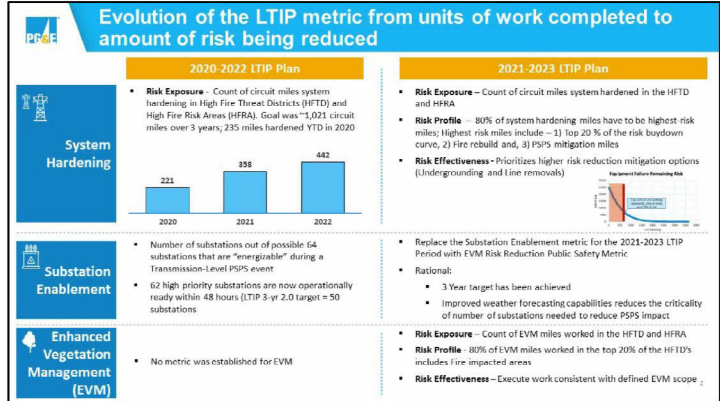


**Public Safety  
Long Term Incentive Plan (LTIP)  
Target Setting**

**January 11, 2021**



Together, Building  
a Better California





### Why System Hardening and Enhanced Vegetation Management?

**System Hardening (SH) and Enhanced Vegetation Management (EVM) focus on mitigation of potential wildfire risk from Distribution Overhead Assets, which have resulted in a significantly higher number of ignitions (nearly 90% of the total CPUC Reportable ignitions from 2015 – 2020 YTD)**

- Distribution assets represent high ignition risk due to a combination of high exposure area (overhead assets traversing HFTDs), proximity to risk factors (vegetation), and intrinsic asset characteristics
- SH and EVM mitigation work focus on mitigating these risk factors on Distribution Assets and are key mitigation programs to continue addressing potential wildfire risk

Initiating Cause	2015 - 2020 YTD <sup>1</sup> CPUC Reportable Ignitions in HFTD		Estimated Ignitions per 1,000 Circuit Miles in HFTD <sup>2</sup>	
	Distribution	Transmission	Distribution	Transmission
Equipment – PG&E	217	30	8.5	5.4
Vegetation	305	11	11.9	2.0
All Other <sup>3</sup>	195	34	7.6	6.1

For Equipment-driven ignitions, the Distribution ignitions per Mile rate is 5.6x greater than Transmission

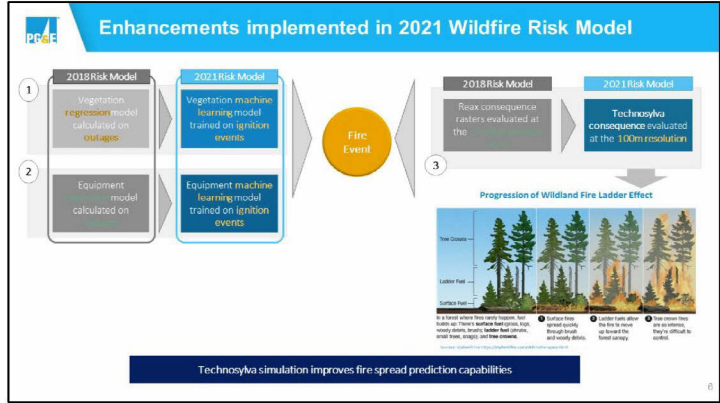
For Vegetation-driven ignitions, the Distribution rate is 5.9x greater than Transmission

1. YTD represents data as of the end of September, 2020  
 2. Circuit mileage in HFTD areas source: 2020 O&M Safety Plan – 25,998 of distribution overhead mileage in HFTD areas, 9,542 of transmission overhead mileage  
 3. Other includes ignitions primarily driven by 3<sup>rd</sup> Party and Animal

## Risk Model and Risk Quantification

1/20/2014



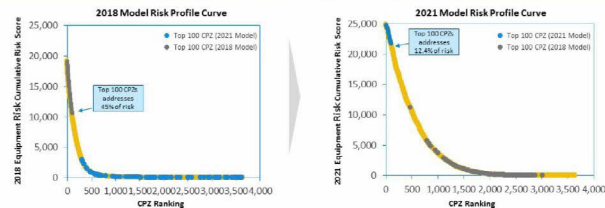






## Risk models provide risk profile curves to guide workplan

The risk profile curve shows *the amount of risk that can be addressed* with every subsequent mile within a Circuit Section or CPZ that is mitigated. This view illustrates the relative magnitude of risk associated with the top 100 CPZs and the visualization highlights the consolidation of risk by CPZ as you move down the prioritization list.



The improvement in the Risk Model results in a significant shift in the highest risk circuit protection zones

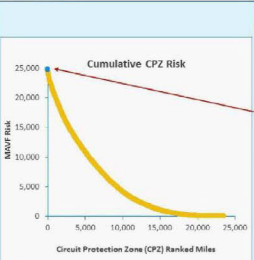
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## Project Example

© 2008

**The top 50 highest risk-miles represent 1.4% of the total risk**

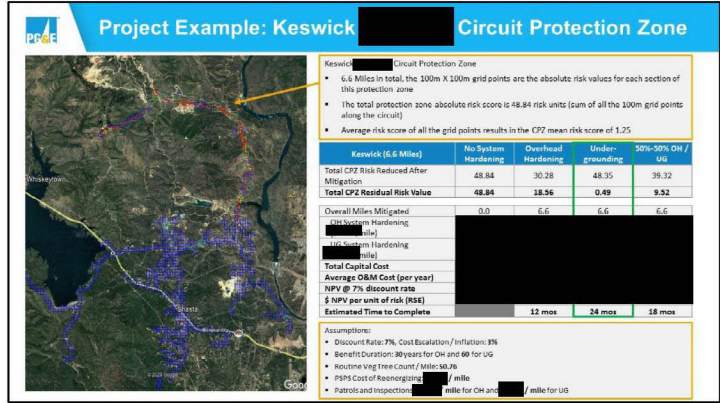


Protection Zone Name	Miles	Cumulative Miles	Mean MAVP Score	Total CPZ MAVP	% total risk reduced*
OREGON TRAIL	0.02	0.02	3.16	3.16	0.01%
[REDACTED]	0.01	0.03	1.88	1.88	0.01%
CALPINE	0.08	0.12	1.69	1.69	0.02%
MARIPOSA	0.01	0.13	1.44	1.44	0.02%
SHEPHERD	0.05	0.18	1.30	1.29	0.02%
MIDDLE DOWNS 1109L6	1.00	1.17	1.26	1.77	0.04%
SHIPS LAKE 1107C9	6.66	7.83	1.25	48.84	0.17%
KESWICK	4.71	12.04	0.92	48.56	0.23%
MIDDLE DOWNS	5.61	17.65	0.88	51.70	0.42%
MCNOCKI	0.64	18.29	0.77	10.81	0.44%
MARIPOSA	4.29	22.58	0.72	7.55	0.47%
BUCKS CR	0.09	22.67	0.72	4.26	0.47%
SOLIMMS	0.42	23.08	0.72	8.70	0.48%
MIDDLETON	24.80	47.88	0.72	151.83	0.57%

\*Based on assuming an Oh hardening risk mitigation (62% risk reduction effectiveness)

**Key Takeaway**

On each project a more granular risk spend efficiency evaluation will be performed on an NPV basis (total cost of ownership over the asset life) once the project is fully scoped similar to what is shown on the Keswick circuit protection zone on the next slide



## Target Setting

H. Smith


## System Hardening

Conditions

**Condition 1: 80%<sup>1</sup> of system hardening miles have to be highest-risk miles over the three-year period or LTIP is 0**

**Risk Profile (Highest Risk Miles defined as)**

1. Top 20%<sup>2</sup> of risk buydown curve
2. Fine rebuild miles
3. PPS mitigation miles



**Condition 2: Minimum percentage of miles mitigated with either Line Removal or Undergrounding over the three-year period or LTIP is 0**

**Risk Effectiveness**

- 10% of Undergrounding or Line Removal work in the System Hardening project portfolio<sup>3</sup>

**Risk Exposure**

- Count of circuit miles system hardened in the HTD and HFRA

System Hardening Targets (Risk Miles)

	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	180	199	208
2022	423	464	485
2023	423	464	485
2021-2023	1,026	1,127	1,178

1. Basis of the 80% is to allow for operational execution considerations including permitting, weather related access, and mob/demob efficiencies
2. Basis of the top 20% correlates to ~70% of the risk on the risk buydown curve
3. Risk reduction effectiveness for Overhead Hardening is estimated at 62% and Undergrounding or Line Removal is estimated at 99%

**System Hardening targets are set based on 2021 risk miles and program funding assumptions**

**Program Funding**

- Forecasted [redacted] and [redacted] Wildfire Mitigation capital spend in 2021 and 2022, respectively, consistent with the Proposed Decision Revision for the 2020-2022 GRC. 2023 Wildfire Mitigation capital spend is forecasted at the 2022 level.

**Unit Costs**

- Assumes [redacted] circuit miles of Overhead SH work and [redacted] Underground work

**Program Pace**

- Get to steady pace of 450-500 high risk miles / year

System Hardening LTIP Targets

	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	180	199	208
2022	423	464	485
2023	423	464	485
2021-2023	1,026	1,127	1,178

Targets are miles of system hardening work for specific risk-prioritized work

- The total mileage of the proposed 2021 Project Portfolio was set as the threshold goal (LTIP 0.5) for 2021
- LTIP 0.5 goal in 2022 reflects escalation of program funding level; the 2023 LTIP 0.5 goal is set equal to the 2022 level based on the 2023 GRC funding level forecast
- The target and stretch goals (LTIP 1.0, 2.0) were set as 10% and 15% higher, respectively

[redacted] includes scoping and engineering costs for future system hardening projects beyond 2021 and additional minor capital spend for other Wildfire Mitigation Programs



## Enhanced Vegetation Management (EVM)

### Conditions

- Condition 1: 80%<sup>1</sup> of EVM miles have to be highest-risk miles over the three-year period or LTIP is 0**
- Risk Profile (Highest Risk Miles defined as)**
- Top 20%<sup>2</sup> of risk model buydown curve
  - Fire impacted miles
- Risk Effectiveness**
- Execute work consistent with defined EVM scope
    - Achieve 12' recommended radial clearance
    - Access viable potential trees including high risk species
    - Remove overhangs above and within 4 feet of power lines
    - Mitigate vegetative fuels under and adjacent to powerlines on targeted basis
- Risk Exposure**
- Count of EVM miles worked in the HFTD and HFRA

### EVM Targets (Risk Miles)

	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	1,800	1,890	2,070
2022	1,800	1,890	2,070
2023	1,800	1,890	2,070
2021-2023	5,400	5,670	6,210

1. Basis of the 80% is to allow for operational execution considerations including permitting, weather-related access and customer approvals  
 2. Basis of the top 20% correlates to ~85% of the risk on the risk buydown curve



### EVM targets are set based on work to be completed over the remaining twelve years of the program

**Program Duration**

- Assumes execution of the 12-year Enhanced Vegetation Management Plan (2021-2032)
- Evaluating viability of 10-year pace (2021-2030)

**Program Funding**

- Forecast of [redacted] and [redacted] spend on EVM program in 2021, 2022 and 2023 respectively (in alignment with POR)

**Unit Costs**

- Assume [redacted] per miles of EVM work

Enhanced Vegetation Management LTP Targets

	LTP 0.5	LTP 1.0	LTP 2.0
2021	1,800	1,890	2,070
2022	1,800	1,890	2,070
2023	1,800	1,890	2,070
2021-2023	5,400	5,670	6,210

Targets are miles of EVM work for specific risk-prioritized work.

- The total mileage of the proposed 2021 Project Portfolio was set as the threshold goal (LTP 0.5) for 2021
- The target and stretch goals (LTP 1.0, 2.0) were set as 5% and 15% higher, respectively





### EVM Quality Control – Layers of Defense

**Enhanced Vegetation Management Work Performed by Contractors**

Layer 1: Vegetation Management Quality Control Team	Layer 2: Electric Operations Quality Assurance Team & Veg Mgmt PMO	Layer 3: Internal Audit
<p><b>2020</b></p> <ul style="list-style-type: none"> <li>Primarily rely on contractor expertise for directly observing contract tree crews performing work</li> <li>Work verification is performed on 100% of only the EVM program each year, typically within an average of 14 days following completed work</li> <li>Current workforce encompasses a 1:5 ratio of QV Inspector to tree crews with 100 QV contract inspectors staffed at peak</li> </ul> <p><b>2021</b></p> <ul style="list-style-type: none"> <li>Ramp-up verification to include all vegetation management work (T&amp;D), in HFTD areas on a 100% basis; Shift towards near real-time quality assessment</li> <li>Proposed QV workforce of ~350 FTE, steady-state, targeting a 1:3 ratio of QV Inspector to tree crews</li> <li>Staff the VM team with Pu&amp;E inspection employees to ensure internal expertise on all aspects of Vegetation work, targeting a 1:20 ratio of VM to tree crew</li> </ul>	<p><b>2020</b></p> <ul style="list-style-type: none"> <li>Presented a one-time Quality Assurance Audit of the EVM process to identify improvement opportunities (audit completed in 2019)</li> <li>Reported to CPUC's Wildfire Safety Division and Federal Monitor; VM team addressed findings &amp; coordinated follow up actions</li> </ul> <p><b>2021</b></p> <ul style="list-style-type: none"> <li>Quality Assurance Assessments to be performed on a weekly basis using a statistical sampling approach for completed work</li> <li>Conduct two EVM (IA) audits to assess efficacy of the EVM program (1<sup>st</sup> audit) and evaluate the EVM process (2<sup>nd</sup> audit)</li> <li>Dedicated &amp; Specialized Arborist Team, part of the VM organization, to directly liaison with Federal Monitor and CPUC's Wildfire Safety Division to be responsive on a timely basis to potential field audit findings</li> </ul>	<p><b>2020</b></p> <ul style="list-style-type: none"> <li>Performed an advisory over program strategy and governance</li> <li>Performed a validation audit over the use of URM within veg management</li> <li>Performing a facilitated audit of the holistic EVM program (in progress)</li> </ul> <p><b>2021</b></p> <ul style="list-style-type: none"> <li>Perform Internal Audit for all Vegetation Management Programs, including Routine, CEMA, EVM and Vegetation Control</li> <li>Review of 2021 risk-informed EVM work plan prior to work initiation (in progress)</li> <li>Perform advisory over all QA findings and tracking of all actions to ensure full extent of condition is addressed and systemic issues are being addressed</li> </ul>



## Governance and Oversight

### Wildfire Risk Governance Committee

- System Hardening project lists (by CPZ) consistent with the Target Setting methodology will be formally approved annually by the Chief Risk Officer
- Enhanced Vegetation Miles (by CPZ) consistent with the Target Setting methodology will also be formally approved annually by the Chief Risk Officer

### PG&E Board – SNO and Compensation Committees

- Annual submission of a) System Hardening project list and b) specific locations of the Enhanced Vegetation Management miles to the SNO and Compensation Board Committees by the Chief Risk Officer
- Monthly progress updates on plan vs. actual for both System Hardening and Enhanced Vegetation Management including completed work quality performance will be submitted to the SNO and Compensation Board Committees by the Chief Risk Officer

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## Appendix

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### CZU Lightning Complex Fire

Source: fire.ca.gov

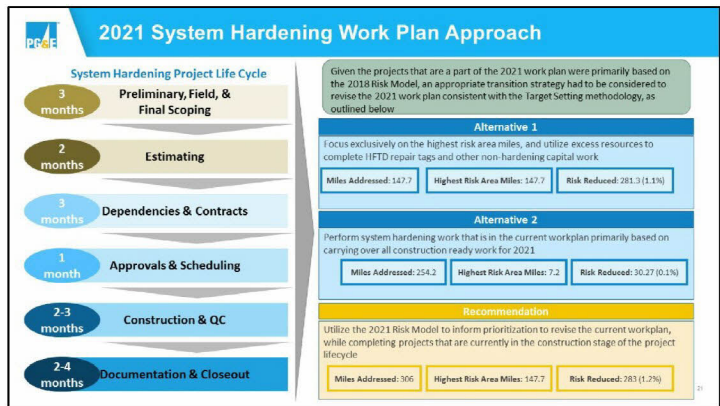
#### Fire Description and Observations

- The wildfires started at 6:41 AM on August 16, 2020 and was the result of a thunderstorm that produced close to **11,000 bolts of lightning** and started **hundreds of fires** throughout California.
- The lightning strikes initially started fires separately known as the Marmella Fire near Davenport and the Waddell Fire, near Waddell Creek, as well as three fires on what would become the northern edge of the CZU Complex fire.
- Two days after the fires began, a **change in wind conditions** caused these three northern fires to **rapidly expand and merge**, growing quickly to over 40,000 acres.
- This was not one fire but a **merging of small fires into one massive fire**. Our current **consequence models focus on potential fires growing from one ignition point** as compared to simulating the fire behavior of multiple ignition points combining into one fire.
- The modeling complexity of this wildfire is such that it would **require taking into account the hundreds of fires** that were started rather than treating this as a single wildfire.
- Also, the focus of our **consequence model evaluates the potential ignition points from our overhead electric distribution circuits in HTDs** and several of the ignition points for this fire occurred where none of our assets existed.

#### Damage Overview

 <b>86,509 acres burned</b>	 <b>Active for 37 days</b>	 <b>1 fatality</b>	 <b>140 structures damaged</b>
	 <b>1 injury</b>	 <b>1,480 structures destroyed</b>	

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**Selected list of most destructive fires in the past thirty years**

Fire Name	Cause	Date	County	Area	Structures Damaged	Deaths	PG&E Electric Power caused Fire?
Yupond - Commercial	Arson	Oct 05	Alameda	2800	2000	28	No
Langley - Multiple residential	Child	Oct 09	Alameda	28,000	350	1	No
Chico - Electrical	Child	Oct 00	San Diego	272,040	2800	15	No
Old - Human Released	Child	Oct 00	San Bernardino	91,281	1,000	0	No
Levin - Power Line	Child	Oct 00	San Diego	181,960	1,000	2	No
Orange - Electrical	Child	Aug 15	Los Angeles	76,000	1,000	4	No
Butte - Power Lines	Child	Sep 10	Alameda	70,000	700	2	Yes
Clayton - Arson	Child	Aug 06	San Diego	5,500	700	0	No
Penning - Arson	Child	Jul 17	Maricopa	63,628	331	0	No
Labon - Electrical	Child	Oct 17	Napa and Sonoma	38,000	330	20	No
Blair - Power Lines	Child	Oct 17	San Diego	15,000	1,200	3	Yes
Alisa - Power Lines	Child	Oct 17	Napa and Sonoma	31,000	780	6	Yes
Sanborn - Arson	Child	Oct 00	San Diego	98,000	600	0	No
Coastal (New Wood Complex) - Power Lines	Child	Oct 17	Yuba	5,980	264	4	Yes
Palmer - Power Lines	Child	Oct 17	San Diego	2,200	160	0	Yes
Thomas - Power Lines	Child	Sep 17	Ventura, Santa Barbara	250,000	1,000	2	No
Can - Human Released	Child	Jul 18	Alameda, Contra Costa	220,000	1,000	0	No
Camp Fire - Power Lines	Child	Nov 18	Butte	330,000	18,000	80	Yes
Woolsey - Under Investigation	Child	Nov 18	Ventura	98,000	1,400	0	No
Wineville - Power Lines	Child	Oct 18	Sanoma	77,700	370	0	Yes
Redline - Human Released	Child	Nov 18	Del Norte	2,500	0	0	No
August Complex - Under Investigation	Child	Aug 20	Maricopa, Humboldt, Trinity, Tehama, Glenn, Butte, Colusa	1,000,000	600	1	No
North Complex - Under Investigation	Child	Aug 20	Butte, Plumas, Yuba	1,000,000	2,300	15	No
UKL Lightning Complex - Under Investigation	Child	Aug 20	Lake, Napa, Sonoma, Yuba, Colusa	800,000	1,400	0	No
CDL Lightning Complex - Under Investigation	Child	Aug 20	San Diego, San Mateo	88,500	1,400	0	No
CDL Lightning Complex - Under Investigation	Child	Aug 20	San Mateo, San Francisco	190,000	300	0	No
Green Fire - Under Investigation	Child	Sep 20	Napa, Sonoma	47,000	1,000	0	No
Creek Fire - Under Investigation	Child	Sep 20	Fresno, Modoc	377,000	800	0	No

PG&E Electric Power caused fire in cases where power lines were found to be the cause of the fire.