence** and **machine learning** to complement manual inspections

Vegetation Management

5. Vegetation Management and Inspections

- Continue & expand key programs:
  - Expand brush clearance to **200,000-300,000** poles annually
  - Hazard Tree Management Program (HTMP) to assess **75,000** trees annually and timely mitigations
  - Continue Drought Relieve Initiative (DRI) inspections and timely mitigations
  - **Risk-based** HFRA vegetation management quality control inspections
- Integrated vegetation management platform to improve work planning, scheduling, notification, and reporting
- 2019 lessons learned and challenges:
  - Resource shortage for qualified trimmers
  - Support from property owners and agencies

Grid Ops & Protocols

6. Grid Operations and Protocols

SCE expects to reduce the scope and impact of PSPS; however, PSPS will continue to remain available for extreme conditions in the long term

Multi-Prong approach to mitigate impacts of PSPS

- ***Switching Playbooks***
- ***Targeted Grid Hardening***
- ***Engineering & System Evaluation***
- ***Microgrids & Resiliency Zones***
- ***Customer Care***

Rapidly developing circuit-specific plans to reduce the impacts observed in 2019 by:

- Leveraging existing isolation equipment
- Targeting remediations
- Identifying small upgrades to reduce the number of customers impacted by PSPS
- Deploying more weather stations
- Pursuing microgrid opportunities when technologically and economically feasible
- Establishing Community Resource Centers
- Deploying Community Crew Vehicles
- Providing potable water
- Addressing food spoilage claims
- Conducting community outreach

Emergency Preparedness

7. Emergency Planning and Preparedness

SCE's emergency preparedness and response plans consider numerous hazards that potentially impact SCE's service area and/or the electric grid

Customer Engagement & Education

- Provide customers with important and consistent messaging
- Participate in statewide multichannel and multi-lingual media campaign

- Send letters to customers in HFRA in non-HFRA with information about PSPS, emergency preparedness, and SCE's wildfire mitigation plan to customers in HFRA
- Host 8-12 community meetings in areas impacted by 2019 PSPS

Emergency Response Training

- Continue training ~540 existing and new SCE IMT members on de-energization protocols
- Determine additional staffing needs and train, exercise and qualify new staff

Data Governance

8. Data Governance

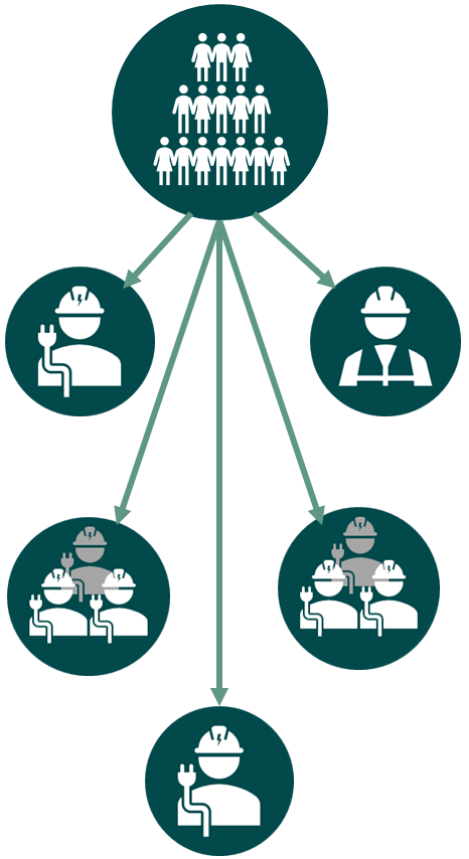
- Traditionally, organizations across SCE have addressed data governance at the system and activity level focused on data quality, security, and compliance
- In 2019, SCE established new processes and tools to help manage large datasets associated with its wildfire mitigation activities (e.g. iPads, mobile applications)
- In 2020-2022, SCE plans to invest in automation, machine learning, and artificial intelligence focusing on data architecture, management, and stewardship
- These refinements will help integrate wildfire mitigation data in areas like vegetation management, asset inspections, and PSPS allowing for greater insights from advanced analytics of asset health for improved risk modeling and prediction
- SCE will continue to develop foundational data governance strategy and a data quality framework / methodology to measure and manage master data quality

Resource Allocation

9. Resource Allocation Methodology

Human resources continue to be the binding constraint to accelerate more wildfire mitigation work

- Wildfire mitigation activities have considerably increased the overall scope of utility work and pose challenges for resource allocation
- In many cases, the same crews that support wildfire mitigation activities are responsible for executing SCE's traditional infrastructure replacement work
- Despite the importance of traditional infrastructure replacement work, SCE will pursue them at a slower pace in order to execute larger portions of higher safety risk reduction wildfire mitigation work
- SCE will continually monitor safety and reliability, and where necessary, adjust short- and long-term plans to optimize resource allocation and prioritization of work



Community Engagement & Customer Care

10. Expanded Customer Communications

SCE has expanded communications to make it easier for customers to receive updates and in their preferred language

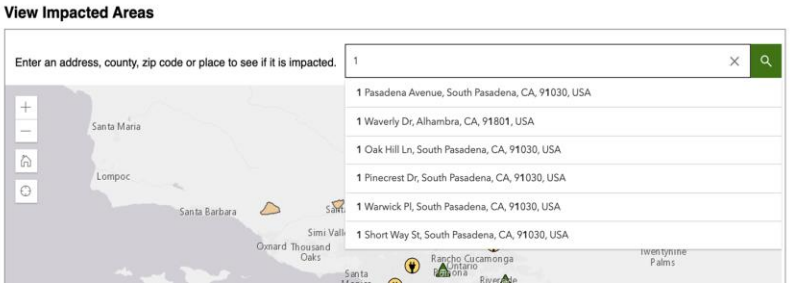
- **Expanded alerts** to a broader audience with non-SCE account holders that can register to receive outage alerts by zip code, as well as Nextdoor on social media

- **SCE.com** has been improved to provide easy to look up information on an interactive map to receive address level PSPS information with daily, near-real time updates, along with the location of Community Resource Centers and Community Crew Vehicles. SCE.com performance has also been upgraded to handle more traffic

- Customers can sign up to receive notifications in their **preferred language** (English, Spanish, Mandarin, Cantonese, Korean, and Tagalog)

Expanded Alerts

SCE.com Upgrades



Community Engagement & Customer Care

10. Providing Valued Programs & Services

SCE is offering a variety of new programs and services to customers, including our most vulnerable populations

- **Back-up generation** will be offered to customers that have a range of varying needs
  - Our most vulnerable income-qualified, critical care customers will receive a fully subsidized back up battery for up to 24 hours of resiliency
  - Customers reliant on well water pumping will receive a rebate up to $500
  - Customers that need a portable power battery can utilize a $50 rebate
- **Goods and services** are also provided to customers in need ranging from ice, firewood, and blankets to solar cell phone chargers
- **Resiliency zones** are in-development to augment certain vulnerable rural communities in which back-up power will be provided to essential services within those areas
- **Circuit-level customer care plans** provide a summary overview of all programs & services available for each circuit area (137 completed to-date with a goal of 1,100)

Community Engagement & Customer Care

10. Community Engagement & Expanded Partnerships

SCE is committed to keeping its customers and key stakeholders informed of WMP activities, PSPS protocols, and general emergency preparedness

- Plan to concentrate efforts in 2020 on communities impacted by multiple PSPS events & conduct virtual livestreams to increase reach
- Increased partnerships with Community Based Organizations and agencies supporting Access & Functional Needs customers
- Expanded our pool of Community Resource Centers (from 13 to 34) and adjusted our protocols for social distancing, in addition to the continued use of our mobile Community Crew Vehicles

Community Meetings & Livestreams

Community Crew Vehicle

Appendix

2019 SCE PSPS Events *

	September 2019			October 2019				November 2019	
Event Metric(s)	Sep 4- Sep 8	Sep 9 – Sep 19	Sep 21- Oct 1	Oct 2- Oct 11	Oct12 – Oct 20	Oct 21- Oct 26	Oct 27 – Nov 3	Nov 15 – Nov 17	Nov 23 – Nov 26
Customers De-energized	**633**	**14,786**	**85**	**24,010**	**1,171**	**30,700**	**126,120**	**49**	**1,192**
Counties Impacted	**1**	**4**	**2**	**6**	**3**	**6**	**9**	**1**	**7**
Circuits De-energized	**2**	**38**	**2**	**37**	**8**	**39**	**93**	**1**	**8**
Average Outage Duration Total (Hours)	**21**	**19**	**6**	**29**	**16**	**30**	**29**	**5**	**19**

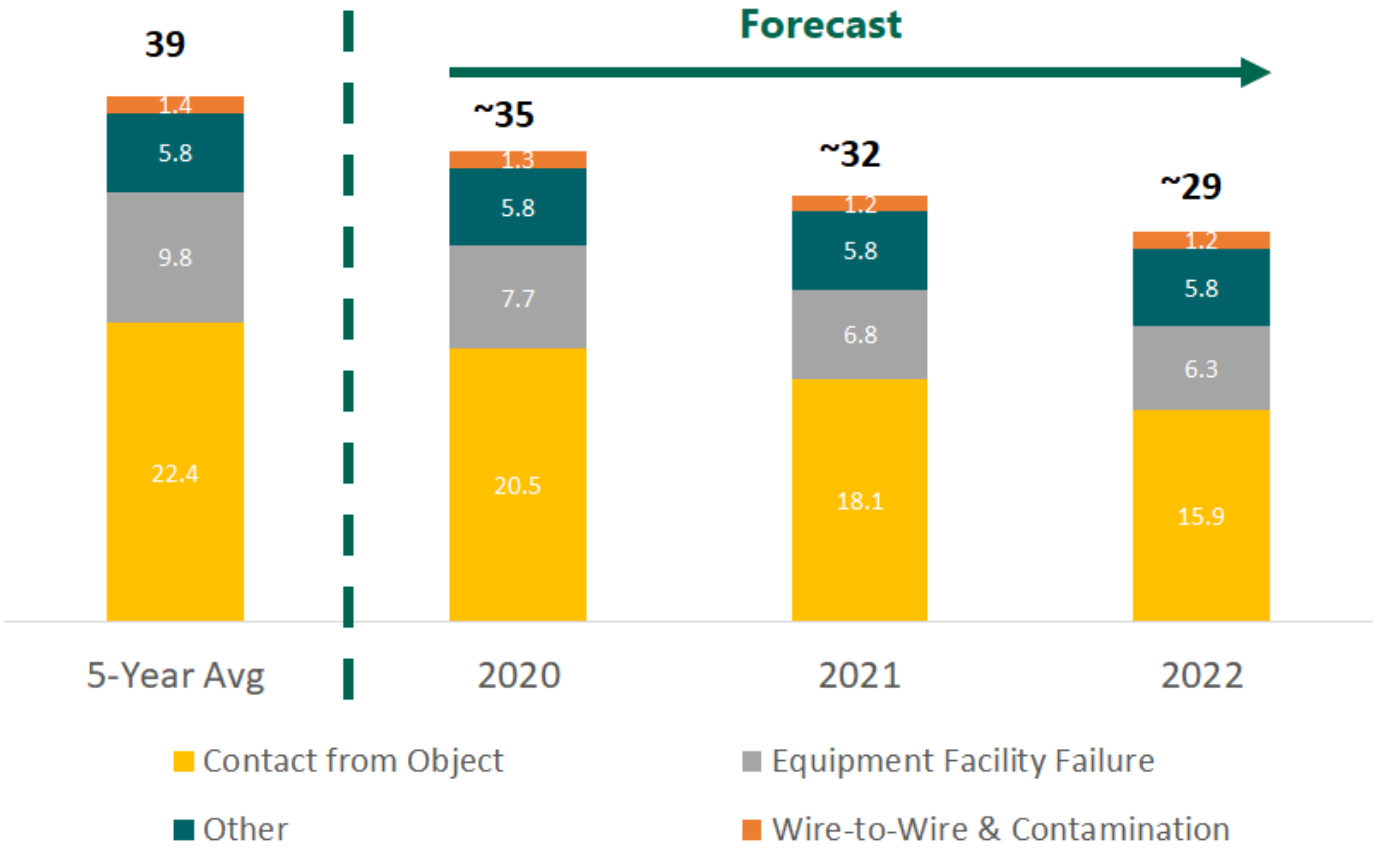
**16 PSPS Watch Periods in 2019, with customer de-energizations in 9 events. Table above outlines event details for the 9 events*

CPUC Reportable Ignitions in HFTD by Cause (2015 – 2019)[1]

Cause of Ignition	2015	2016	2017	2018	4-yr. Avg. ('15 – '18)	2019[2]	% Change (2019 vs. 4-yr. Avg.)
Contact From Object	**27**	**22**	**21**	**22**	**23**	**19**	**- 17%**
Animal	10	6	4	4	6	7	+ 17%
Vegetation	6	6	6	5	5.8	2	- 65%
Metallic Balloon	3	4	8	6	5.3	4	- 24%
Vehicle	5	3	2	7	4.3	3	- 29%
Other	3	3	1	0	1.8	3	N/A[3]
Equipment/Facility Failure	**8**	**17**	**6**	**11**	**10.5**	**12**	**+ 14%**
Other or Unknown	**10**	**3**	**6**	**4**	**5.8**	**6**	**+ 4%**
Total	**45**	**42**	**33**	**37**	**39.3**	**37**	**- 6%**

[1] Numbers do not include ignitions involved in ongoing litigation.
[2] 2019 CPUC reportable ignitions are still under review and will be finalized and filed on April 1, 2020.
[3] Sample size too small to provide meaningful % value.

2020-2022 Forecasted HFRA Reportable Ignitions Per Year after Execution of WMP, Compared to 5-Year Historical Average



Sources: *SCE WMP 2020, Tables 18a, 18b, 31a and 31b*
Note: This forecast is based on cumulative mitigation effectiveness of each of the mitigation measures against the ignition drivers that form the baseline historical ignitions, and does not account for the impact of numerous exogenous factors beyond the control of the utility (e.g. weather conditions, suppression responses, etc.), and as such this forecast represents significant range of uncertainly around the expected value calculations.

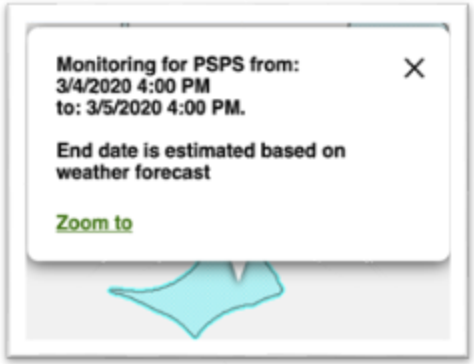
Cadence of customer notification of PSPS monitoring and de-energization

Stakeholder	Initial Notification (Alert)	Update Notification (Alert)	Imminent Shut down (Warning)	De-energized (Statement)	Preparing for Re-Energization (Statement)	Re-energized (Statement)	PSPS Averted (Statement)
First/Emergency Responders/ Public Safety Partners, local and tribal governments	72 hours before	48 and 24 hours before	1 to 4 hours	When De-Energization Occurs	Before Re-Energization Occurs	When Re-Energization Occurs	When circuits are no longer being considered for PSPS
Critical Infrastructure / Service Providers	72 hours before	48 and 24 hours before	1 to 4 hours	When De-Energization Occurs	Before Re-Energization Occurs	When Re-Energization Occurs	When circuits are no longer being considered for PSPS
Customers	48 hours before	24 hours before	1 to 4 hours	When De-Energization Occurs	Before Re-Energization Occurs	When Re-Energization Occurs	When circuits are no longer being considered for PSPS

SCE will target the schedule above to notify customers. Circumstances such as erratic weather or the sudden onset of hazardous conditions that jeopardize public safety may affect SCE's ability to provide advanced notice to customers.

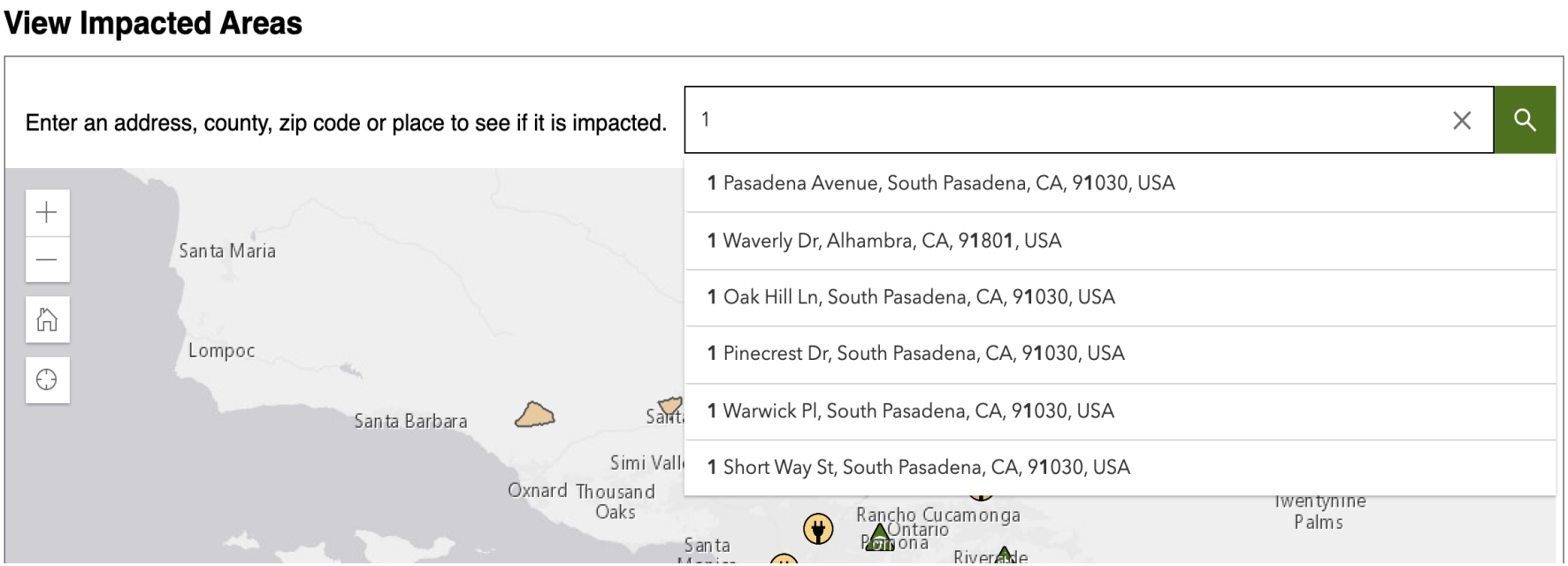
SCE.com PSPS webpage examples

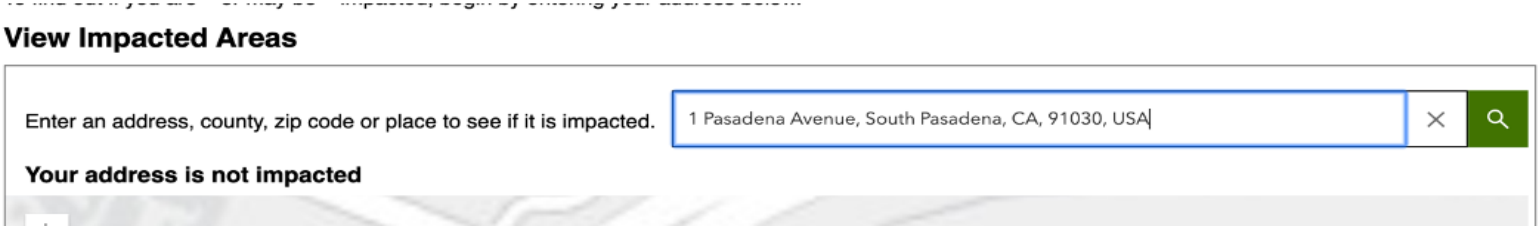
Areas that are under consideration for de-energization and that are de-energized are displayed, including estimated dates and times for re-energization



SCE.com PSPS Webpage Examples (cont'd)

Address search functionality identifies if a location is under consideration, de-energized, or not impacted by PSPS

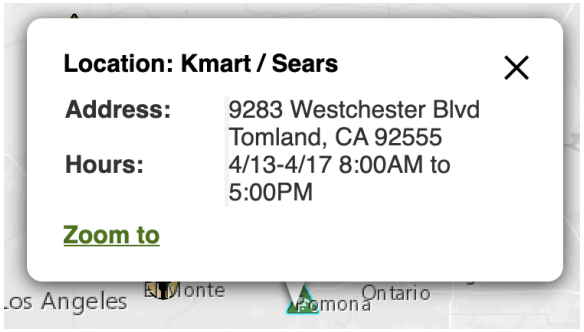


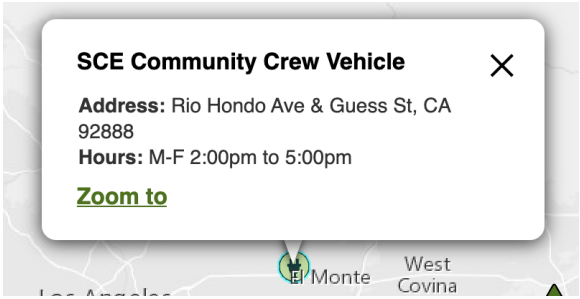


SCE.com PSPS Webpage Examples (cont'd)

Locations of CCVs and CRCs include dates and hours of operation

Map Pop-Up





List View