
# Wildfire Safety Advisory Board

## *Recommendations for Developing the SHEUR Threshold*

# AGENDA

I. Introduction

*The SHEUR Threshold*

II. An Illustrative Example

⚠ *Dense material coming…*

III. Q&A / Next Steps

# Objectives

- Develop a methodology for determining risk reduction & System Hardening for Electric Utility Resiliency (SHEUR) threshold so that IOUs will, transparently, be able to determine mitigations to reduce the risk of wildfire & avoid the use of PSPS.

- Develop WSD's capacity to determine if IOU wildfire mitigation expenditures are the most cost effective by requiring the IOUs to consider wildfire risk & PSPS risk in mitigation project RSE calculations to maximize the benefit to the people of CA.

# WSAB Recommendations

## Combine recommendations 2.1 & 4.1 to create the objective of the WMP RSE analyses

### 2.1: Risk Spend Efficiency Analysis Required for Each Mitigation Measure

- The Board recommends that the 2021 WMP Guidelines require utilities to complete a Risk Spend Efficiency (RSE) analysis for each mitigation measure, at a circuit level, so that each measure can be considered individually, in aggregate, and against each other, to determine the most appropriate wildfire mitigation effort for each circuit section.
- The Board recommends that the 2021 WMP Guidelines require PSPS to be treated as a risk for the purposes of the RSE calculations in order to encourage utilities to allocate resources in a way that prioritizes reducing the number, scope, duration, and reenergization timeline of PSPS events.

### 4.1 Develop an Electric Utility Resiliency and Risk Reduction Threshold

- The Board provides the following guidance that the WSD and stakeholders begin developing a new System Hardening for Electric Utility Resiliency (SHEUR) threshold, that sets an acceptable level of electric operation risk and establishes the risk reduction that a utility should assume so that it can design its systems accordingly. The future demonstration of compliance with the newly developed SHEUR threshold could become an achievable condition of approval of a utilities' WMP.

# Why a SHEUR Threshold is Necessary?

- There is no clear regulatory standard for how IOUs identify and quantify wildfire risk at this time.

- There is no established acceptable level of operational risk an electrical utility should assume before initiating a PSPS.

# Steps to Meeting Objectives

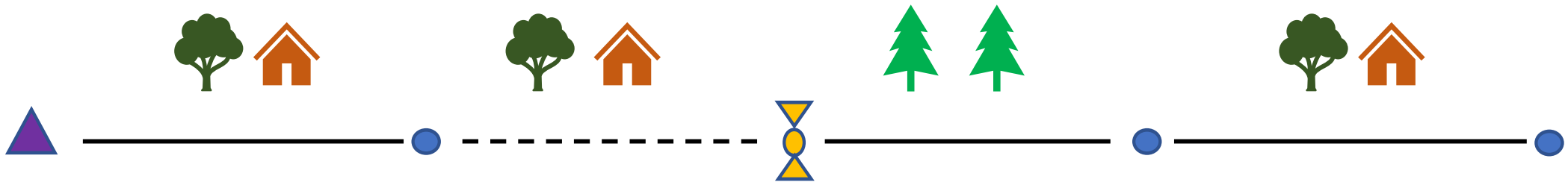
1. Develop risk profiles for each type of electrical utility asset & modifiers for factors such as construction, topography, & wind.
2. Develop methods for wind event projections & wildfire consequence mapping.
3. Using one and two, require IOUs to analyze their grids to determine circuits that have unacceptable risk of wildfires & consequences (and therefore PSPS experiences).
4. Require IOUs to analyze the circuits with unacceptable risks & use RSE calculations to determine the most cost-effective application of wildfire mitigation resources to decrease wildfire risk & to exclude people from PSPSs.

# Illustrative Example

- This example assumes a methodology to illustrate the use of the recommended tools of quantified risk, a SHEUR safety threshold, & cost benefit analysis at a circuit/project level. The methodology is *not* the recommendation. There are other methodologies that may be superior. The purpose of this illustration is to demonstrate the utility of the recommended tools.

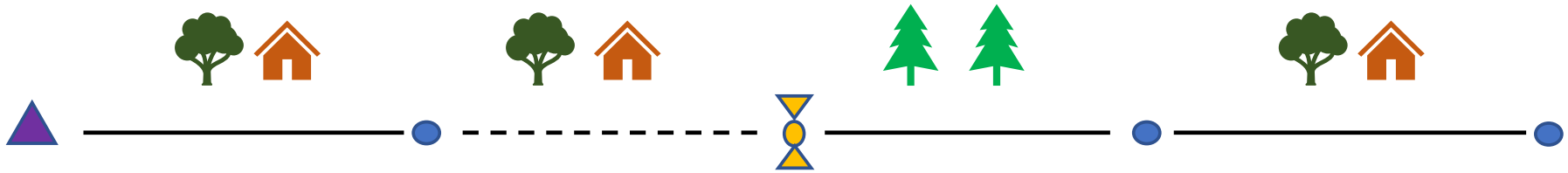
- The Transmission System is not modeled in this example, other than that it is not rated to operate safely below the SHEUR threshold for very high winds, and, consequently, is subject to PSPSs. The exclusion of the Transmission System in the example does not mean that it is excluded from the application of the recommendation's principles. Application of these principles may show that transmission mitigations may have higher RSE values in reference to wildfire mitigation and PSPS avoidance.

# Illustrative Circuit Section



| | Conductor | Construction | Pole Height | Topography | # of Customers |
|---|---|---|---|---|---|
| Segment 1 | uncovered | normal | low | semi urban | 1 |
| Segment 2 | underground | normal | low | semi urban | 1 |
| Segment 3 | uncovered | normal | low | wooded | 0 |
| Segment 4 | uncovered | normal | low | semi urban | 1 |

# Wind Projection & Consequence Mapping



| Wind Projections | |
|---|---|
| Very High Winds | 1 event |
| High Winds | 3 events |
| Low Winds | all other times |

| Consequence Mapping | |
|---|---|
| Very High Winds | High consequences for all 4 segments |
| High Winds | High consequences for all 4 segments |
| Low Winds | Low consequences for all 4 segments |

# Asset Risk (in wildfires per unit of asset, per operational hour)

| | Construction | | Pole Height | | Topography | | Wind Profile | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Normal* | *Spaced* | *Low* | *High* | *Wooded** | *EVM*** | *Very High* | *High* | *Low* |
| **Overhead** | 0.0004 | 0.0006 | 0.0009 | 0.0007 | 0.02 | 0.008 | 0.008 | 0.004 | 0.004 |
| **Underground** | 0.000008 | 0.000005 | 0 | 0 | 0.0046 | 0.0006 | 0.000006 | 0.000006 | 0.000006 |
| **Overhead & Covered** | 0.0003 | 0.00007 | 0.00001 | 0.0007 | 0.00064 | 0.002 | 0.009 | 0.0006 | 0.0006 |

* Standard vegetation management compliant with GO95

** Enhanced Vegetation Management

# Analysis of Circuit 1

## Analysis

- Using the SHEUR risk chart, a wildfire incident rate can be determined for each line segment during low, high, & very high wind events. It should be noted that low wind is not projected to be capable of high consequence fires. Also, the circuits will not experience very high wind events (> 55 mph) since the source of the circuit will be de-energized since the transmission line is not rated to operate during very high wind events.
- The incident rates of segments 1,3, & 4 are above the SHEUR threshold during high wind events & segment 2 is below the SHEUR threshold. During high wind events segments with incident rates above the SHEUR thresholds will be de-energized as part of a PSPS. Also, since segment 1 is the source for segment 2, when segment 1 is de-energized segment 2 will also be de-energized.

## Results

Projected Wildfires = (Sum of segments IR)*(operations hours-PSPS hours) = Z wildfires, none high consequence

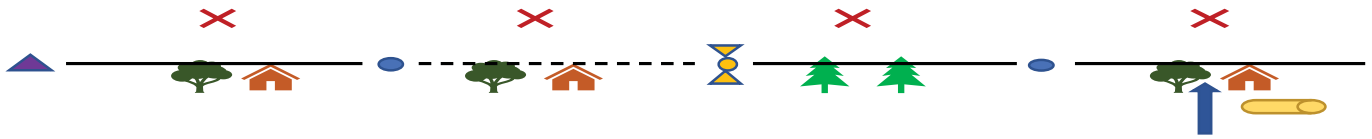
Projected PSPS = (3 high wind events + 1 high wind event) X (3 people) = 12 PSPS experiences

# Wildfire Mitigation Measures

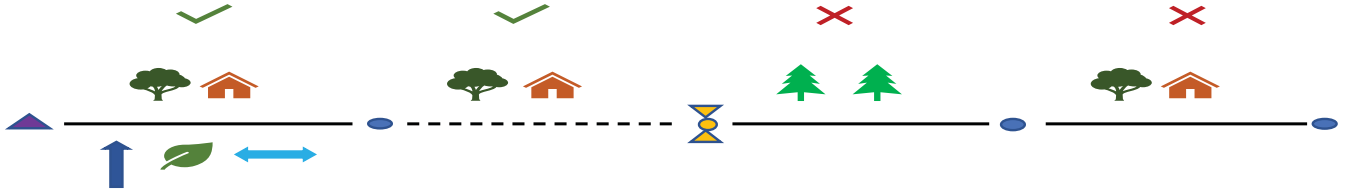
| Mitigation Type | Cost |
|---|---|
| Undergrounding | $$$$$$ |
| Covered conductors | $$$$$ |
| Spaced conductors | $$ |
| Increased pole height | $$ |
| Enhanced vegetation management | $ |

# Mitigation Projects

**Project 1**



**Project 2**



**Legend**

- Power on
- Power off
- EVM
- High pole
- Covered conductor
- Spaced conductor

# Mitigation Project 1

**Mitigations**
- Segment 4: increase pole height $$
- Segment 4: install covered conductor $$$$$

  **Total cost**: $$$$$$$ (7)

**Analysis**
- Segment 4's incident rate has been reduced to below the SHEUR threshold.
- Segments 1 & 3 still have high risk incident rates above the SHEUR threshold and high wildfire risks with high consequences. During the 3 projected high wind events, electrical power will need to be shut down.
- Since segment 4's source are the 2 high risk segments (1&3), there are still 4 PSPS events projected, 1 transmission and 3 distribution, affecting all 4 segments and all 3 people.
- Since the power will be shut down to segment 4 during the high-risk wind events and very high-risk wind events, there is no high consequence wildfire mitigation benefits from Project 1.

**Results**
- Projected PSPS Event avoidance: none
- Projected wildfire avoidance = *X*, none high consequence wildfires
- RSE = (*X* wildfire avoidance, none high consequence + 0 PSPS avoidance / $$$$$$$) = *Low efficiency*

# Mitigation Project 2

**Mitigations**

- Segment 1: increase pole height to high $$
- Segment 1: replace with spaced conductor $$
- Segment 1: enhanced vegetation management $

  **Total cost:** $$$$$ (5)

**Analysis**

- Segment 1's incident rate has been reduced to below the SHEUR threshold.
- Since segment 2 is already below the SHEUR threshold because of undergrounding, both segments 1 & 2 can now be left in power during high wind events even though they are still high consequence segments.
- Wildfire risk is not reduced for segments 3 & 4 so PSPS events are not reduced for those segments. PSPS events (3 distribution & 1 transmission) will affect 1 person 4 times.

**Results**

- Projected PSPS event avoidance: 3 people will not experience 3 PSPS events; 9 PSPS experiences avoided
- Projected wildfire avoidance = *X*, including high consequence wildfires
- RSE = (*X* wildfire avoidance, including high consequence + 9 PSPS experiences avoided / $$$$$) = *High efficiency*

# Projects Evaluation

## Project 1

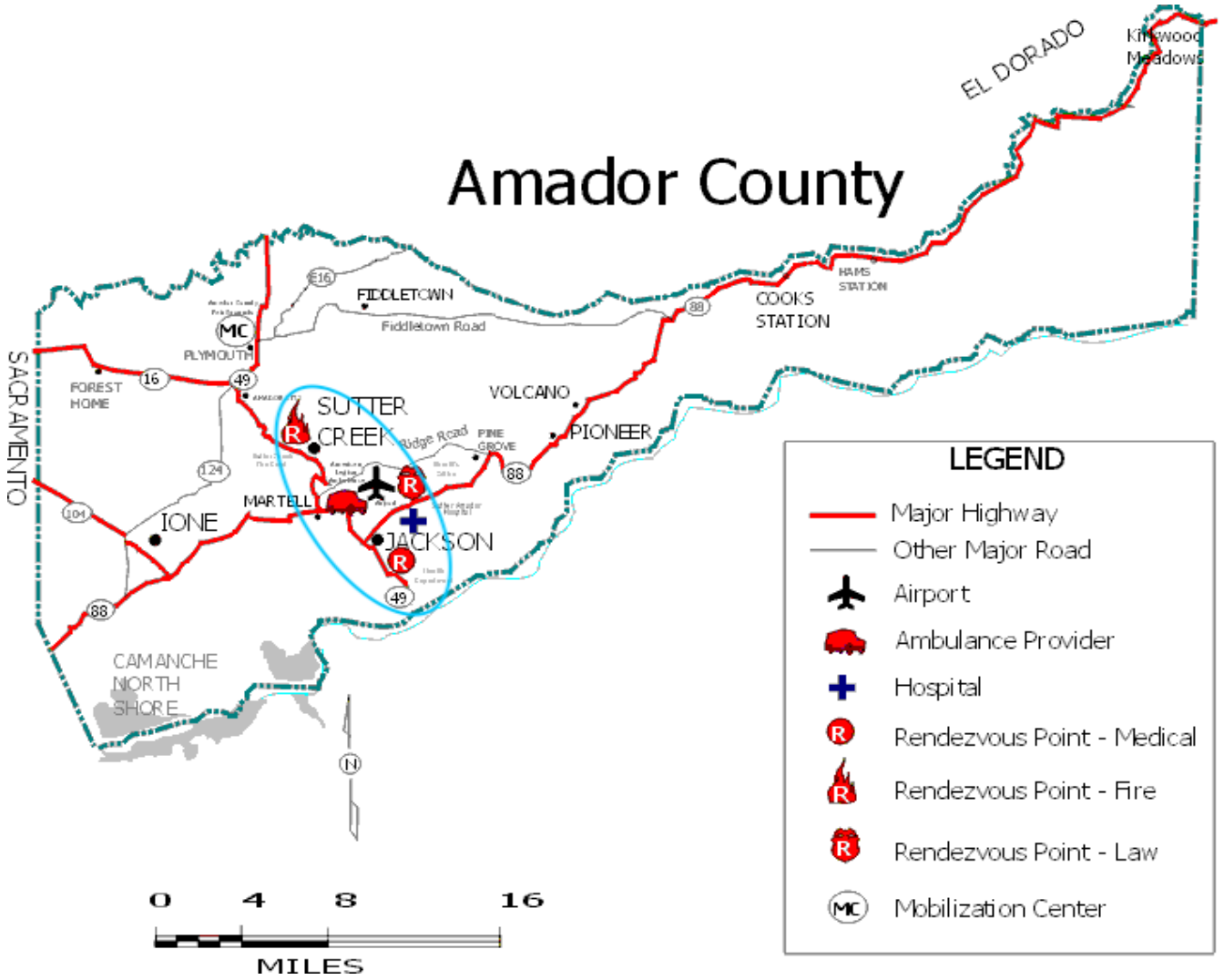
Did not avoid PSPS experiences & did not avoid high consequence wildfires since it would be de-energized when It was capable for initiating a high consequence.

## Project 2

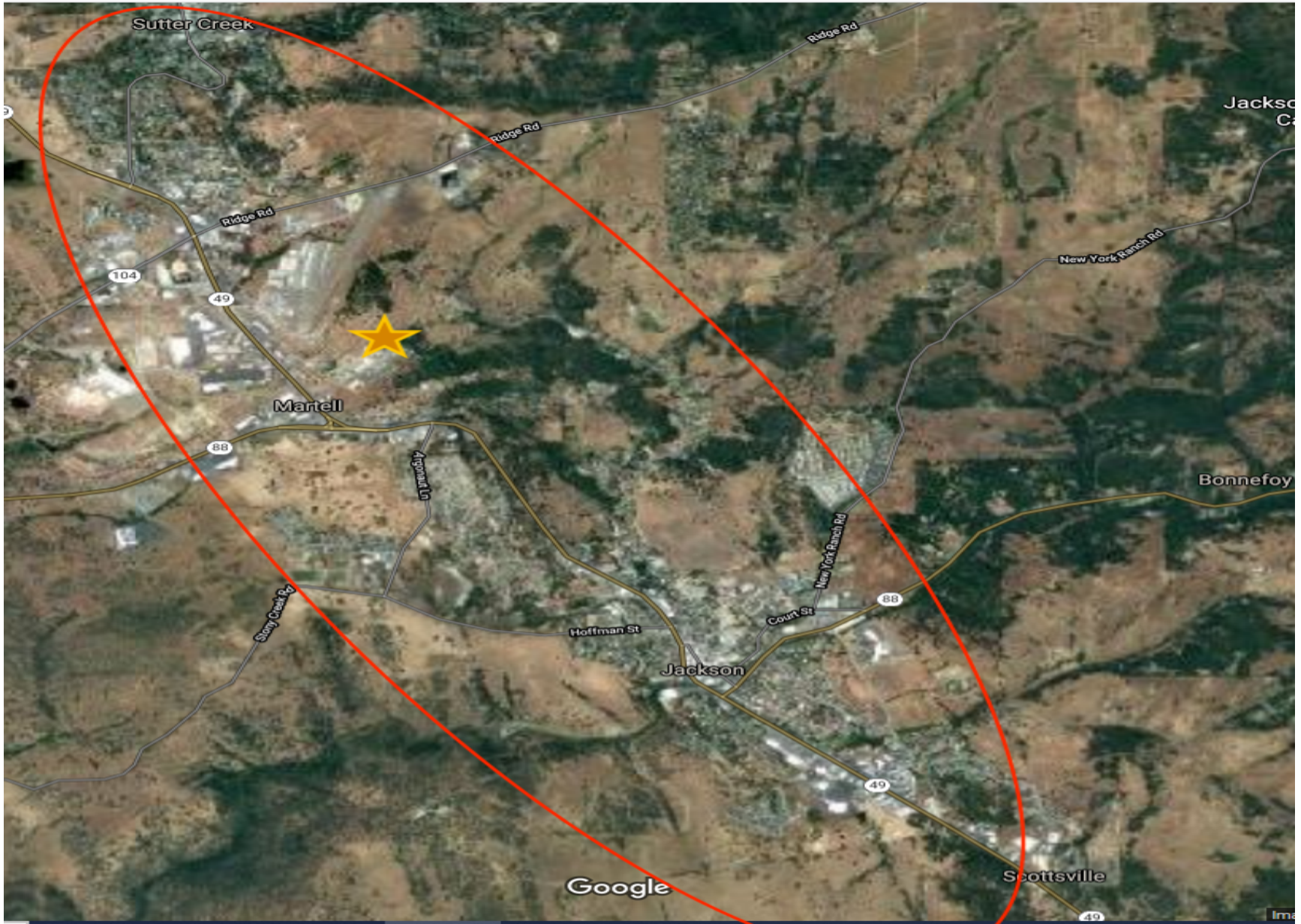
Avoided low and high consequence wildfires & 75% of PSPS experiences. The mitigation of high consequence fires should be prioritized over low consequence fires.

**Project 2 is more efficient**

# Case Study: Amador County



# Case Study: Amador County

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# Case Study: Amador County

7 mile stretch on Hwy 49 from Sutter Creek to South Jackson

- Significant percentage of the population
- Small fraction of the circuit miles in the county

*Major employers & facilities:*

- Sutter Amador Hospital
- Jackson Jr. High School, Argonaut High School etc.
- Amador County Jail
- Walmart
- Kit Carson Nursing and Rehab

# Additional Considerations

Initially the limitation of resource allocation will mean that parts of the grid that are capable of being SHEUR zones will need to be prioritized. Thought should be given to providing guidance to the IOUs and consider balancing factors such as:

- Environmental justice issues
- Disproportionate impact on disadvantaged communities
- Location of medically vulnerable residents
- Community services
  (hospitals, communications, food distribution, etc.)
- Municipal services & infrastructure (police, fire depts etc.)
- Economic impacts

# Summary

Developing a methodology for risk reduction & a SHEUR threshold will enhance transparency & accountability by:

- Making the process by which utilities determine wildfire risk and deploy wildfire mitigations more transparent
- Enabling the WSD to confirm that projects maximize wildfire mitigation expenditures.

# Q&A/ Next Steps

# Contact Information

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