Public Safety
Long Term Incentive Plan (LTIP)
Target Setting

November 23, 2020

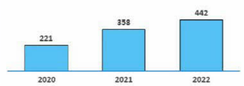
Together, Building
a Better California

Evolution of the LTIP metric from units of work completed to amount of risk being reduced

System Hardening

2020-2022 LTIP Plan

- **Risk Exposure** - Count of circuit miles system hardening in High Fire Threat Districts (HFTD) and High Fire Risk Areas (HFRA). Goal was ~1,021 circuit miles over 3 years; 235 miles hardened YTD in 2020



2021-2023 LTIP Plan

- **Risk Exposure –** Count of circuit miles system hardened in the HFTD and HFRA
- **Risk Profile** – 80% of system hardening miles have to be highest-risk miles; Highest risk miles include – 1) Top 20 % of the risk buydown curve, 2) Fire rebuild and, 3) PSPS mitigation miles
- **Risk Effectiveness -** Prioritizes higher risk reduction mitigation options (Undergrounding and Line removals)

Substation Enablement

2020-2022 LTIP Plan

- Number of substations out of possible 64 substations that are "energizable" during a Transmission-Level PSPS event
- 62 high priority substations are now operationally ready within 48 hours (LTIP 3-yr 2.0 target = 50 substations

2021-2023 LTIP Plan

- Replace the Substation Enablement metric for the 2021-2023 LTIP Period with EVM Risk Reduction Public Safety Metric
- Rational:
  - 3 Year target has been achieved
  - Improved weather forecasting capabilities reduces the criticality of number of substations needed to reduce PSPS impact

Enhanced Vegetation Management (EVM)

2020-2022 LTIP Plan

- No metric was established for EVM

2021-2023 LTIP Plan

- **Risk Exposure** – Count of EVM miles worked in the HFTD and HFRA
- **Risk Profile** - 80% of EVM miles worked in the top 20% of the HFTD's includes Fire impacted areas
- **Risk Effectiveness** – Execute work consistent with defined EVM scope

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Why System Hardening and Enhanced Vegetation Management

System Hardening and Enhanced Vegetation Management focus on Distribution Overhead Assets, which have demonstrated a much higher rate of ignitions

- Distribution assets represent high ignitions risk due to a combination of huge exposure area, proximity to risk factors (i.e. falling vegetation), and intrinsic asset traits
- SH and EVM mitigation work, by addressing these risk factors on Distribution Assets, are key programs to continue addressing ignitions risk

	2018-2019 CPUC Reportable Ignitions – Associated Asset Family		Estimated Ignitions per 100 Circuit Mile[1]	
Initiating Cause	Distribution	Transmission	Distribution	Transmission
Equipment – PG&E	299	7	0.3691	0.0385
Vegetation	258	0	0.3185	0.0000
All Other	309	24	0.3815	0.1322

For Equipment-driven ignitions, the Distribution Ignitions / Mile rate is **9.58x** greater than Transmission.

In 2018-2019, there were no Transmission-related Vegetation-driven ignitions, as opposed to 258 Distribution-related ignitions.

1. Circuit mileage source: 2020 Wildfire Safety Plan – 81,005 of distribution overhead mileage, 18,160 of transmission overhead mileage.

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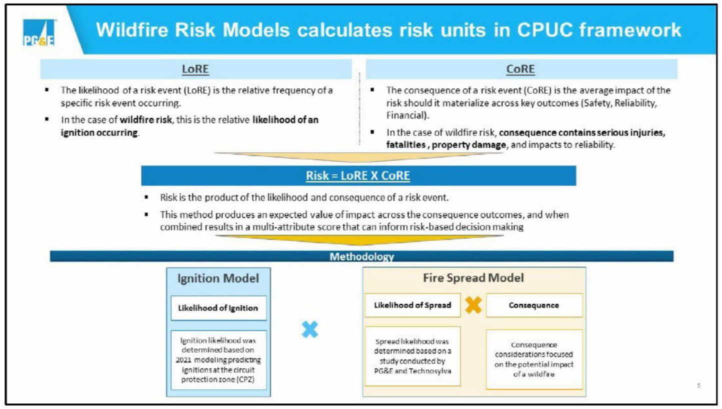
Risk Model and Risk Quantification



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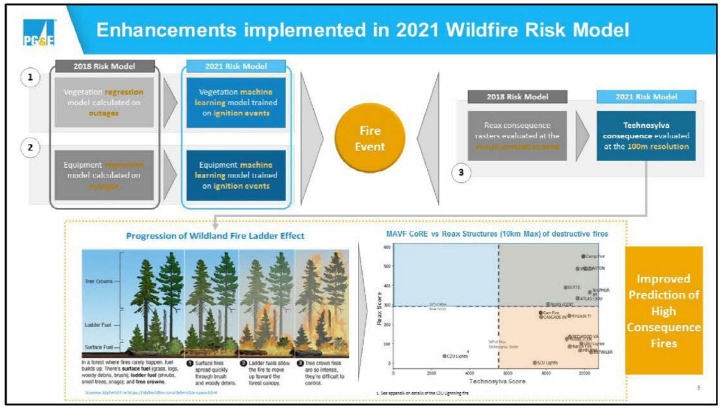

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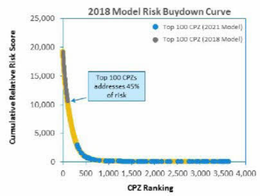
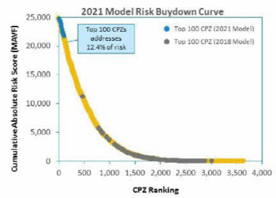
Risk models provide risk buydown curves to guide workplan

The risk buydown curve shows ***the amount of risk that can be addressed*** with every subsequent mile within a CPZ that is mitigated. This view shows the relative magnitude of potential projects and can compares impacts of programs with varied effectiveness. The visualization helps to highlight the consolidation of risk by CPZ as you move down the prioritization list.

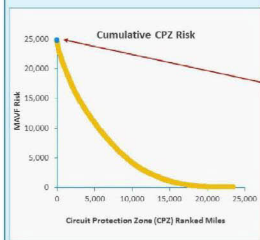




Equipment (Conductor) Risk Buydown curves highlight the significant shift of where the top 100 CPZ's are between the two models primarily as a result of the shift in the consequence model

Project Example

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



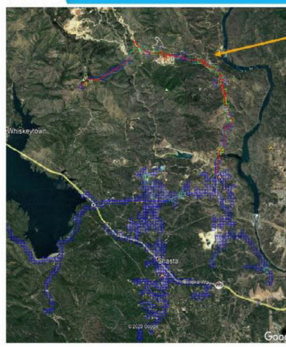
Protection Zone Name	Miles	Cumulative Miles	Mean MAVF Score	Total CPZ MAVF	% total risk reduced[1]
OREGON TRAIL 1103CUS391	0.02	0.02	3.16	3.16	**0.01%**
CALPINE 1144276-G	0.01	0.03	1.88	1.88	**0.01%**
MARIPOSA 210190130	0.08	0.12	1.69	1.69	**0.02%**
SHEPHERD 2111688294	0.01	0.13	1.44	1.44	**0.02%**
MIDDLETOWN 1103CB	0.05	0.18	1.30	5.20	**0.03%**
UPPER LAKE 1101CB	1.00	1.17	1.26	3.77	**0.04%**
KESWICK 11011586	6.66	7.83	1.25	48.84	**0.17%**
MIDDLETOWN 1102302610	4.21	12.04	0.92	48.56	**0.29%**
KONOCTI 1102965078	5.61	17.65	0.88	51.70	**0.42%**
MARIPOSA 2102241564	0.64	18.29	0.77	10.81	**0.44%**
BUCKS CREEK 1101CB	4.29	22.58	0.73	9.55	**0.47%**
DEL MAR 2109378446	0.09	22.67	0.73	2.19	**0.47%**
MIDDLETOWN 1102CB	0.42	23.08	0.72	8.70	**0.49%**
MIDDLETOWN 1103830	24.80	47.88	0.72	151.83	**0.87%**

[1]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 for the asset life) once the project is fully scoped similar to what is shown on the Keswick [redacted] circuit protection zone on the next slide

Project Example: Keswick [redacted] Circuit Protection Zone



Keswick [redacted] Circuit Protection Zone

- 6.6 Miles in total, the 100m X 100m grid points are the absolute risk values for each section of this protection zone
- The total protection zone absolute risk score is 48.84 risk units (sum of all the 100m grid points along the circuit)
- Average risk score of all the squares gives the CPZ mean risk score of 1.25

Keswick (6.6 Miles)	No System Hardening	Overhead Hardening	Under-grounding	50%-50% OH / UG
Total CPZ Risk Reduced After Mitigation	48.84	30.28	48.35	39.32
Total CPZ Residual Risk Value	**48.84**	**18.56**	**0.49**	**9.52**
Overall Miles Mitigated	6.6	6.6	6.6	6.6
OH System Hardening [redacted] mile)	[redacted]			
UG System Hardening [redacted]/mile)				
Total Capital Cost				
Average O&M Spend (per year)				
NPV @ 7% discount rate				
$ NPV per unit of risk (RSE)				
Estimated Time to Complete	**N/A**	**12 mos**	**24 mos**	**18 mos**

Assumptions:

- Discount Rate: **7%**, Cost Escalation / Inflation: **3%** (generally aligned with major project business cases)
- Benefit Duration: **30** years for OH and **60** for UG
- Routine Veg Tree Count / Mile: **50.76**
- PSPS Cost of Reenergizing: [redacted] **/ mile**
- Patrols and Inspections [redacted] **/ mile** for OH and [redacted] **/ mile** for UG

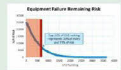
Target Setting

System Hardening

Conditions

Condition 1: 80%[1] 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%[2] of risk buydown curve
2. Fire rebuild miles
3. PSPS 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[3]

Risk Exposure
- Count of circuit miles system hardened in the HFTD and HFRA

System Hardening Targets (Risk Miles)

	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	305	320	350
2022	350	368	403
2023	396	416	455
2021-2023	1,051	1,103	1,209

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%

The LTIP targets for system hardening are set based on 2021 risk miles and program funding assumptions

Program Funding
- Forecast of[redacted]Wildfire Mitigation capital spend in 2021 consistent with the Settlement for the 2020-2022 GRC. 2022 forecast escalates 2021 by 15% and 2023 forecast escalates 2021 by 30%.

Unit Costs
- Assume[redacted]er circuit miles of Overhead SH work an[redacted]or Underground work

Program Duration
- Execution of the **13-year** plan focusing on top 20% circuit protection zones by **2032**

System Hardening LTIP Targets

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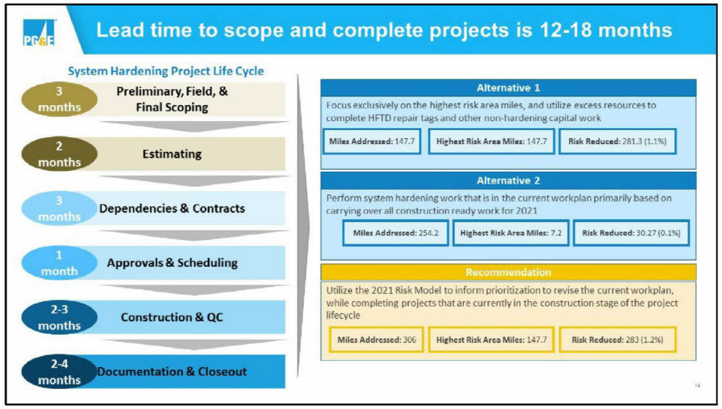
Targets are miles of system hardening work for specific risk-prioritized work

- The total mileage of the proposed 2021 Project Portfolio was set as the threshold goal (LTIP 0.5) for 2021
- LTIP 0.5 goals in 2022 and 2023 reflect escalation of program funding level
- The target and stretch goals (LTIP 1.0, 2.0) were set as 5% and 15% higher, respectively

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



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Enhanced Vegetation Management (EVM)

Conditions

Condition 1: 80%[1] 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%[1] of risk model buydown curve
- Fire impacted miles

Risk Effectiveness
- Execute work consistent with defined EVM scope
  - Achieve 12' recommended radial clearance
  - Assess strike 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

Note: Targets are based on 12-yr EVM Program pace (2021 – 2032) consistent with the POR. Evaluating viability of 10-yr pace (2021 – 2030).

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

The LTIP targets for EVM 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 o[redacted]and[redacted]spend on EVM program in 2021, 2022 and 2023 respectively (in alignment with POR)
- 10-year pace will result in incremental forecast of [redacted] per year

Unit Costs
- Assumes[redacted]per miles of EVM work

Enhanced Vegetation Management LTIP Targets

	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	1,800	1,890	2,070
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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 (LTIP 0.5) for 2021
- The target and stretch goals (LTIP 1.0, 2.0) were set as 5% and 15% higher, respectively

Governance and Oversight

Wildfire Risk Governance Committee

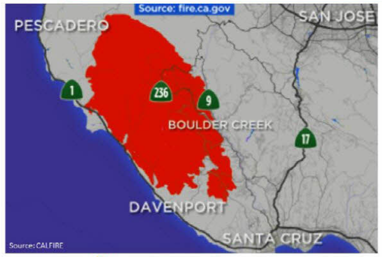
- System Hardening project lists will be formally approved annually by the Chief Risk Officer
- Enhanced Vegetation Miles (specific location) will also be formally approved annually by the Chief Risk Officer

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 committees by the Chief Risk Officer
- Quarterly progress updates on both System Hardening and Enhanced Vegetation Management will be submitted to the committees by the Chief Risk Officer

Appendix

CZU Lightning Complex Fire



Damage Overview

- Active for 37 days
- 86,509 acres burned
- 1 injury
- 1 fatality
- 1,490 structures destroyed
- 140 structures damaged

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 Warnella 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.
- Also, the focus of our **consequence model evaluates the potential ignition points from our overhead electric** distribution circuits in HFTDs and several of the ignition points for this fire occurred where none of our assets existed.
- 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

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