


# Utility Wildfire Risk

## Commonalities and Metrics

Joseph W. Mitchell, Ph.D.  
for  
The Mussey Grade Road Alliance

Prepared by M-bar   
Technologies and Consulting

[jwmitchell@mbartek.com](mailto:jwmitchell@mbartek.com)

January 25, 2016

S-MAP Intervenor Workshop

1

# Topics

- ALARP
- Utility Risk Commonalities:  
Environments and Assets
- Metrics

# ALARP Framework

- MGRA & UCAN favor using ALARP as a framework because it has been implemented in a number of contexts
- Start with a known working framework
- Construct different FN tolerability curves for different values: safety, environmental, economic.
- Identify the missing components (data, models) and estimate uncertainty
- Identify how utilities manage specific risks in lieu of data and models
- Subject Matter Expert → Data driven estimations over time
- Create “draft” framework using current risk methodology
- Iteratively improve framework by collecting data, developing models, and analyzing risk
- Any alternative framework needs to be a complete framework, not calculation technique

# ALARP Tolerability & Values

	Lives / Injuries	Property	Environment
Gas explosion, residential	Intolerable	High	Low
Wildfire, urban interface	High	Intolerable	High
Major methane leak	Moderate	Moderate	High
Cyberattack	Moderate	High	Acceptable
Mitigation: Risk from power shut off under fire weather	Moderate	Moderate	Acceptable
Mitigation: Extensive wildland clearing for fire prevention	Acceptable	Low	High / Intolerable

# Cost Issues

- It is costly to collect data and develop models
  - Collect data and develop models for all major risks unless a positive showing that costs would be grossly disproportional to benefits
- “Gross disproportionality” criterion results in higher safety spending
  - Provides a buffer that errs on the side of safety. Avoids “Pinto problem”.

# Utility Risk Commonalities

- Public requires:
  - Assured level of protection from utilities and CPUC
  - Not to pay multiple times for the same product
  - To know its public utilities are using the best and most cost effective assets
  - To know that its public utilities are properly prioritizing safety improvements
- Risk based on:
  - Environments
  - Assets
- Separation of business and public risks

# Environments and Assets

- Utility claim: All utility risk profiles are unique
- Risks are associated with the behavior of assets in specific environments
- Only portfolios of assets and environments are unique to utilities
- Utilities have many assets and environments in common
- Where there is commonality, seek common risk approach. Where not, justify differences.

# Example: Wildfire Environments



From Littell et. al., 2009

Two major wildfire environments in California:

- Chaparral and coastal woodland
  - Wind driven events (“Santa Ana”, “Sundowner”, “Diablo”) Fosberg 1966, Blier 1998, Raphael 2003
  - Peak fire season Sep-Nov
  - High winds – risk of infrastructure damage & vegetation contact
  - Witch, Slide, Malibu, Guejito
- Sierra
  - Peak fire season Jun-Oct
  - Utility fires due to vegetation contact
  - Butte, Trauner

**NOTE – COMMONALITY IS BY ENVIRONMENT NOT UTILITY**



# Example: Underground Assets

## Vault



Widespread in  
SCE area  
Popular with  
homeowners  
(aesthetics)

## Padmount



SDG&E Claims:  
safer (leakage,  
confined space)  
cheaper  
more reliable

<http://www.sandiego.gov/undergrounding/>

## QUESTIONS:

- Are there real environmental differences between SCE/SDG&E territories that merit different technologies?
- Are there real safety issues that warrant concern in SMAP/RAMP?
- Why is it OK for ratepayers of one utility to have different risk/cost/reliability?

# Safety Metrics

## Examples and Usage

# “Near Miss Metrics” Example: Outages SDG&E data

Timestamp

Cause Identification

Circuit	Occurrence	Cause Category	Cause Description	Control Date	Station Code
1001	1/10/05 5:13 AM	Weather	Circ. Flashover/storm/high winds/undet.	0	RSF
1001	2/21/05 7:50 AM	Weather	Circ. Flashover/storm/high winds/undet.	0	RSF
1001	7/20/05 8:04 PM	Customer Contact	Vehicle contact	0	RSF
1001	8/25/05 11:24 AM	Customer Contact	Vehicle contact	0	RSF
1001	1/13/06 8:32 AM	Undetermined	Undetermined	0	RSF
1001	10/14/06 11:01 AM	Weather	Circ. Flashover/storm/high winds/undet.	0	RSF
1001	10/14/06 4:04 PM	Customer Contact	Vehicle contact	0	RSF
1001	12/27/06 6:31 AM	Equipment	Capacitor failure	0	RSF
1001	8/16/07 3:28 PM	Undetermined	Undetermined	0	RSF
1001	8/15/09 1:07 PM	Equipment	Capacitor failure	0	RSF
1001	12/7/09 4:28 PM	Weather	Circ. Flashover/storm/high winds/undet.	0	RSF
1001	5/8/10 10:31 PM	Customer Contact	Vehicle contact	0	RSF
1001	5/12/10 7:37 PM	Undetermined	Undetermined	0	RSF

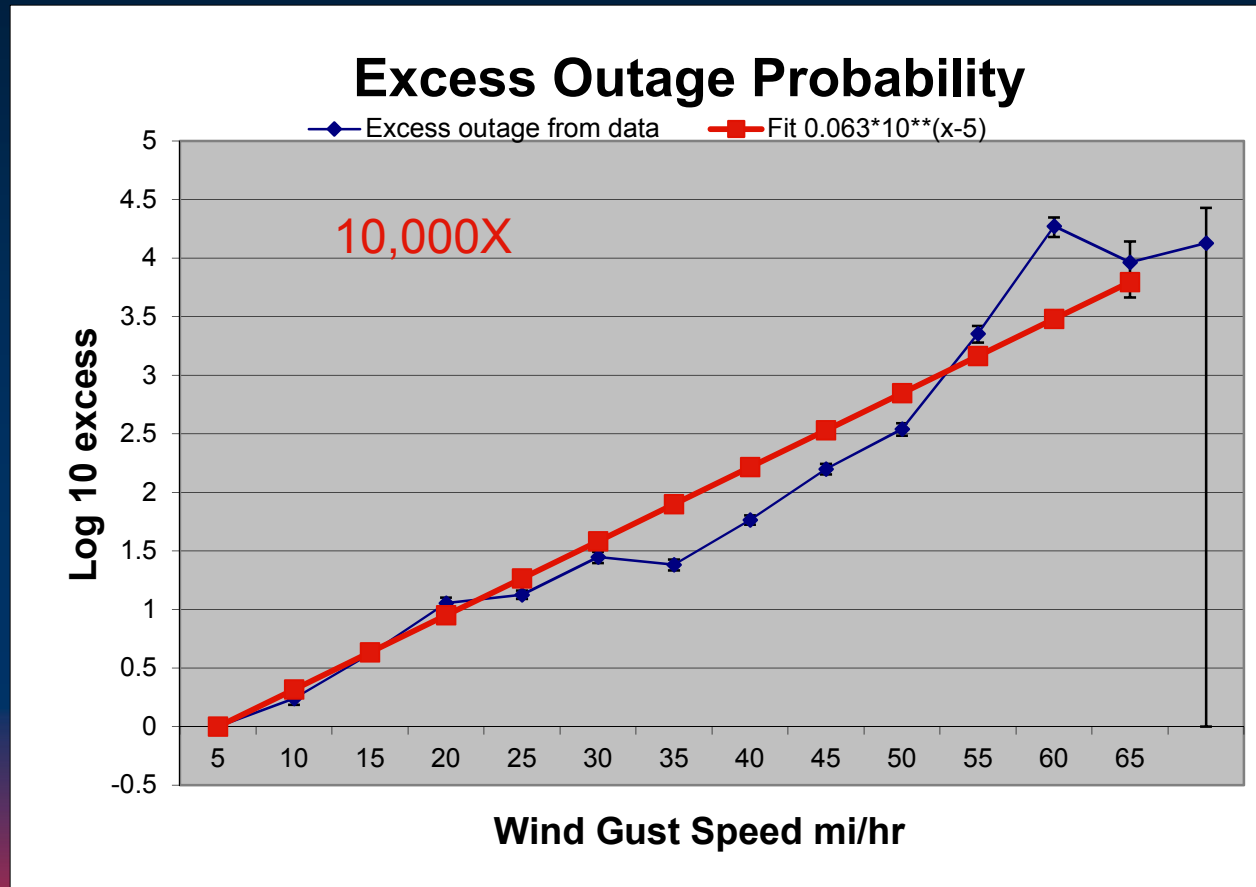
General Location:  
Circuit & Nearest  
Weather Station

# Refine data:

## What has safety impacts?

- Most Relevant to Fire Safety (more likely during fire weather)
  - Weather related outages
  - Vegetation related outages
  - Mechanical failures
- Less Relevant to Fire Safety:
  - Vehicle collisions
  - Electrical component failures
  - Birds & animals
- Unknown: Treat as Suspect

# Find safety-related effects:



Good example of a “fat-tail” risk:

Potential damage rises faster than probability falls.

The worst events drive future losses.

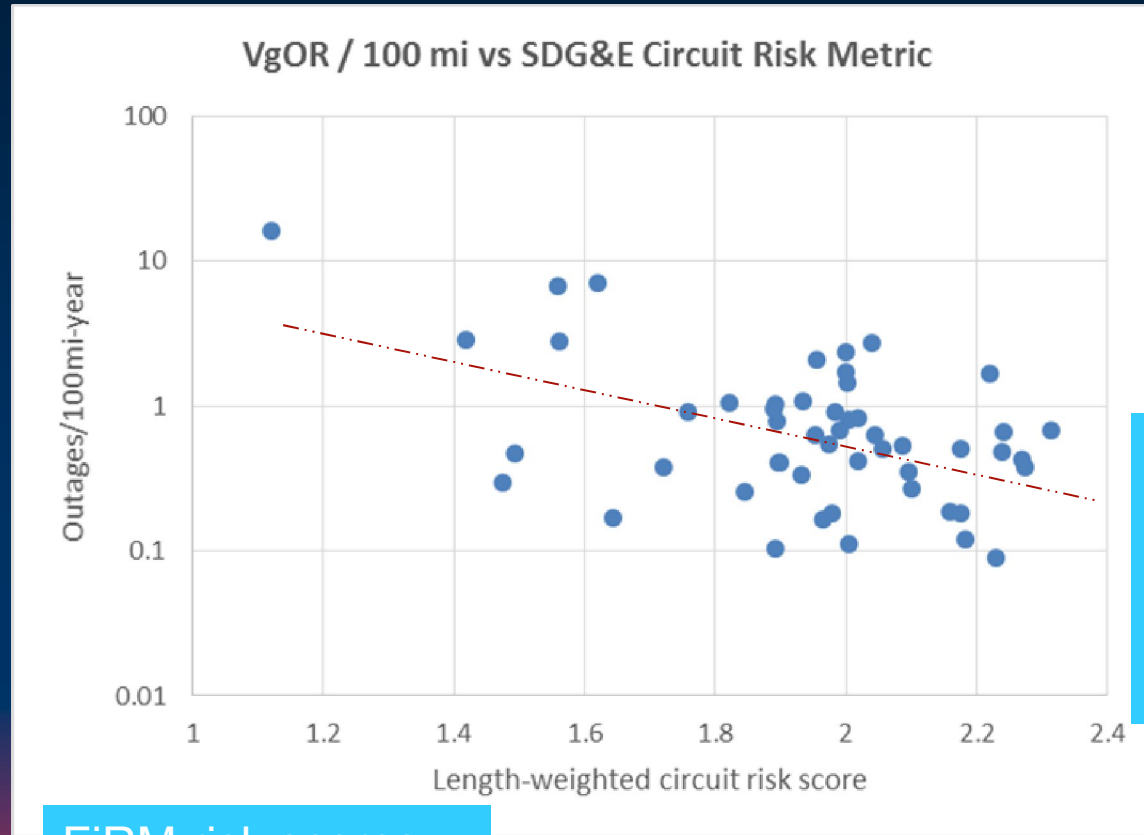
Other examples:

- Earthquakes
- Landslides

Averages from history don't work, Monte Carlo can help

# Compare with risk estimates

Outage rate for vegetation-related outages only



Possible effect of vegetation management program

FiRM risk scores (SME) per circuit, weighted for length

# Example: Outage impacts

CUE example: “What is the value of improved electric reliability that avoids the asthma attack caused by diesel powered backup generators running during an extended outage? What is the dollar value of the house fire avoided by the candle because electric reliability was improved?” (Comments p. 3)

MGRA and other parties actually did candle & generator fire risk estimates for A.08-12-021. Data from generator and candle fires from fire agencies. Increased usage & risk estimated from projected reliability reduction.

D.09-09-030 accepted opposing party positions that fire risk could actually be increased by shutting off power under too low of a threshold.

**CONCLUSION – THERE IS A SIGNIFICANT AMOUNT OF EXISTING DATA FOR NUMEROUS RISKS.**

# Other Fire Metrics

- Fire history
- Inspection records
- Maintenance records

Metrics need to be identified for other risks



# Thank You

**Slides available from:**  
M-bar Technologies and Consulting  
Ramona, California  
[www.mbartek.com](http://www.mbartek.com)  
[jwmitchell@mbartek.com](mailto:jwmitchell@mbartek.com)