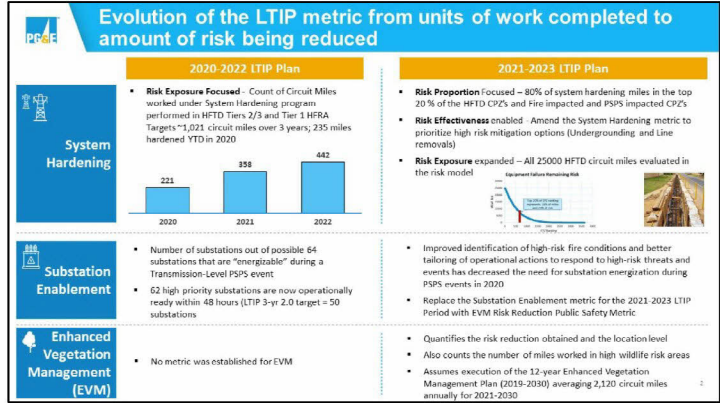


**Public Safety
Long Term Incentive Plan (LTIP)
Target Setting**

November 11, 2020





Risk Model and Risk Quantification

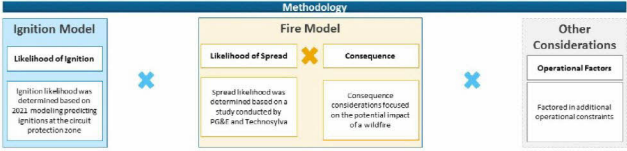
J. Smith

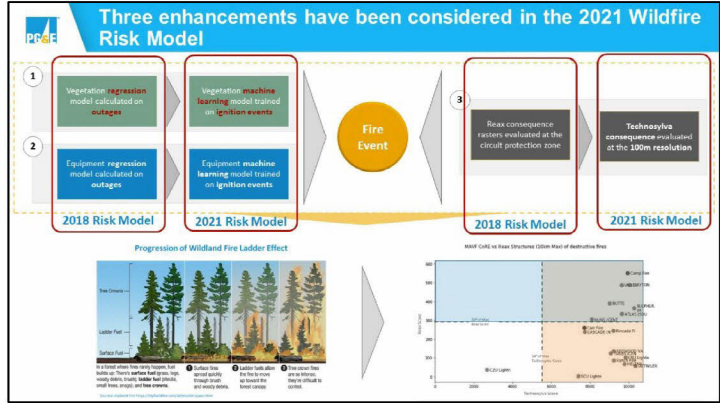
The wildfire risk model considers the likelihood and consequences of potential wildfires

- | | |
|---|--|
| <p>LoRE</p> <ul style="list-style-type: none"> The likelihood of a risk event (LoRE) is the relative frequency of a specific risk event occurring. In the case of wildfire risk, this is the relative likelihood of a ignition occurring. | <p>CoRE</p> <ul style="list-style-type: none"> The consequence of a risk event (CoRE) is the average impact of the risk should it materialize across key metrics (Safety, Reliability, Financial). In the case of wildfire risk, consequence contains serious injuries, fatalities, property damage, and impacts to reliability. |
|---|--|

Risk = LoRE X CoRE

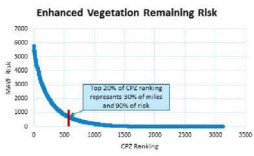
- Risk is the product of the likelihood and consequence of a risk event.
- This method produces an expected value of impact across the consequence metrics, and when combined results in a multi-attribute score that can inform risk based decision making.





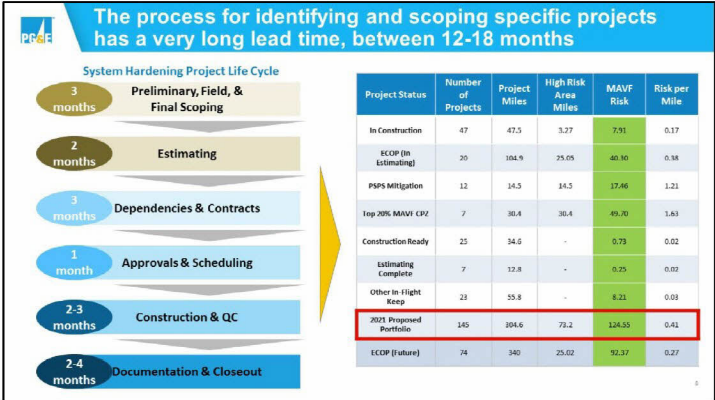


Four CPZ's – EVM & SYS HD – 2018 and 2019



Project Example

1. 2024



Target Setting

© 2008

In order to communicate simplistically we adopted a "top down" approach to LTIP target setting for System Hardening

Risk Proportion

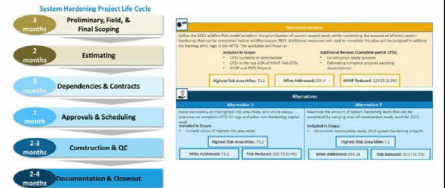
- Condition 1: 80% of the miles performed in the top 20% of the CPZ, Fire rebuild and PSPS impacted circuits
- 2021 is a transition year given risk model pivot

Risk Effectiveness

- Condition 2: 5%, 10% and 15% of Undergrounding work in the System Hardening project portfolio in 2021, 2022 and 2023, respectively

Risk Exposure Expanded

- All 25000 HFD miles were evaluated within the 2021 Risk Model







System Hardening LTIP Targets¹

	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	805	520	550
2022	350	368	403
2023	396	416	455
2021-2023	1,051	1,103	1,209

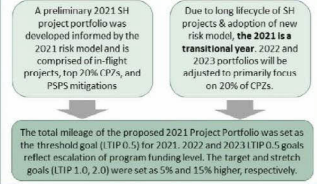
Targets are miles of system hardening work for specific risk-prioritized work.

In order to communicate simplistically we adopted a "top down" approach to LTIP target setting for System Hardening

System Hardening Assumptions

- 
Program Funding Level
 Forecast of [redacted] Wildfire Mitigation capital spend (bulk of which is System Hardening) in 2021 consistent with the Settlement for the 2020-2022 O&C. 2022 forecast escalates 2021 by 15% and 2023 forecast escalates 2021 by 30%.
- 
Work Portfolio
 Assumes 9%, 10% and 11% of Undergrounding work in the System Hardening project portfolio in 2021, 2022 and 2023, respectively.
- 
Unit Cost
 Assumes [redacted] per circuit miles of Overhead SH work on [redacted] for Underground work.
- 
System Hardening Program Duration
 Execution of the 13-year plan focusing on top 20% CPZs by 2032.

Top-Down Approach to Determine LTIP Target Miles



	System Hardening LTIP Targets ¹		
	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	300	315	345
2022	350	368	403
2023	398	418	455
2021-2023	1,051	1,103	1,209

¹Targets are miles of system hardening work for specific risk-prioritized work.

In order to communicate simplistically we adopted a "top down" approach to LTIP target setting for EVM

EVM Assumptions

- Program Funding Level**
Forecast of [redacted] and [redacted] based on EVM program in 2021, 2022 and 2023 respectively (in alignment with HFR)
- EVM Program Duration**
Assumes execution of the 12 year Enhanced Vegetation management Plan (2019-2030)

Top-Down Approach to Determine LTIP Target Miles

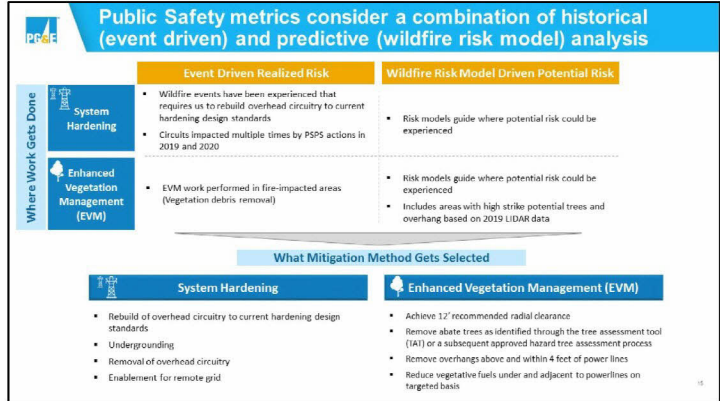
- Based on historical completion rates, a 12-year program was chosen to address all enhanced vegetation risk in the system
- The amount of enhanced vegetation management work for the HFTD was evaluated for the system
- The remaining enhanced vegetation management work on the system was forecast over the 10 remaining years of the program to determine the yearly miles for the threshold (LTIP 0.5).
- The target and stretch goals (LTIP 1.0, 2.0) were set as 5% and 15% higher, respectively.

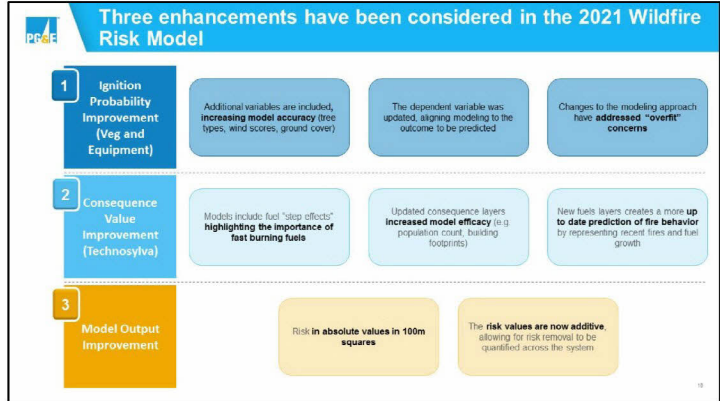
	LTIP 0.5	LTIP 1.0	LTIP 2.0
2021	2,120	2,226	2,438
2022	2,120	2,226	2,438
2023	2,120	2,226	2,438
2021-2023	6,360	6,678	7,314

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

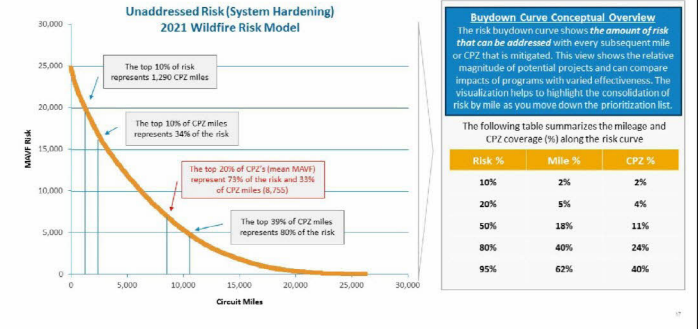
Appendix

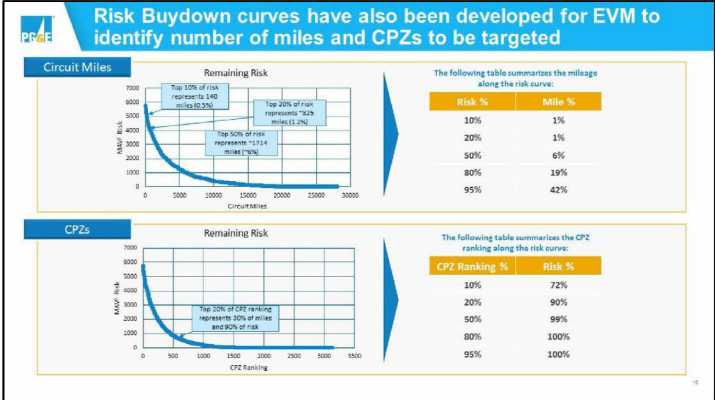
11/20/2014



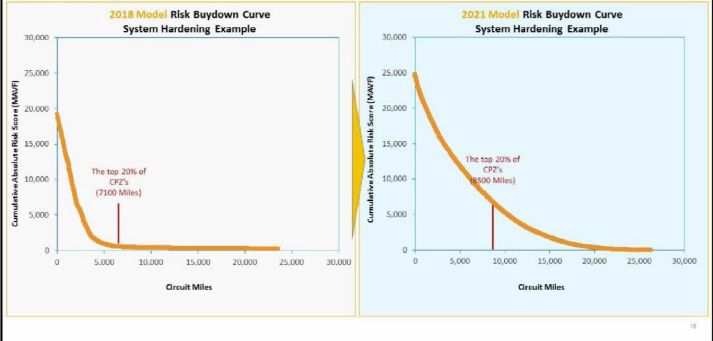


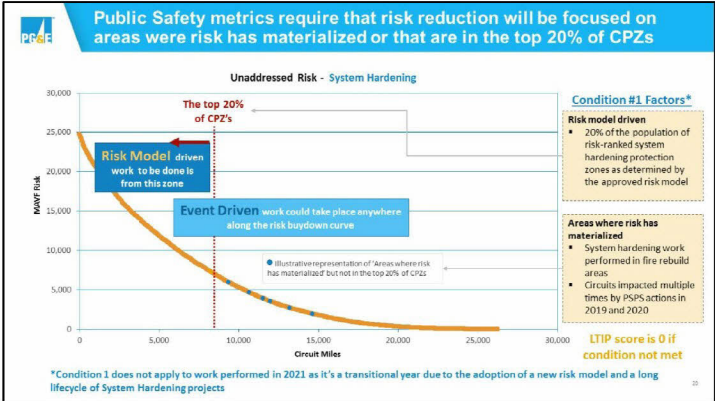
The Wildfire Risk Model is used to develop a Risk Buydown curve for potential System Hardening projects





As a result of modeling enhancements risk buydown curves have evolved







Public Safety metrics require that a portion of the mitigation focus on alternate hardening strategies

Underground



Undergrounding is the replacement of the primary (and some secondary) overhead conductors and cables, eliminating the need for overhead lines altogether

Remote Grid



Remote Grid uses stand-alone, distributed energy sources and utility infrastructure for 24/7/365 reliable energy delivery in lieu of traditional wires

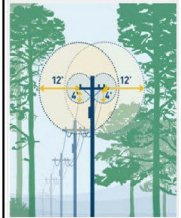

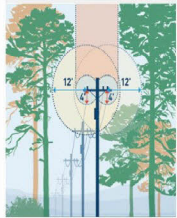

Condition #2 Factors

Mitigation Method

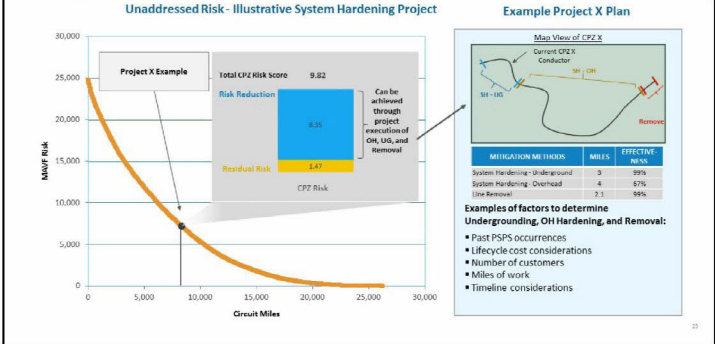
- At least 5%, 10%, and 15% of undergrounding or line removal work in the system hardening project portfolio in 2021, 2022, and 2023, respectively

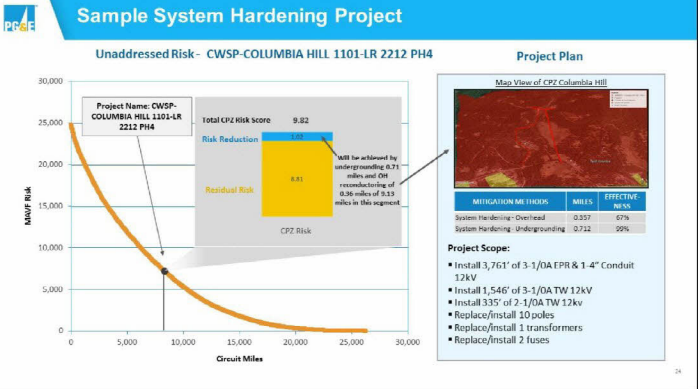
LTIIP score is 0 if condition not met

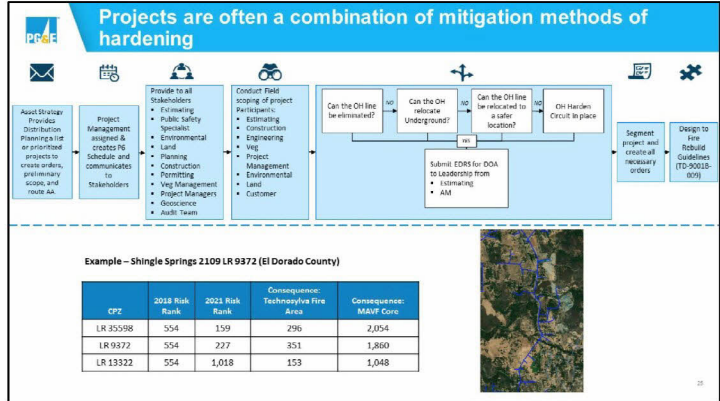
Public Safety metrics require that EVM consider four aspects

1 Vegetation Clearance	2 Tree Assessment Tool	3 Branch Overhang Clearance	4 Fuel Reduction
<p>Achieving 12' recommended radial clearance</p> 	<p>Removing abate trees as identified through the tree assessment tool (TAT) or a subsequent approved hazard tree assessment process</p>  <p>Assessment on multitude of strike, failure, and impact attributes targeted towards failure impact on PG&E assets</p>	<p>Removing overhangs above and within 4 feet of power lines</p> 	<p>Reducing vegetative fuels under and adjacent to powerlines on targeted basis</p> 

A project is evaluated based on where it is being performed and what mitigation method is being used







PG&E Recommendation and Alternatives

Recommendation

Utilize the 2021 wildfire risk model to inform the prioritization of current scoped work, while maximizing the amount of efficient system hardening that can be completed before wildfire season 2021. Additional resources not used to complete this plan will be assigned to address the backlog of EC tags in the HFTD. The workplan will focus on:

<p>Included in Scope:</p> <ul style="list-style-type: none"> • CPZs currently in construction • CPZs in the top 20% of MAVF Risk CPZs • ECOP and PSPS Projects 	<p>Additional Review: (Complete partial CPZs)</p> <ul style="list-style-type: none"> • Construction ready projects • Estimating complete projects awaiting dependencies
--	--

Highest Risk Area Miles: 73.2	Miles Addressed: 306.4	MAVF Reduced: 124.55 (0.5%)
-------------------------------	------------------------	-----------------------------

Alternatives

Alternative 1	Alternative 2				
<p>Focus exclusively on the highest risk area miles, and utilize excess resources to complete HFTD EC tags and other non-hardening capital work</p> <p>Included in Scope:</p> <ul style="list-style-type: none"> • Current scope of highest risk area miles 	<p>Maximize the amount of system hardening work that can be completed by carrying over all construction ready work for 2021</p> <p>Included in Scope:</p> <ul style="list-style-type: none"> • All current construction ready 2021 system hardening projects 				
<table border="1"> <tr> <td>Highest Risk Area Miles: 73.2</td> </tr> </table>	Highest Risk Area Miles: 73.2	<table border="1"> <tr> <td>Highest Risk Area Miles: 7.2</td> </tr> </table>	Highest Risk Area Miles: 7.2		
Highest Risk Area Miles: 73.2					
Highest Risk Area Miles: 7.2					
<table border="1"> <tr> <td>Miles Addressed: 73.2</td> <td>Risk Reduced: 106.70 (0.4%)</td> </tr> </table>	Miles Addressed: 73.2	Risk Reduced: 106.70 (0.4%)	<table border="1"> <tr> <td>Miles Addressed: 254.18</td> <td>Risk Reduced: 30.27 (0.1%)</td> </tr> </table>	Miles Addressed: 254.18	Risk Reduced: 30.27 (0.1%)
Miles Addressed: 73.2	Risk Reduced: 106.70 (0.4%)				
Miles Addressed: 254.18	Risk Reduced: 30.27 (0.1%)				

Example – Shingle Springs 2109 LR 9372 (El Dorado County)



CPZ	2018 Risk Rank	2021 Risk Rank	Consequence: Technology Fire Area	Consequence MAVF Core
LR 35598	554	159	296	2,054
LR 9372	554	227	351	1,860
LR 13472	554	1,018	153	1,048

Top 20% MAVF Risk Rank Cut Line is 727

27

Example – Calistoga 1101 (Napa County)

ECOP - Calistoga 1101
 HQ - LR 43924

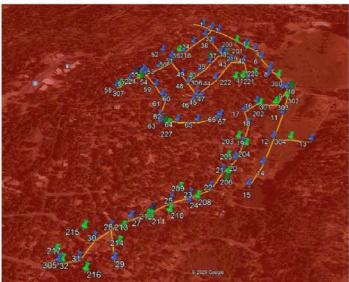
Overview Map

CPZ	2018 Risk Rank	2021 Risk Rank	Consequence: Technology Fire Area	Consequence: MAVF Core
LR 734	882	683	78.2	886
LR 736	24	833	81.1	690
LR 43924	34	1005	31.2	446

Top 20% MAVF Risk Rank Cut Line is 727



Example – Miwuk 1701 CB Zone (Tuolumne County)



CPZ	2018 Risk Rank	2021 Risk Rank	Consequence: Technology/Fire Area	Consequence: MAVF Core
LR 8050	45	1,569	12.2	296
LR 11800	139	1,887	14.8	242
LR 953336	12	2,267	10.3	31.4
CB	2	2,353	11.4	64.1
LR 10600	1	2,690	3.7	8.3

Top 20% MAVF Risk Rank Cut Line is 727



Ladder Effects

Ladder effects in wildland fires create the conditions for low lying fast burning fuels to intensify as they move from up the canopy and into more energy dense fuel sources. Accounting for this effect in wildfire modeling de-emphasizes areas of dense fuels as high risk for ignition, due to lack of potential surface fuels.

Additionally, locations that have large amounts of surface fuels that can sustain high temperatures are rated more highly as these are more likely to ladder into difficult to contain crown fires.

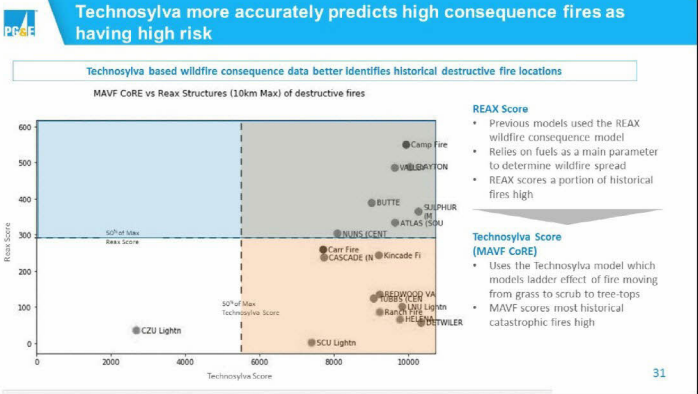
Progression of Wildland Fire Ladder Effect



In a forest where fires rarely happen, fuel builds up. Think of surface fuel (grass, logs, woody debris, brush), ladder fuel (limbs, small trees, snags), and tree crowns.

- 1 Surface fires spread quickly through brush and woody debris.
- 2 Ladder fuels allow the fire to reach up toward the forest canopy.
- 3 Tree crown fires are intense, they're difficult to control.

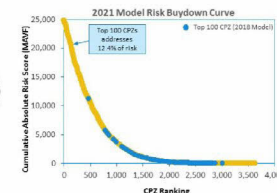
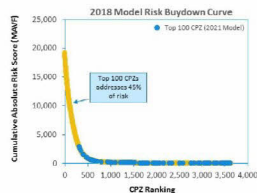
Source: <http://www.fire.ca.gov/2010/04/01/understanding-wildfire-science/>





Risk Model Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Date
Risk Model	Risk Model Comparison W08 - 10/30/2020	Create risk comparison between the 2018 risk model and 2021 risk model to highlight movement of CPZs. The getting top 100 CPZs in CPZs.	Jon Eric Thainan	Complete - See the Risk Model Followup Section	11/3/2020



Key Takeaways

- No CPZs in the top 100 overlap
- This will result in significant change to the prioritization and expected risk buydown of mitigations
- The 2018 risk results were not distance weighted, where the 2021 prioritization included a distance factor.

