

# San Diego Gas & Electric Company Wildfire Mitigation Plan

February 13, 2019

# SDG&E's Wildfire Mitigation Plan

## SDG&E Service Territory

	Distribution	Transmission
Substations	136	20
Poles/Structures	208,970	14,330
Circuits	1,033	237
Circuit Miles	17,000+	1,970+
OH Circuit Miles	6,500+	1,800+

- 4,100 Square Miles
- 1.4 Million Electric Meters
- 3.6 Million Electric Customers

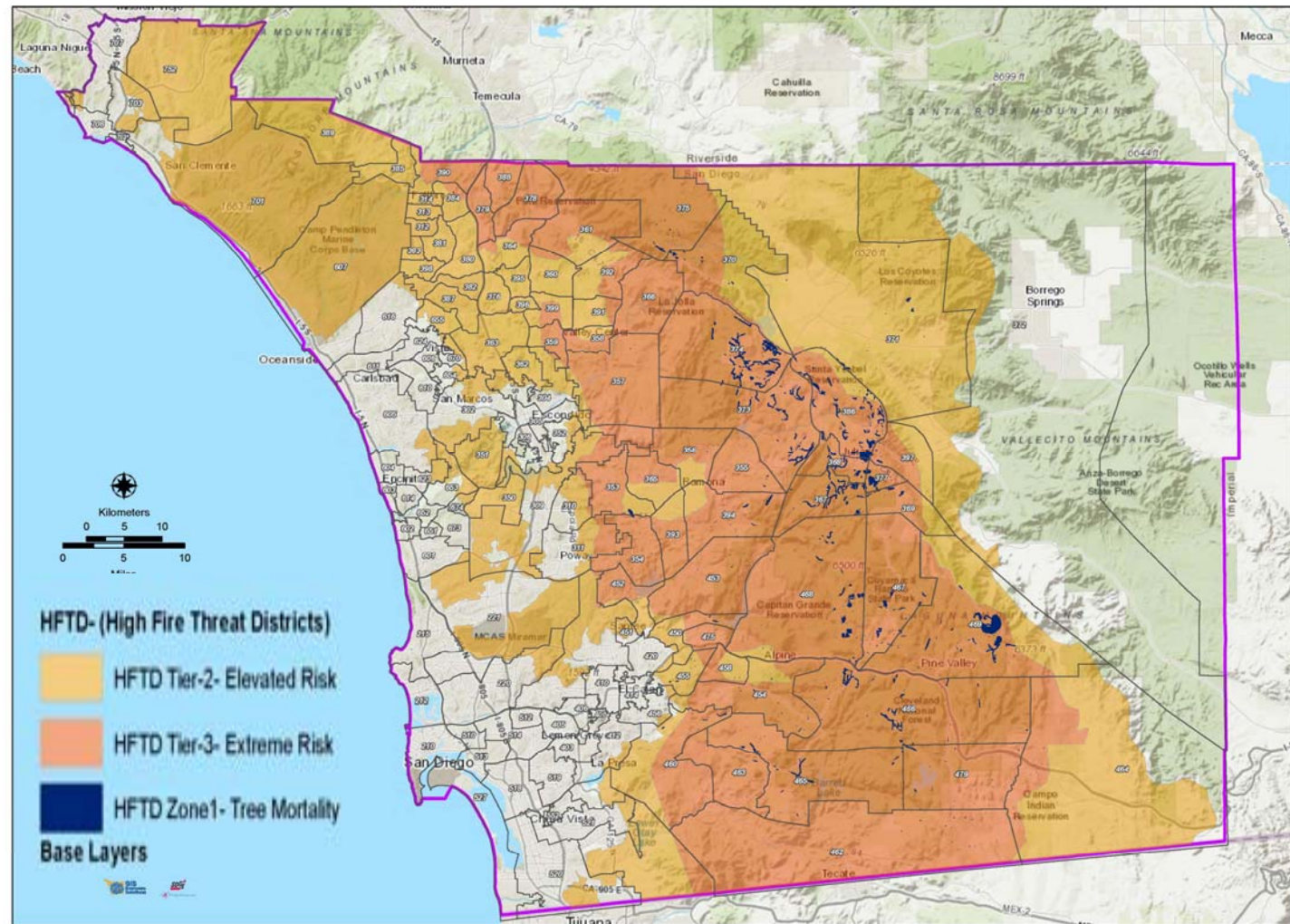


# SDG&E's Wildfire Mitigation Plan

## High Fire Threat District

- SDG&E mapped its entire system based on fire risk in 2008.
- Focused on hardening and situational awareness efforts in the highest-risk areas.
- The CPUC required all California IOUs in 2017 to adopt the High Fire Threat District (HFTD) maps.
- SDG&E's original fire map was nearly identical to the HFTD map.
- 54% of SDG&E's overhead circuit miles reside in the HFTD.

SDG&E High Fire Threat Districts (HFTD), Tier-2, Tier-3, and Zone-1



## Objectives of the Plan

## Slide 4

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**ST4**      tie this to the executive summary  
Swetek, Tyson, 2/8/2019

# *Wildfire Mitigation Plan Objectives*

## **Overview of Wildfire Mitigation Plan**

- Create a Wildfire Mitigation Plan that is consistent with state law and objectives.
- Minimize the probability that various components of SDG&E's electric system might become the original or contributing source of ignition for a wildfire.
- Create a wildfire plan that embraces safety, prevention, mitigation, and recovery as central priority for SDG&E.

### SDG&E's Plan:

- Highlights the programs, initiatives and innovations that describe SDG&E's efforts made and will continue to make to mitigate fire risk.
- Builds upon SDG&E's existing Fire Prevention Plan that has been filed annually with the CPUC since 2012.
- Further examines various improvements and enhancements that could be made to SDG&E's Community Fire Safety Plan.
- The overall Plan is continually evolving and SDG&E is continuing evaluating all aspects of the Plan for further improvements as they become available.

## Preventive Strategies and Programs

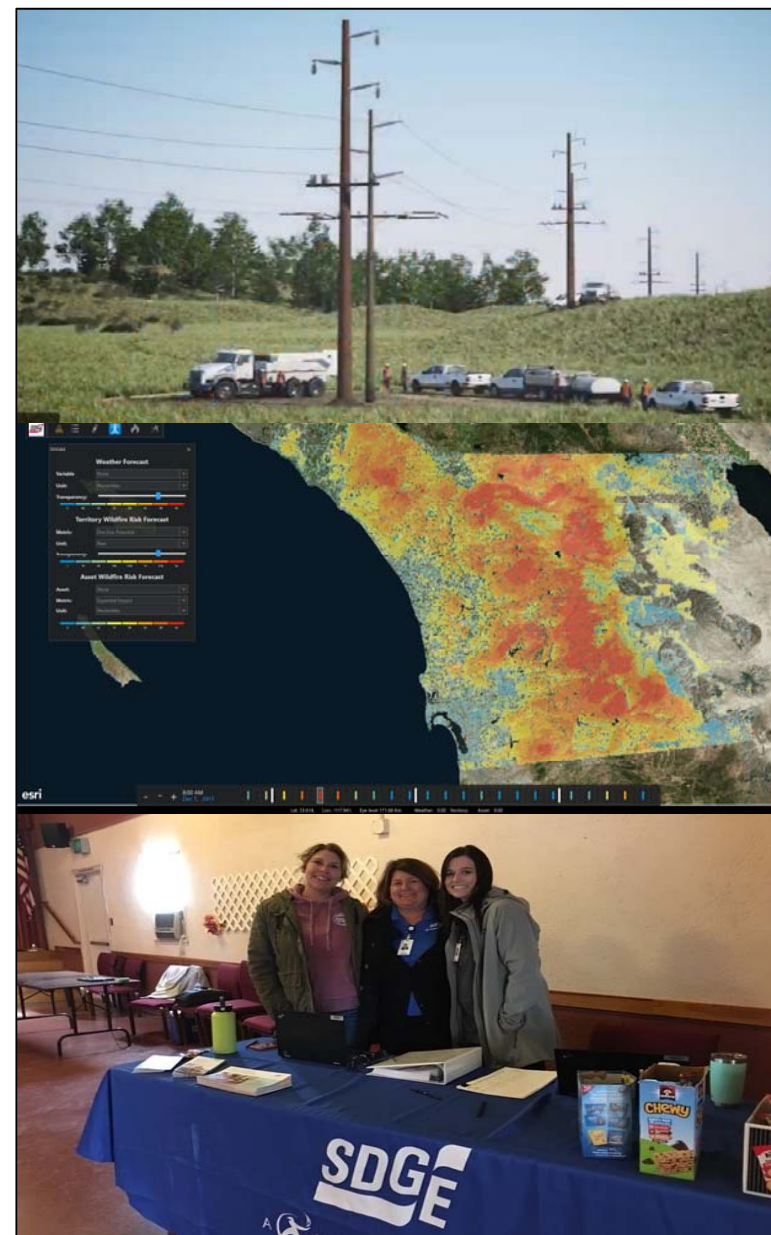


## Preventive Strategies and Programs

### Wildfire Risk Mitigation

SDG&E's approach to minimizing the risk of its electrical infrastructure causing catastrophic wildfires involves a three-pronged approach, integrating efforts in:

- **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.





## Slide 7

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**ST6** Create a picture for each of the 3 main approaches, fix the heading

Swetek, Tyson, 2/8/2019

**ST21** Brian to complete

Swetek, Tyson, 2/8/2019

## Risk Analysis and Risk Drivers

## *Risk Analysis and Risk Drivers*

### **Risk Management Process**

- The CPUC has implemented a risk-informed General Rate Case (GRC) framework, incorporating the Safety Model Assessment Proceeding (S-MAP) and Risk Assessment Mitigation Phase (RAMP), which focus on safety and risk mitigation.
- S-MAP provides a framework for risk models and tools, while RAMP presents the utility's top safety risks and proposed plans for the mitigation of those risks.
- SDG&E's business strategies have evolved to reflect this risk-informed approach.

#### **Six Steps of SDG&E's Risk Management Process**

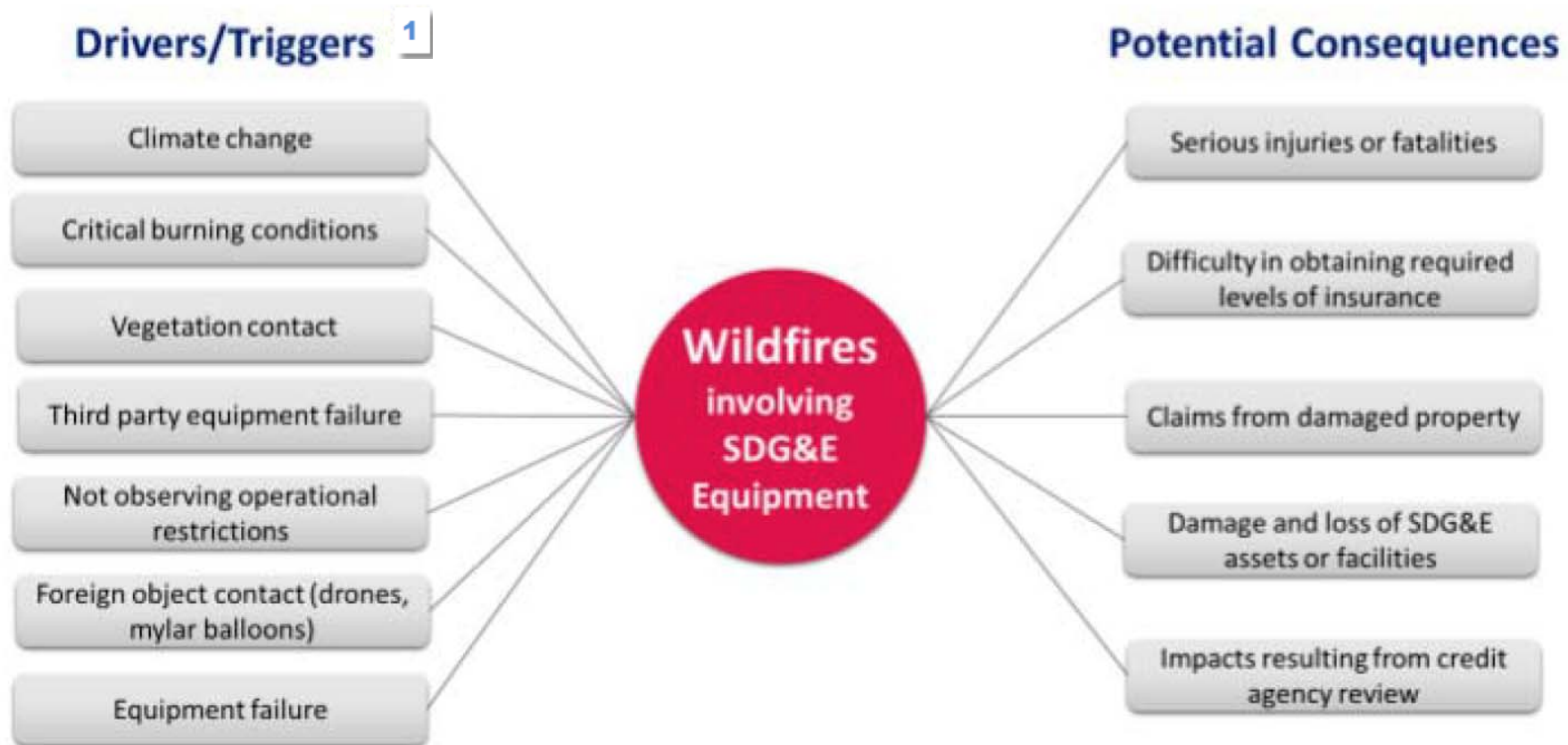
- Risk Identification
- Risk Analysis
- Risk Evaluation and Prioritization
- Risk Mitigation Plan Development and Documentation
- Risk Informed Investment Decisions and Risk Mitigation Implementation
- Monitoring and Review



## Risk Analysis and Risk Drivers

### Overview of Wildfire Risk

- The threat of wildfire has increased throughout California over the past several years, which in turn causes Wildfire Risk to be the number one risk in SDG&E's risk register.



1. **Risk Drivers/Trigger:** an indication that a risk could occur. It does not reflect actual or threatened conditions.

# Wildfire Prevention Strategy and Programs

Using a variety of situational awareness inputs, SDG&E established four Operating Conditions to monitor the wildfire potential throughout its service territory in order to guide and inform various operating decisions, such as:

- Recloser settings
- Sensitive relay settings
- Testing procedures
- Work restrictions
- Contract fire resources

Normal Condition	Elevated Condition	Extreme Condition	Red Flag Warning
Burn environment is not conducive for catastrophic wildfires.	The burn environment has become conducive for wildfires.	A combination of high winds, low relative humidity, and the burn environment will create critical wildfire weather conditions.	Declared by the National Weather Service when high winds and low relative humidity are forecasted to occur for an extended period. During these conditions there is the potential for catastrophic wildfires.



# Wildfire Prevention Strategy and Programs

## Operational and Engineering Practices – Aviation Firefighting

- SDG&E has developed and implemented an effective, year-round aerial firefighting program to support the fire agencies in its service territory.
- SDG&E has an agreement with the County of San Diego, CalFire, and the Orange County Fire Authority for aerial firefighting.
- Dispatch of SDG&E's aviation firefighting assets is performed through CalFire.
- Currently, SDG&E has a lease for year-round use of an Aircrane firefighting helitanker.
- ***SDG&E plans to enter into a one year lease for an additional firefighting helitanker, a Sikorsky S-60, which unlike the Aircrane, has night fly capability.***



# Wildfire Prevention Strategy and Programs

## Operational and Engineering Practices – Fuels Management/Ignition Management

➤ ***SDG&E, in partnership with fire departments, fire safe councils, and other stakeholders will seek to implement a fuels management program.***

- Fuel management projects can lower the risk of catastrophic wildfires by reducing and removing wildland fuel accumulations.
  - 4,000 acres of SDG&E right of ways and easements currently receiving fuel reduction.

➤ ***In 2018, SDG&E established an enhanced Ignition Management Program.***

- This program tracks ignitions and potential ignitions and performs root cause analysis on each ignition or potential ignition to detect patterns or correlations.
- Such ignition or potential ignition events will be assigned to a mitigation owner from the business unit most logically positioned to eliminate or reduce future events of a similar nature.





# Wildfire Prevention Strategy and Programs

## Inspection Plan

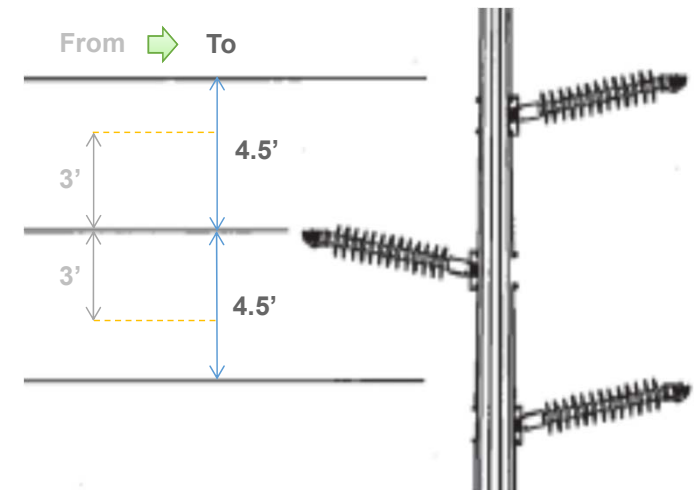
- **Corrective Maintenance Program (CMP)** – a CPUC governed prescriptive program of inspection and repair.
  - Governs all distribution facilities (UG and OH) and has prescribed inspection and repair cycles.
  - Examines both safety and reliability on all facilities in all areas.
  
- **QA/QC annual patrol of HFTD area** – facilities in the HFTD Tier 3 are patrolled annually.
- **QA/QC inspection of HFTD area** – annually one third of the HFTD Tier 3 is inspected.
  - Any corrections noted in either of the above are made before the next fire season.
  - 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.



# Wildfire Prevention Strategy and Programs

## System Hardening Plan

- **Design criteria** leverages the wind and meteorology data to design to the known local conditions of the area.
  - Designs for fire hardened circuits meet the highest expected winds for the area.
- **Installation of stronger conductor** to prevent a structural failure and reduce the possibility of wires coming down.
- **Increase conductor spacing** to reduce the risk of a flash at all conductor levels.
  - Conductors are being spaced beyond the electrical requirements in the highest risk areas to reduce the phase to phase contact risk.
- **Install Steel Poles** for 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.



An example: increasing the vertical phase spacing on a 69kV line from 3' to 4.5' per phase.

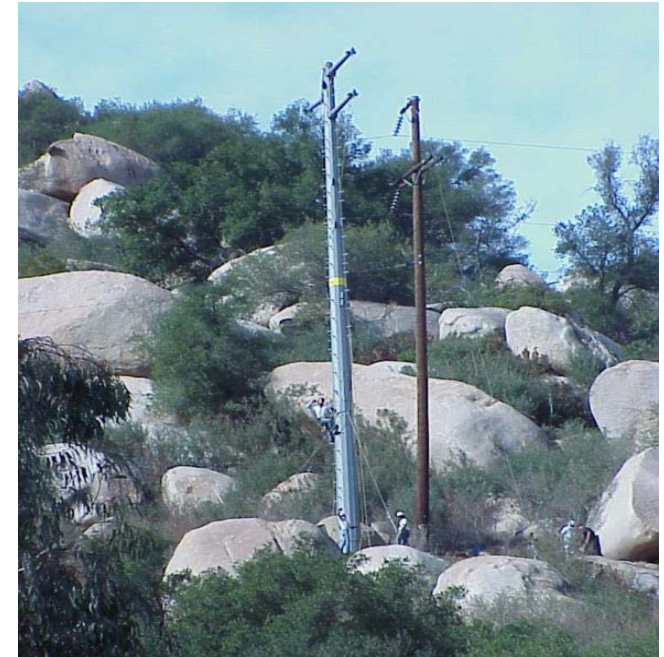


Covered Conductor Application

# Wildfire Prevention Strategy and Programs

## System Hardening Plan

- **FiRM (Fire Risk Mitigation):** Multi-year distribution program to replace #4 and #6 copper conductors, replace wood poles to steel poles, install additional overhead SCADA sectionalizing switches, performing pole loading calculations, supports future growth of falling conductor protection.
  - ***Acceleration planned - estimated completion now: 2025***
- **Transmission Fire Hardening:** Addressing all 69kV transmission lines located in the HFTD.
  - Estimated completion: 2025
- **CNF:** Multi-year program to fire harden facilities in the Cleveland National Forest.
  - Estimated completion: 2021
- **Pole Risk Mitigation and Engineering (PRiME):** Program to develop documented pole loading calculations for all poles in SDG&E's service territory (starting in the HFTD).
  - ***Acceleration planned - estimated completion in the HFTD now: 2027***





# Wildfire Prevention Strategy and Programs

## System Hardening Plan

- **WiSE (Wire Safety Enhancement):** Multi-year distribution program to replace #4 and #6 copper conductors outside the HFTD.
  - *Fire hardens circuits within the costal canyons*
  - *Fire hardens circuits within the wildland urban interface*
  - *Estimated completion: 2021*
- **Expulsion Fuse Replacements:** Multi year program to replace expulsion fuses within the HFTD.
  - *Installs Cal Fire approved power fuses*
  - *Estimated completion: 2021*
- **Hotline Clamp Replacements:** Multi-year maintenance program to replace connectors within the HFTD.
  - *Clamp failures have lead to downed conductor*
  - *Estimated completion: 2025*
- **Public Safety Power Shutoff Engineering Enhancements:** Multi-year program to install sectionalizing devices in order to reduce the customer impact of PSPS events.



Remote Sectionalizing Device



New Cal Fire Approved Fuse



# System Design and Operations

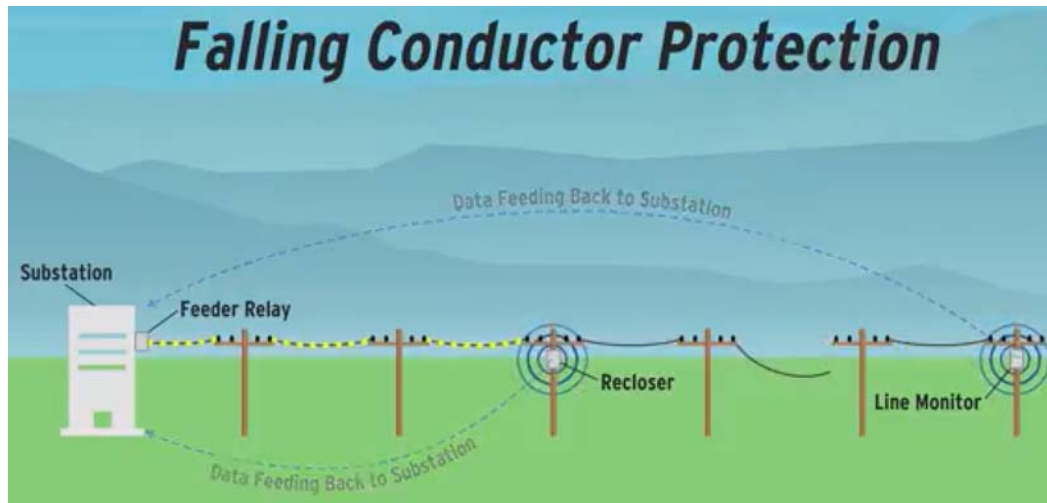
## Advanced Electric System Protection

### 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 incredibly sensitive in order to isolate faults faster than normal profile.
  - Sensitive Ground Fault: This setting detects high impedance faults which largely result from downed conductors.

### Protective Devices

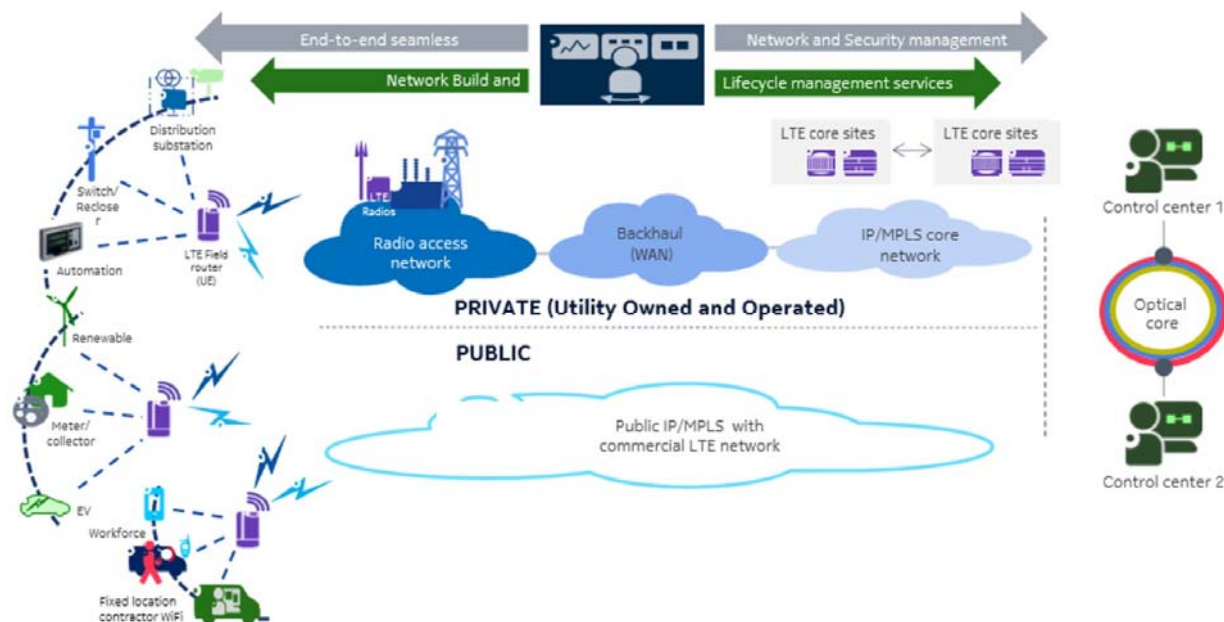
- Sensitive Profile and Sensitive Ground Fault Protection**
  - Over 270 distribution circuit automated reclosers in the HFTD have the capability for sensitive profile and sensitive ground fault protection
- **Falling Conductor Protection**
  - *Developing technology to de-energize conductors prior to hitting the ground*
  - *As part of SDG&E's fire hardening efforts, devices are being installed to enable the future deployment of falling conductor technology*



# System Design and Operations

## Private Long Term Evolution (LTE) Communications

- Developing a wireless communication infrastructure for increased reliability and system coverage, enhanced security, and remote access capabilities within the HFTD.
- ***Builds a communication network to enable the technologies described in Advanced Electric System Protection.***
- ***Improved network availability and reliability for mobile workforce responding to emergency events***
- ***Expanded network coverage within the HFTD to enable greater deployments of remote sectionalizing devices and controllers***
- ***Enhanced cyber security capabilities for remote management and automation***



# Wildfire Prevention Strategy and Programs

## Vegetation Management Plan

- Manage approximately 465,000 trees.
  - ~175,000 trees pruned with 8,000 to 10,000 trees removed annually.
  - Prune clearance is beyond requirements and contemplates tree growth rates.
  - All trees are mapped in GIS database, which includes information regarding species, growth rate, trim dates, etc.
- Each tree is evaluated, inspected, and trimmed as needed annually.
- Integration of technologies into Vegetation Management Program (LiDAR, drones, etc.).
- Continue practice of removing all tree branches directly overhanging the conductors.
- Contractors are audited (inspection and trim) by a third party.



**SDG&E has, for the 15<sup>th</sup> consecutive year, been recognized by the National Arbor Day Foundation as a “Tree Line USA” Utility company.**

# Wildfire Prevention Strategy and Programs

## Enhanced Vegetation Management Plan

### Enhancements

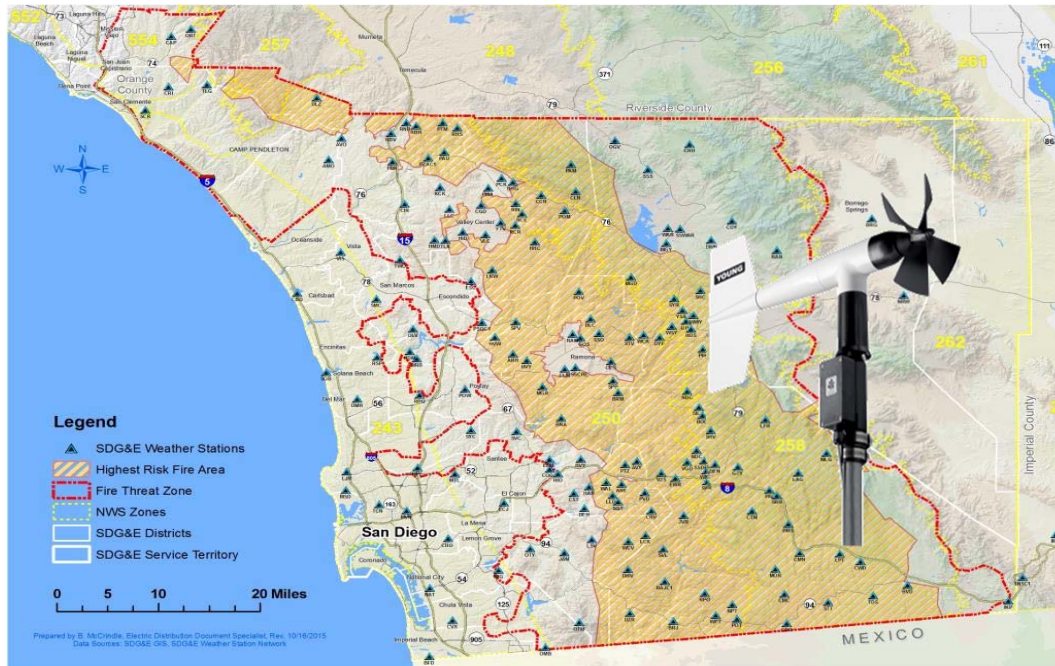
- ***Double the inspection rate in the HFTD.***
- ***Increase post-trim clearance up to 25' where feasible within the HFTD.***
- ***Collaborative data analysis with Meteorology.***
  - ***Combining big data from Meteorology with big data from Vegetation Management with goal to create a 'risk profile for every known tree.'***





# Wildfire Prevention Strategy and Programs

## Situational Awareness Protocols and Determination of Local Conditions



- SDG&E operates America's most granular utility-owned weather network with over 200,000 pieces of weather data daily collected daily.
- Weather stations located on distribution and transmission poles – at least one station representative of every circuit in high risk areas.
- Provides temperature, humidity and wind speed readings every 10 minutes.
- ***Future steps include a strategic rebuild of the weather stations and additional installations in coastal canyons and wildland urban interfaces.***

**Our WEATHER NETWORK**  
for reliability and response

**OVER 170 WEATHER STATIONS**

**REAL-TIME INFO FROM CRITICAL LOCATIONS**

**TRACKS HUMIDITY WIND SPEED TEMPERATURE**

**CAMERAS MONITOR AND WATCH DANGEROUS CONDITIONS INCLUDING THE START AND SPREAD OF WILDFIRE**

**5 METEOROLOGISTS**

**SHARED DAILY LOCAL FIRE DEPARTMENTS NATIONAL WEATHER SERVICE TO KEEP YOU SAFE**

**ON-CALL 24/7/365**

**AMERICA'S LARGEST UTILITY-OWNED WEATHER NETWORK**

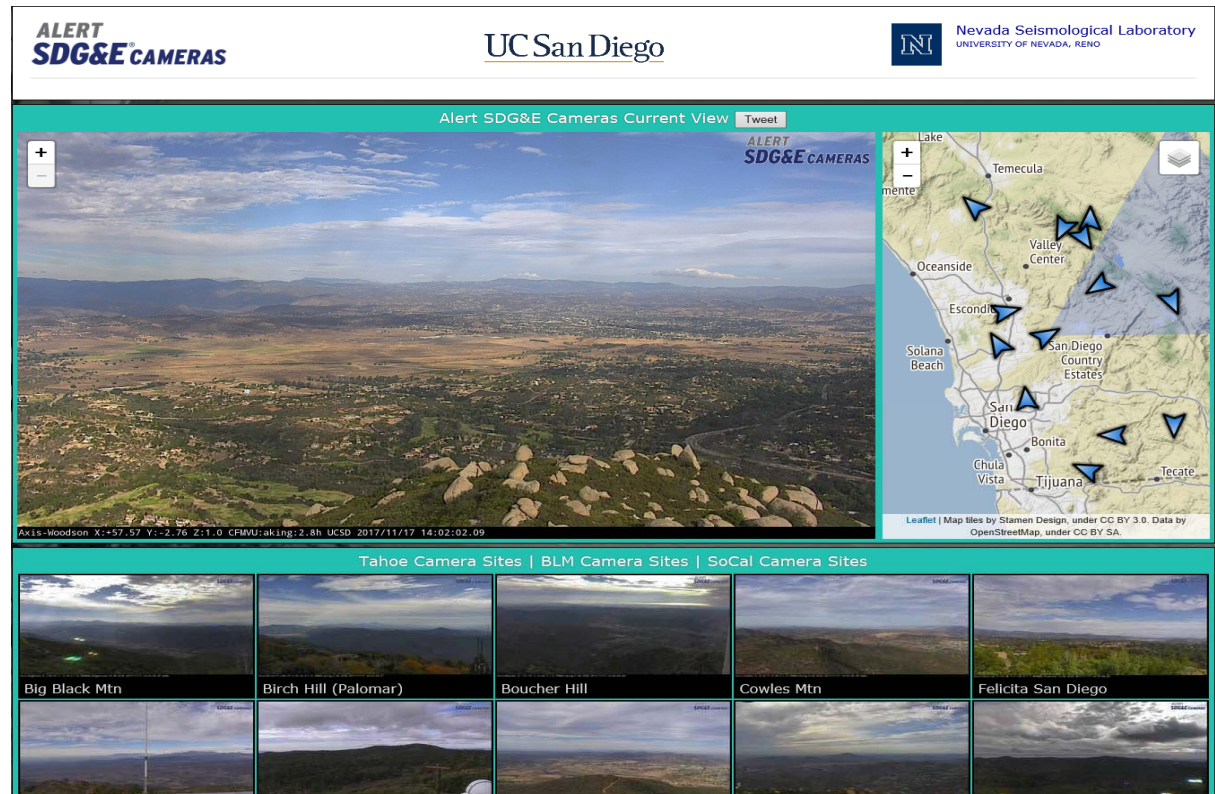
**SDGEnews.com**

# Wildfire Prevention Strategy and Programs

## Situational Awareness Protocols and Determination of Local Conditions



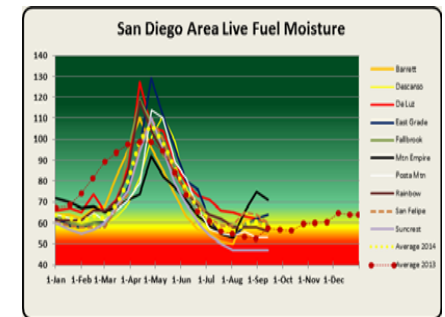
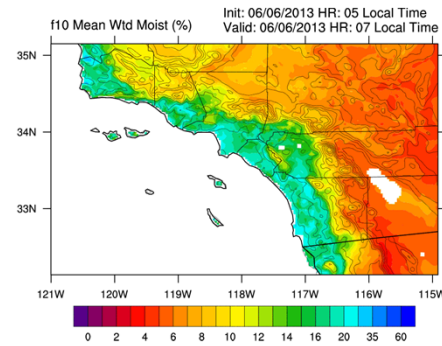
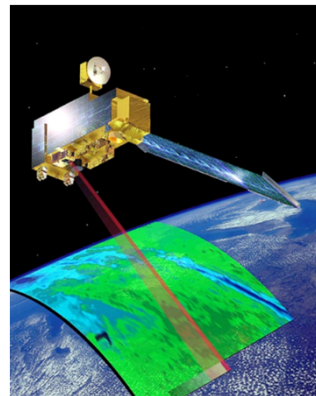
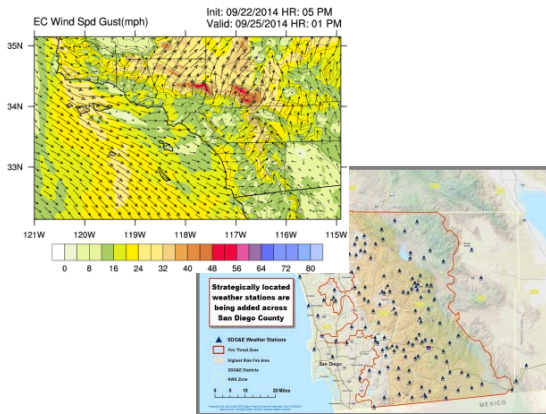
- Over 100 high definition cameras improve fire detection.
- 16 pan-tilt-zoom Alert SDG&E cameras installed in 2017.
  - CALFIRE and other fire agencies have priority to control cameras.
  - Triangulation of cameras allows agencies and SDG&E to accurately determine wildfire location.
  - Infrared capabilities for night vision.
- Wireless fault indicators provide more precise information on where to look for ignitions



➤ ***Additional cameras planned for coastal canyons and Wildland Urban Interface areas***



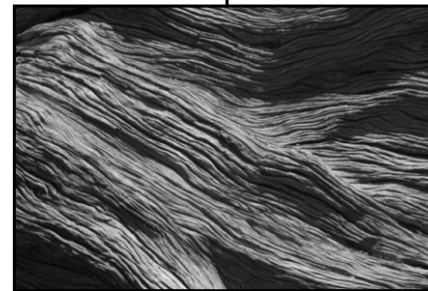
- SDG&E has developed a Fire Potential Index (FPI) to communicate the wildfire potential on any given day.
- Incorporates weather, live fuel moisture, dead fuel moisture, and greenness of the annual grasses.



**Weather**  
(wind speed & humidity)



**Grasses**



**Dead Fuels**

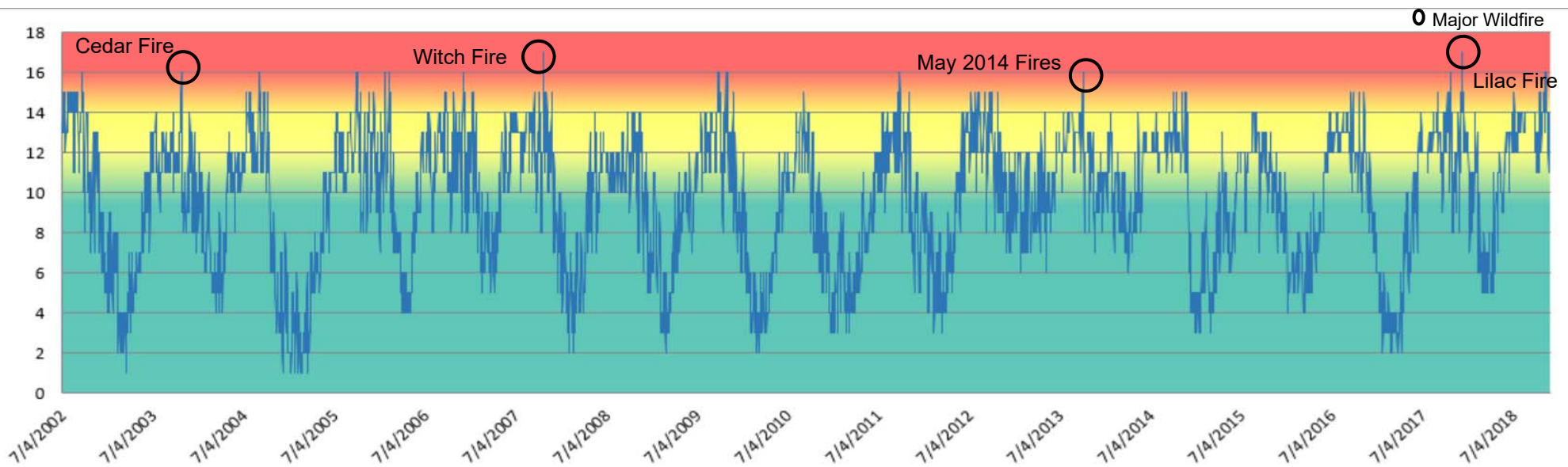


**Live Fuels**

**Fuel Moisture**

- The 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



#### Santa Ana Wildfire Threat Index (SAWTI)

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

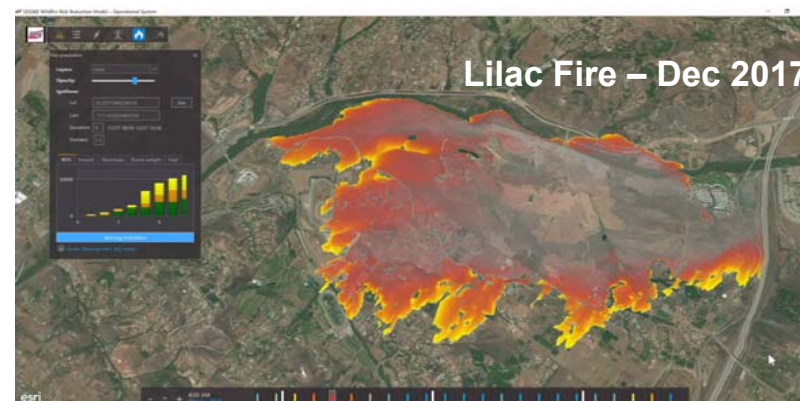
- Calculates the potential for large wildfire activity based on the strength, extent, and duration of the wind, dryness of the air, dryness of the vegetation, and greenness of the grass. Scale from “Marginal” to “Extreme”
- Similar to the Hurricane “Category” Rating Scale



#### 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
- ***SDG&E plans to mobilize and cloud base the WRRM-Ops model to provide in-field capabilities***



# *Wildfire Prevention Strategy and Programs*

## **Public Safety Power Shutoff Protocols**

- SDG&E has an obligation to operate its system safely, which may require SDG&E to de-energize circuits when necessary to protect public safety (PSPS).
- SDG&E is statutorily authorized to do so under P.U. Code §§ 399.2(a) and 451, consistent with Commission Decision 12-04-024 and Resolution ESRB-8.
- A PSPS is a last resort measure to reduce wildfire risk.

In determining whether to employ a PSPS, SDG&E considers a variety of factors, such as:

- Fire Potential Index
- Santa Ana Wildfire Threat Index
- National Weather Service declaration of a Red Flag Warning
- Wind speeds
- Relative humidity
- Live fuel moistures
- Observer input from the field
- Ability for air fire suppression resources to fly in high winds
- Existing fire activity in Southern California and Mexico



# Wildfire Prevention Strategy and Programs

## Public Safety Power Shutoff Protocols

- SDG&E maintains predefined lists of customers by circuit
  - Notification processes have been greatly refined
    - Outbound dialer has been updated and is now capable of faster dialing and larger volumes of calls
    - Authorization to utilize cell phone numbers for emergency outreach
    - Expansion in the use of social media
    - SDG&E's website has become an important resource during high wind events
    - Medical Baseline customer communication
      - Outbound dialer
      - Call center contact
      - Field personnel dispatch
    - External communications are initiated, including customers, elected officials, agency representatives, fire departments, **and newly required notifications to Cal OES, CALFIRE, CPUC, etc.**
- **2019 Enhancements Include:**
- ***Adding two-way texting capabilities and synching the Enterprise Notification System (ENS) with our GIS and weather network.***
  - ***HFTD Fire Prep Communications: SDG&E will conduct ongoing education campaigns.***

# Wildfire Prevention Strategy and Programs

## Public Safety Power Shutoff Protocols

- SDG&E is expanding upon or developing new programs and strategies, leveraging **backup power for resilience** to mitigate the risk associated with Public Safety Power Shutoffs. Specifically:
  - **internet connectivity at fire stations.**
  - **the expansion of the Community Resource Center Network.**
- Essential service providers (e.g., telecommunications and water) should be prepared for PSPS events by having 72 hours of their own backup power.
- **SDG&E is planning the development of a grant program for portable generation targeted at residential medical baseline customers on life support.**





# Wildfire Prevention Strategy and Programs

## Community Resource Centers

- SDG&E established Community Resource Centers following feedback from community meetings.
- Developed with community partners, e.g. CERTs and American Red Cross.
- Nine locations identified in areas prone to extreme fire weather conditions and public safety power shutoffs.
- Provide information, water, communications, snacks, cell phone charging, etc.
- Staffed by community partners and SDG&E.
- ***2019 enhancements include an expansion of the existing sites into the northern area of the service territory.***



**During the November 2018 Red Flag Warnings four centers were open initially with an additional two opened during the peak of the event.**

# Emergency Preparedness and Response

# Emergency Preparedness and Response

## Emergency Management

- The Company utilizes a utility compatible Incident Command Structure (ICS) as an all-hazards framework to manage emergency incidents and events.
- SDG&E's Emergency Operations Center (EOC) serves as the location from which centralized emergency management is coordinated.
- Internal subject matter experts assess and provide situational awareness
- External emergency management partners such as the County of San Diego Office of Emergency Services (OES) are embedded within SDG&E's EOC during emergency conditions.





# *Emergency Preparedness and Response*

## **Disaster and Emergency Preparedness Plan**

- Distribution, Grid and the EOC activate and strategically develop pairings to staff their situation rooms in advance of strong winds.
- Field Operations manages and deploys strategically placed observers (stationary and roving) and contract ignition suppression resources.
- Should any ignitions occur for any reason, a field Fire Coordinator will deploy to the jurisdictional fire agencies Incident Command Post (ICP) to provide real-time situational awareness to SDG&E.



## Performance Metrics and Monitoring

## *Wildfire Mitigation Plan Metrics*

# Metrics to Evaluate SDG&E's Plan Performance

- SDG&E proposes the following metrics to enable the Commission to evaluate compliance with its Plan.
- These metrics should be viewed collectively to demonstrate that progress is being made in the respective areas.
- Substantial compliance with these metrics should demonstrate that SDG&E acted prudently and met the Commission's "reasonable manager" standard.

Operations & Engineering	Situational Awareness	Outreach & Education
<ul style="list-style-type: none"> <li>% of reclosers that protect the HFTD that are disabled during elevated or extreme FPI conditions</li> </ul>	<ul style="list-style-type: none"> <li>% of weather stations operational during RFW or extreme FPI</li> </ul>	<ul style="list-style-type: none"> <li>% of SDG&amp;E's EOC responders that are trained in ICS</li> </ul>
<ul style="list-style-type: none"> <li>% of inspections completed pursuant to General Order 165 within a 12-month period</li> </ul>	<ul style="list-style-type: none"> <li>% of days annually that the FPI is published</li> </ul>	<ul style="list-style-type: none"> <li># of internal and external emergency response preparedness trainings conducted</li> </ul>
<ul style="list-style-type: none"> <li># of miles system hardened in the HFTD (includes multiple projects)</li> </ul>	<ul style="list-style-type: none"> <li>% of days annually that the WRRM-Ops model is functional during elevated or extreme FPI conditions</li> </ul>	<ul style="list-style-type: none"> <li>% of fire agencies in the SDG&amp;E service territory that receive hazard training, including fire</li> </ul>
<ul style="list-style-type: none"> <li>% of vegetation inspections completed in the HFTD</li> </ul>		
<ul style="list-style-type: none"> <li>% of PSPS impacted metered customers notified of the potential PSPS in advance</li> </ul>		

## System Facts within the HFTD

Distribution							
	Circuit Mileage			OH Structures			
	OH	UG	Total	Wood Poles	Steel Poles	Composite	Total
Tier 2	1825	2190	4015	38339	5068	8	43415
Tier 3	1664	402	2066	29539	7662	7	37208
HFTD Total	3489	2592	6081	67878	12730	15	80623
Transmission							
	Circuit Mileage			OH Structures			
	OH	UG	Total	Wood Poles	Steel Poles	Towers	Total
Tier 2	725	32	757	1781	1752	919	4452
Tier 3	288	6	294	923	995	363	2281
HFTD Total	1013	38	1051	2704	2747	1282	6733

## SDG&E's Wildfire Mitigation Plan

- SDG&E is committed to protecting the safety of its customers and communities.
- SDG&E has and will continue to strive for continuous improvement mitigating wildfire risk.
- SDG&E maintains its core value of no wildfire ignitions from SDG&E facilities, focusing on effective and innovative risk management.
- SDG&E has made wildfire safety, prevention, mitigation, and recovery a central tenet of its culture.
- Community collaboration and coordination have been and will remain essential components of the SDG&E's wildfire mitigation activities.
- SDG&E will continue to focus on supporting and communicating with our customers, and increasing overall preparedness.

