SCE's 2019 Wildfire Mitigation Plan

Assembly Committee on Utilities and Energy

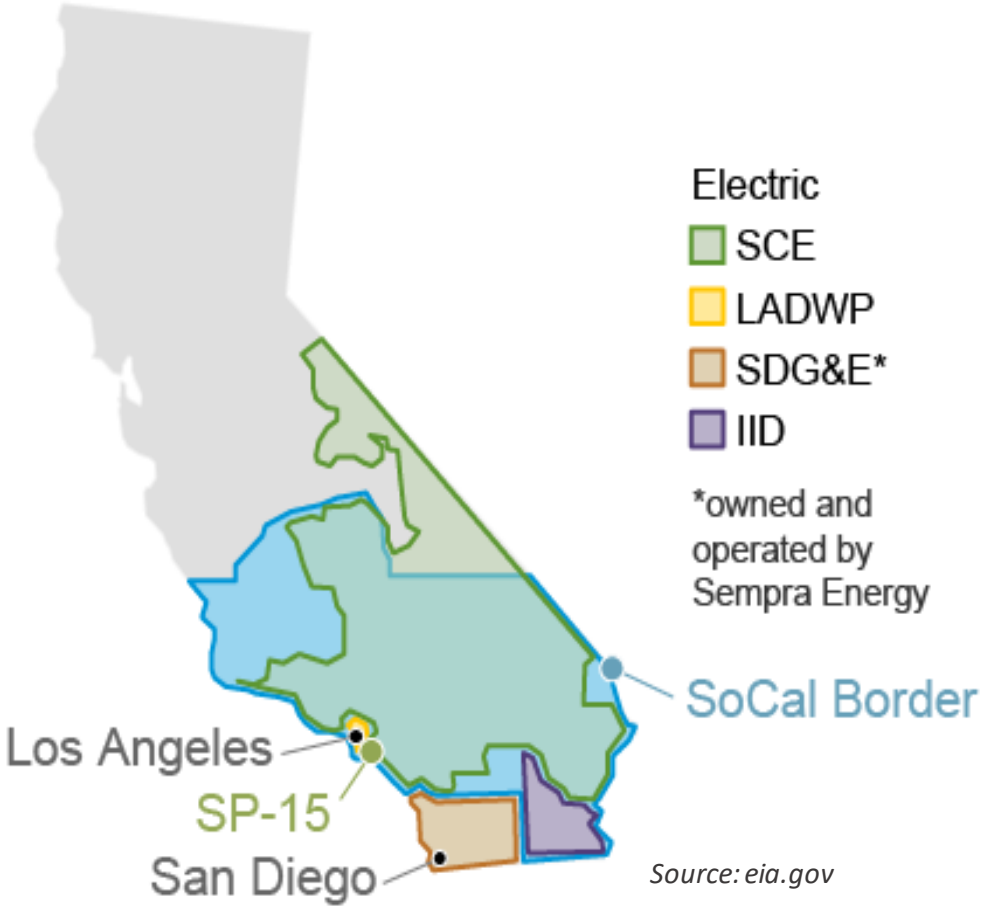
May 21, 2019

We Are Taking Action to Combat Wildfires

SCE's comprehensive Wildfire Mitigation Plan (WMP) builds upon long-standing operational practices to reduce wildfire risk and is based on three pillars:

Hardening Grid Infrastructure	Bolstering Situational Awareness	Enhancing Operational Practices
• Increase the use of fire-resistant poles, composite cross-arms and covered conductor in high fire risk areas • Evaluate design approaches and next-generation engineering technology to further enhance public safety	• Expand meteorological monitoring and forecasting capabilities by installing additional weather stations and high-definition cameras to help SCE and fire agencies to better prepare, mitigate, and respond to reported fires	• Restrict certain types of work in high fire risk areas during a Red Flag Event • Reduce fire risk via a Public Safety Power Shutoff in high fire risk areas during elevated weather conditions • Increase tree trimming and removal to further mitigate safety risks posed by trees or debris

We Are Focusing on High Fire Risk Areas (HFRA)



Source: eia.gov

SCE's Service Area

- 50,000 square miles
- ~52,000 circuit miles
- 5 million customer accounts
- 184 cities, 15 counties and 15 Native American tribes

~35% of our service area is located in HFRA

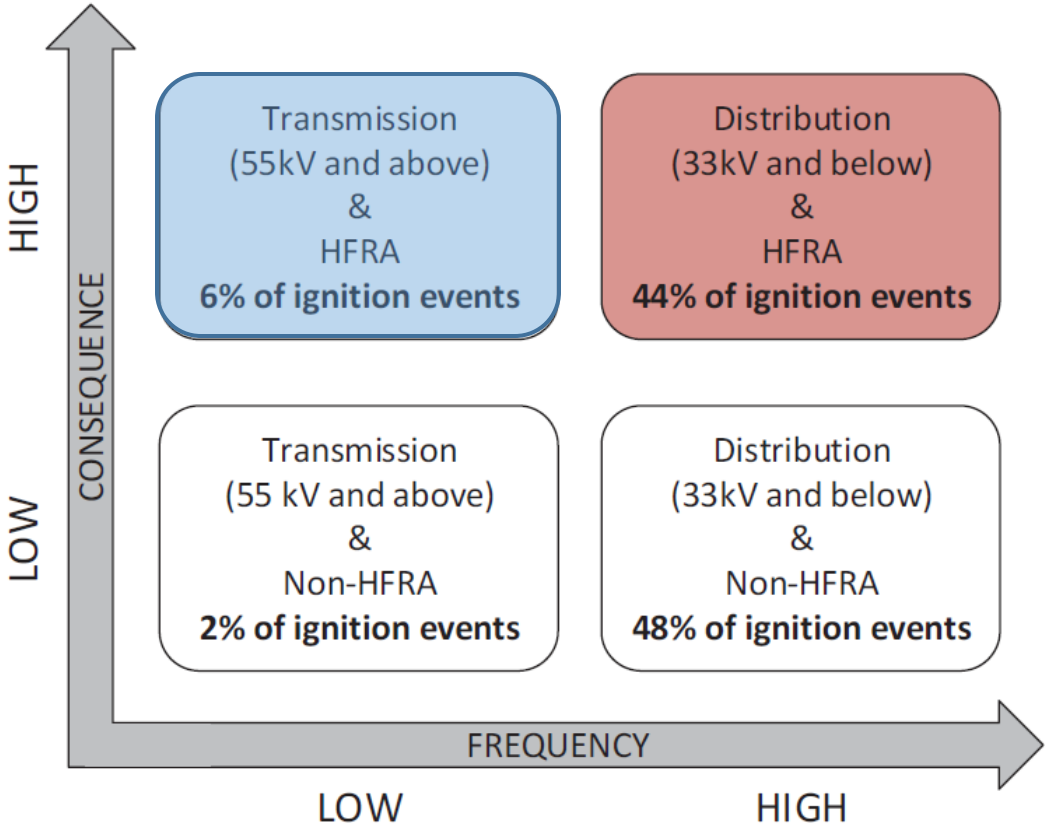
- CPUC Tier 3 = ~18%
- CPUC Tier 2 = ~9%
- Other HFRA[1] = ~8%
- 13,000 circuit miles of distribution
- 6,000 circuit miles of transmission

[1]Areas within SCE's service area that continue to be designated as HFRA and are in the process of being evaluated to determine whether they remain as HFRA

We Used Detailed Risk Analysis to Develop Our Plan

- Our risk analysis determined that the highest consequence and frequency of ignitions were related to distribution infrastructure in HFRA
- Although most of our efforts are directed towards distribution infrastructure, our Wildfire Mitigation Plan also includes mitigation activities for transmission infrastructure

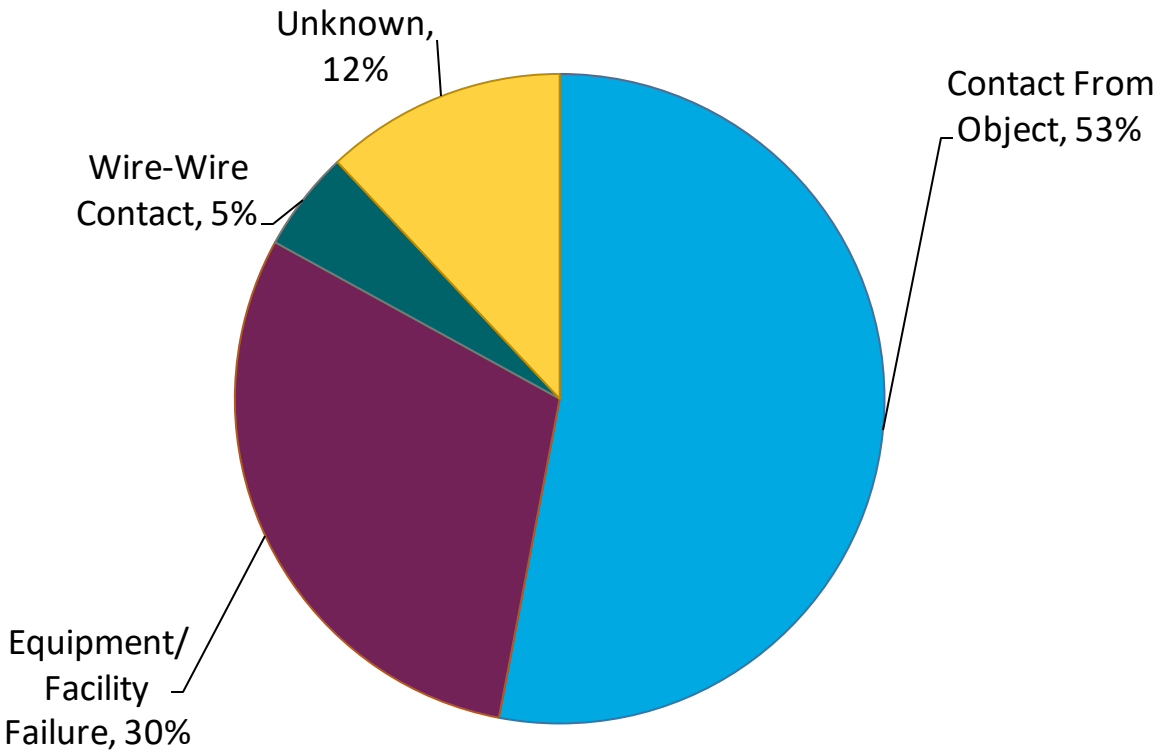
Four Tranches of SCE Assets for Risk Analysis Based on Frequency & Consequence Considerations [1]



[1]*Based on historical 2015-2017 ignition data*

We Are Tackling the Driver of Highest Ignition Risk

Our Wildfire Covered Conductor Program is a key activity to mitigate future ignitions from events historically associated with **~70%** of utility distribution ignitions in HFRA



We are Making Strides in Executing Our WMP

	Mitigations	Activities
Infrastructure	Covered Conductor	• Install covered conductor in HFRA (based on circuit miles)
	Other Infrastructure Mitigations	• Complete various system hardening activities (e.g., composite poles, current limiting fuses (CLFs), remote automatic reclosers (RARs), fast-curve settings) • Conduct studies, evaluations and pilots of alternative technologies
	Undergrounding	• Perform evaluation of targeted undergrounding in HFRA
Operational	Situational Awareness	• Install weather stations and high-definition (HD) cameras
	Inspections	• Perform Enhanced Overhead Inspections (EOI) on transmission and distribution structures in HFRA • Perform existing inspections (poles, switches, circuits, relays, etc.) • Perform Infrared and Corona scanning to obtain HD imagery of equipment
	Vegetation Management	• Perform vegetation removal at poles • Perform hazard tree removal • Conduct LiDAR surveying for transmission, supplemental inspections in HFRA
	Public Safety Power Shutoff	• Effective communications and engagement with emergency services, customers and communities

Hardening Our Grid Infrastructure

We are deploying **state-of-the-art** grid hardening technology and equipment to build a **stronger** and **more resilient** system

- **170+** circuit miles of covered conductor installed with hundreds more miles in queue
- **7,500+** faster-acting fuses installed
- **1,500+** protective devices programmed with more sensitive (fast curve) settings

The covered conductor is an insulated power line that minimizes faults or short circuits, which can create sparks

Bolstering Our Situational Awareness

We have an in-house team of fire weather experts staffing our **24/7 Situational Awareness Center** to monitor local conditions, using high resolution weather modeling and real-time data gathered from our growing network of weather stations, HD cameras and high-tech weather modeling tools

- **266+** weather stations installed to date providing access to real-time weather data and improving weather models at the **circuit level**
- Targeting **450** by end of 2019 and **850** by end of 2020

- **108+** HD cameras installed, covering **~60%** of HFRA, pinpoint wildfire locations and improve response times
- Targeting **160** cameras and **90%** coverage by end of 2019 (stretch goal)

- Developed enhanced **Fire Potential Index** to relay wildfire potential at the **circuit level**
- **2 supercomputers** can run advanced weather models to improve forecast resolution

Enhancing Our Operational Practices

We are using a **robust risk-informed framework** to make a number of **enhancements** to existing standards and operational practices that further fortify our grid and drive down wildfire risk

Enhanced Overhead Inspections Identify Potential Risks

- In less than 5 months, our crews completed detailed ground-based inspections of **400,000+** distribution and transmission structures in HFRA
- Deploying helicopters and drones equipped with Infrared, Ultraviolet, LiDAR and HD image scanning to perform aerial inspections of our facilities in HFRA

Circuit Breaker/Recloser Blocking Add Extra Layer of Protection

- **2,000+** devices remotely set to not automatically re-energize lines during high fire risk conditions

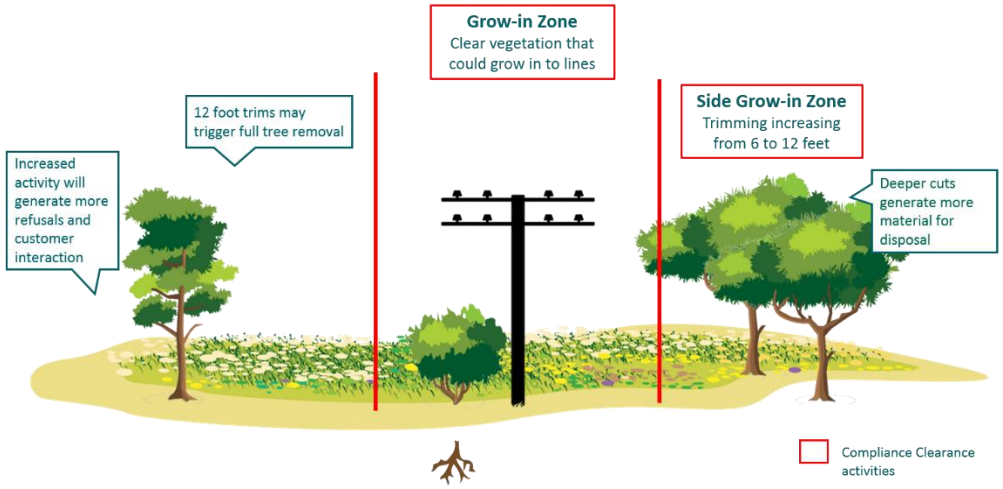
SCE's helicopters are equipped with software and high-tech cameras, like the one shown above, to find potential risk undetectable to the human eye

Enhancing Our Operational Practices

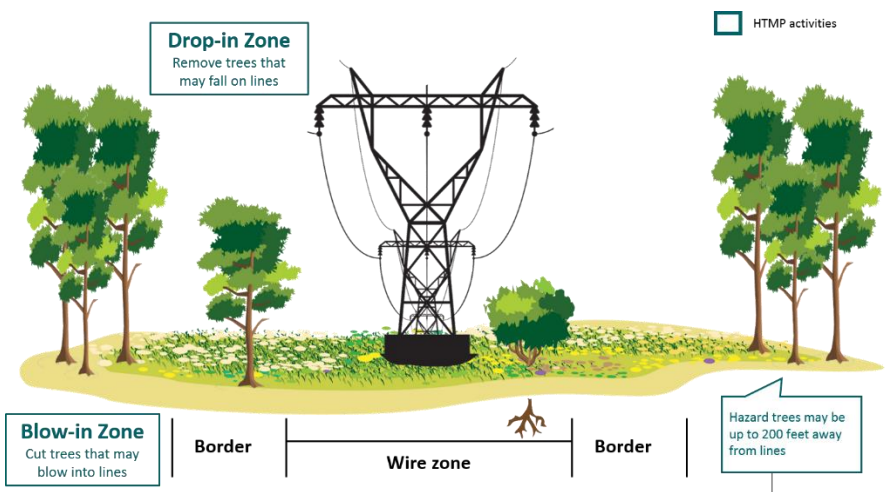
Vegetation Management Accounts for 900,000 Trees in Our Service Area; 400,000 in HFRA

- Enhanced standard practice by increasing trim distances to keep power lines clear
- Performing inspections and removal of hazard trees that pose blow-in/drop-in risk
- Implementing SCE's first live fuel moisture program to improve fire modeling
- Conducting annual joint patrols with fire agencies in HFRA to identify and remediate issues that increase wildfire risk; adding supplemental patrols to mitigate spring growth

Distribution Vegetation Management Plan
Increase trim distances from 6 feet to 12 feet



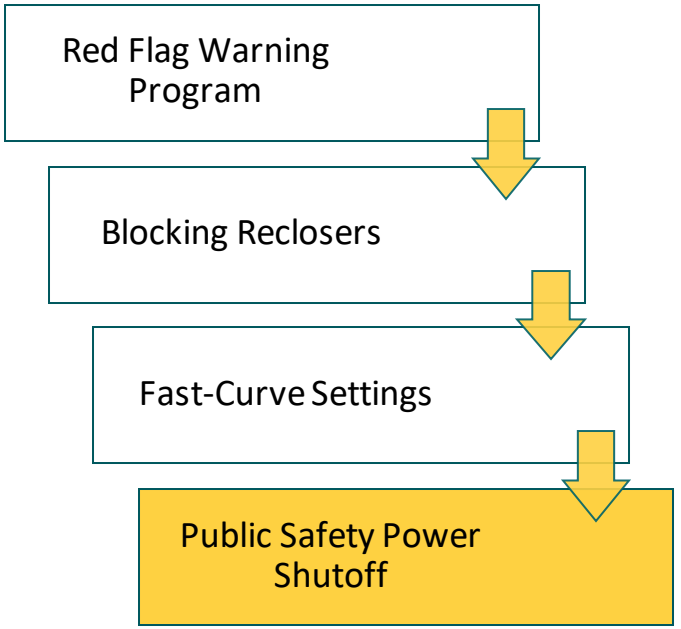
Hazard Tree Management Plan
Remove or cut trees that could fall in or blow into lines



Enhancing Our Operational Practices

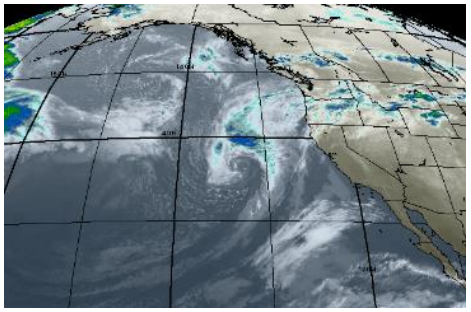
Public Safety Power Shutoff (PSPS) Prevent Ignitions During Elevated Weather Conditions

- PSPS is used to pre-emptively de-energize selected circuits in HFRAs during elevated fire weather conditions and is used in conjunction with other wildfire mitigation tactics
- Refined our PSPS protocol with input from fire authorities and continue to leverage our partnership with CalOES and local/county fire and police
- Coordinating with local governments, public safety and non-profit organizations, and essential use providers



Our SCE team has been meeting with customers, local government and law enforcement agencies to discuss SCE's Wildfire Mitigation Plan to increase awareness of the possibility of a preemptive power shutoff and discuss enhancing community resilience during major events

PSPS Decision Points Include But Are Not Limited To:



SCE Meteorologists forecast **strong wind** conditions in service area

SCE Fire Scientist assessment **of fire potential** to include consideration of **weather** and **fuels**

Real-time observations from qualified electrical workers monitoring for **hazardous conditions** in the field

Impact of de-energizing circuits on **first responders and essential services**

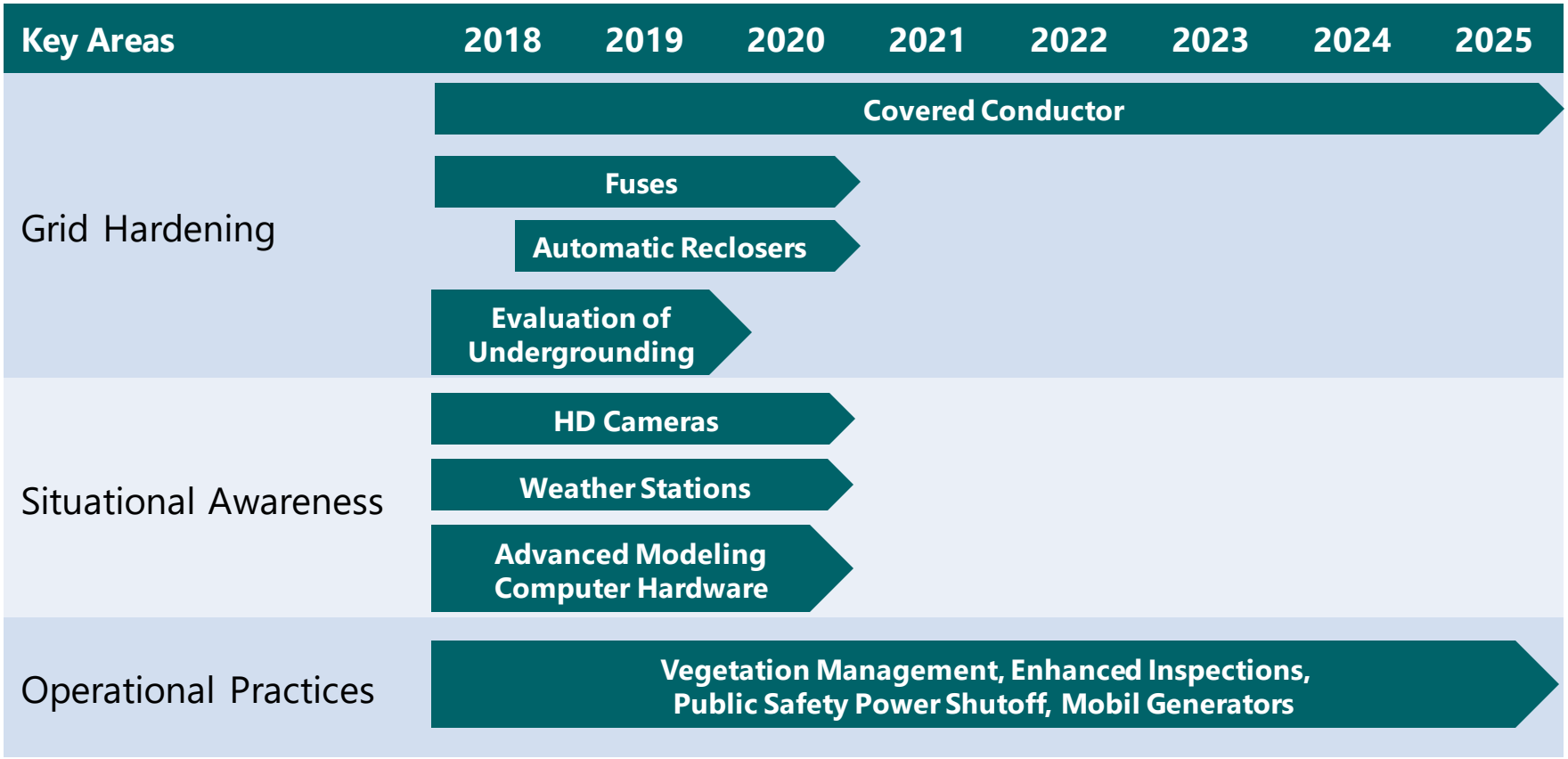
Mobilizing Our Workforce

We are **moving fast** to accomplish the activities in our Wildfire Mitigation Plan, so we are **thinking differently** about how to **leverage and build** our skilled workforce as well as equip them with the tools they need to get the job done

- Integrating risk-based approach in training for frontline employees
- Accelerating use of mobile devices to aid crews with Enhanced Overhead Inspections
- Working closely with IBEW Local 47
- Enlisting contractor crews to support efforts

Our Long-Term Implementation Plan

Our Grid Safety & Resiliency Program and Wildfire Mitigation Plan detail the necessary actions we must take as a utility to make our grid safer and more resilient. This is a **flexible, adaptive plan** that will evolve as we collect better data insights and the threat of wildfires also changes based on climate conditions.



Glossary of Terms

Term	Description
Circuit Miles	Length of powerlines as measured between supporting structures, regardless of number of wires
Current Limiting Fuse (CLF)	Type of fuse that operates more quickly to reduce potential ignition energy
Conductor	Industry term for wire used to conduct electricity between source and destination
Conductor Miles	Combined length of all individual wires on the powerlines
California Public Utilities Commission (CPUC)	A regulatory agency that regulates privately owned public utilities in the state of California, including electric power, telecommunications, natural gas and water companies.
Enhanced Overhead Inspections (EOI)	Risk-based inspections beyond compliance-based inspections
Fast-Curve Settings	Settings that speed activation of protective devices to reduce potential ignition energy
Grid Safety Resiliency Program (GSRP)	Special filing with CPUC that aligns with SB 901 Wildfire Mitigation Plan; submitted September 2018
HD	High definition / high resolution
High Fire Risk Area (HFRA)	CPUC Tier 2 and 3 fire-threat areas as well as additional areas SCE previously designated as high fire risk prior to development of CPUC fire-threat maps
LiDAR	Light Detection and Ranging; survey method using radar principles with lasers
Public Safety Power Shutoff (PSPS)	Preemptively turning power off to circuits impacted by wind condition and elevated fire potential conditions (fuel moisture, dew point, wind speed)
Remote-Controlled Automatic Recloser (RAR)	Protective device that can be set to automatically re-energize a circuit following its initial activation; can be programmed for fast-curve settings
SB901	Senate Bill 901 – legislation that requires utilities to submit Wildfire Mitigation Plan
Tier 1	CPUC fire-threat area defined by CAL FIRE/US Forest Service as having high tree mortality in direct proximity to communities, roads, and utility lines
Tier 2	CPUC fire-threat areas where there is an *elevated* risk (including likelihood and potential impacts on people and property) from utility associated wildfires
Tier 3	CPUC fire-threat areas where there is an *extreme* risk (including likelihood and potential impacts on people and property) from utility associated wildfires
Wildfire Conductor Program (WCCP)	Major element of GSRP
Wildfire Mitigation Plan (WMP)	Annual compliance filing required by SB 901 (2019 compliance activities)