10-Year Electrical Undergrounding Plan Guidelines

Public Meeting to Consider Adoption of the
10-Year Electrical Undergrounding Plan Guidelines
February 20, 2025 - 10 am to 12 pm

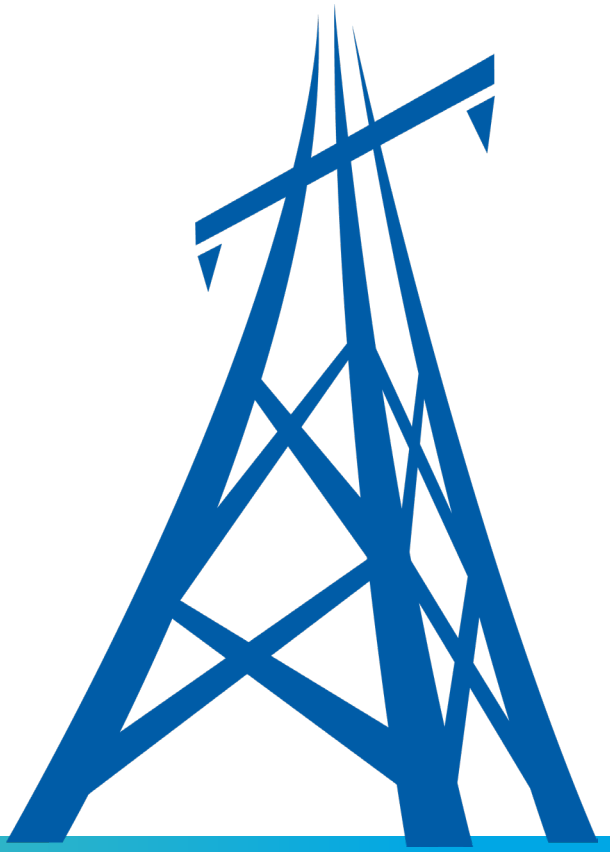
Safety Message

Welcome to Energy Safety's Meeting to Adopt the 10-Year Electrical Undergrounding Plan Guidelines

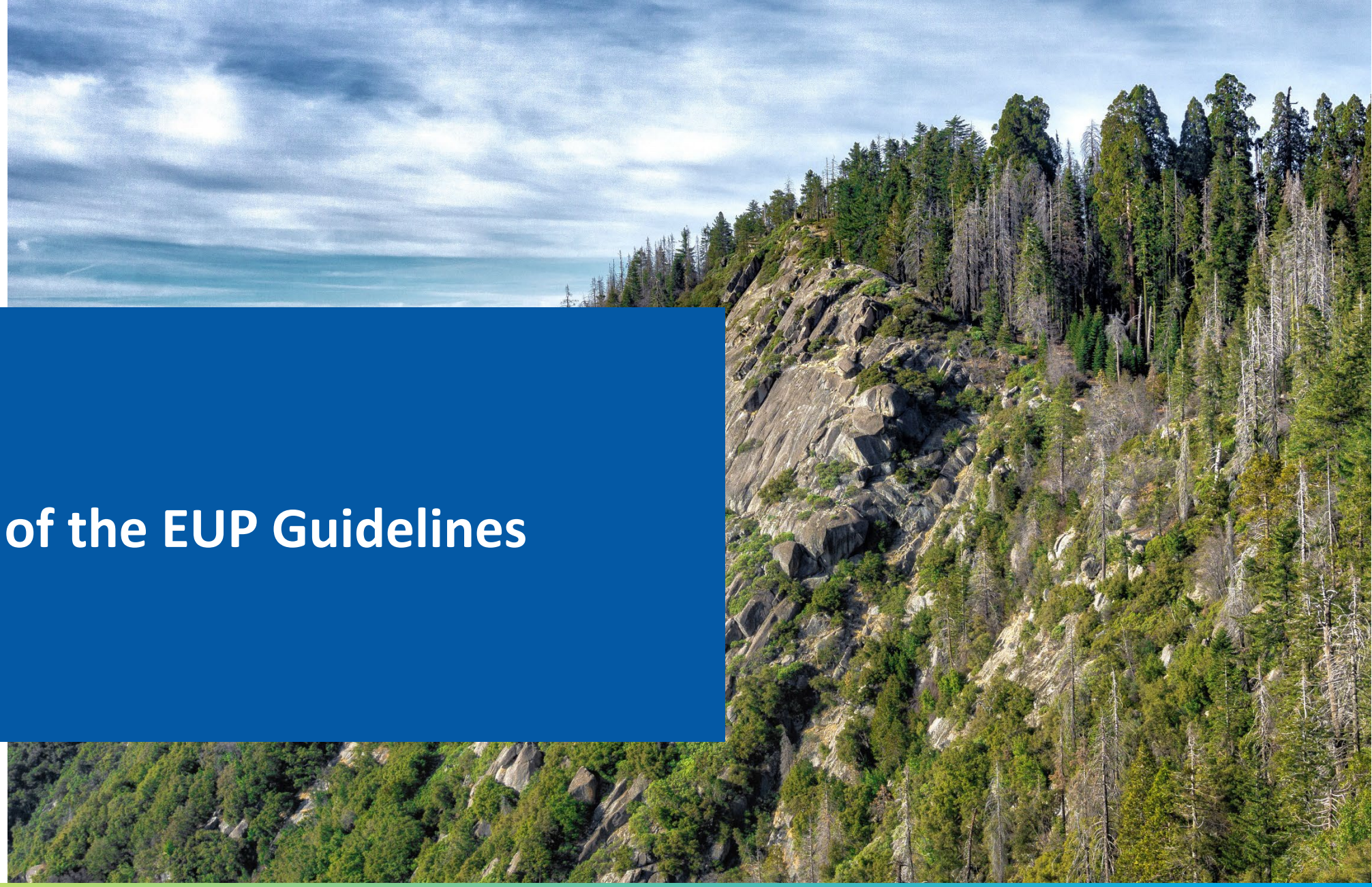
- ✓ Take care of your posture. Sit in a comfortable position
- ✓ Take precautions during extreme heat, stay hydrated
- ✓ Be prepared for earthquakes – duck, cover, and hold
- ✓ Be aware of your surroundings and know your evacuation route(s)
- ✓ Feel something say something and we will find a way to help

AGENDA

- Welcome and Introduction
- Overview of the EUP Guidelines
- Public Comment on Adoption
- Adoption of the 10-Year Electrical Undergrounding Plan Guidelines and Closing Statement



Introduction



Overview of the EUP Guidelines

SB 884 HIGHLIGHTS

Allows a Large Electrical Corporation to submit a voluntary 10-Year Undergrounding Plan:

- Identification of projects with a means of prioritizing the projects
- Timelines for completion, unit cost targets and mileage completion targets for each year
- Comparison of undergrounding versus aboveground hardening
- A plan for utility and contractor workforce development
- An evaluation of project costs, projected economic benefits over the life of the assets, and any cost containment assumptions including the economies of scale

Energy Safety's Approach

Write Guidelines directing a Large Electrical Corporation on what to include in its plan.

Focus of the Guidelines is to ensure that each plan:

1. Contains clearly articulated goals for risk reduction and reliability increase
2. Provides a transparent decision-making framework
3. Is robustly and transparently analyzed
4. Provides consistent granular data

Focus Area 1:
Clearly Articulated Goals

CLEARLY ARTICULATED GOALS

- Each plan must contain a Plan Mitigation Objective (PMO), which is the goal the Large Electrical Corporation sets for total reduction in risk through its 10-year program. The PMO in many ways is the most important number in the plan
- The plan must also include forward-looking, quantifiable Plan Tracking Objectives to assess whether the Large Electrical Corporation is on track to meet its Plan Mitigation Objective

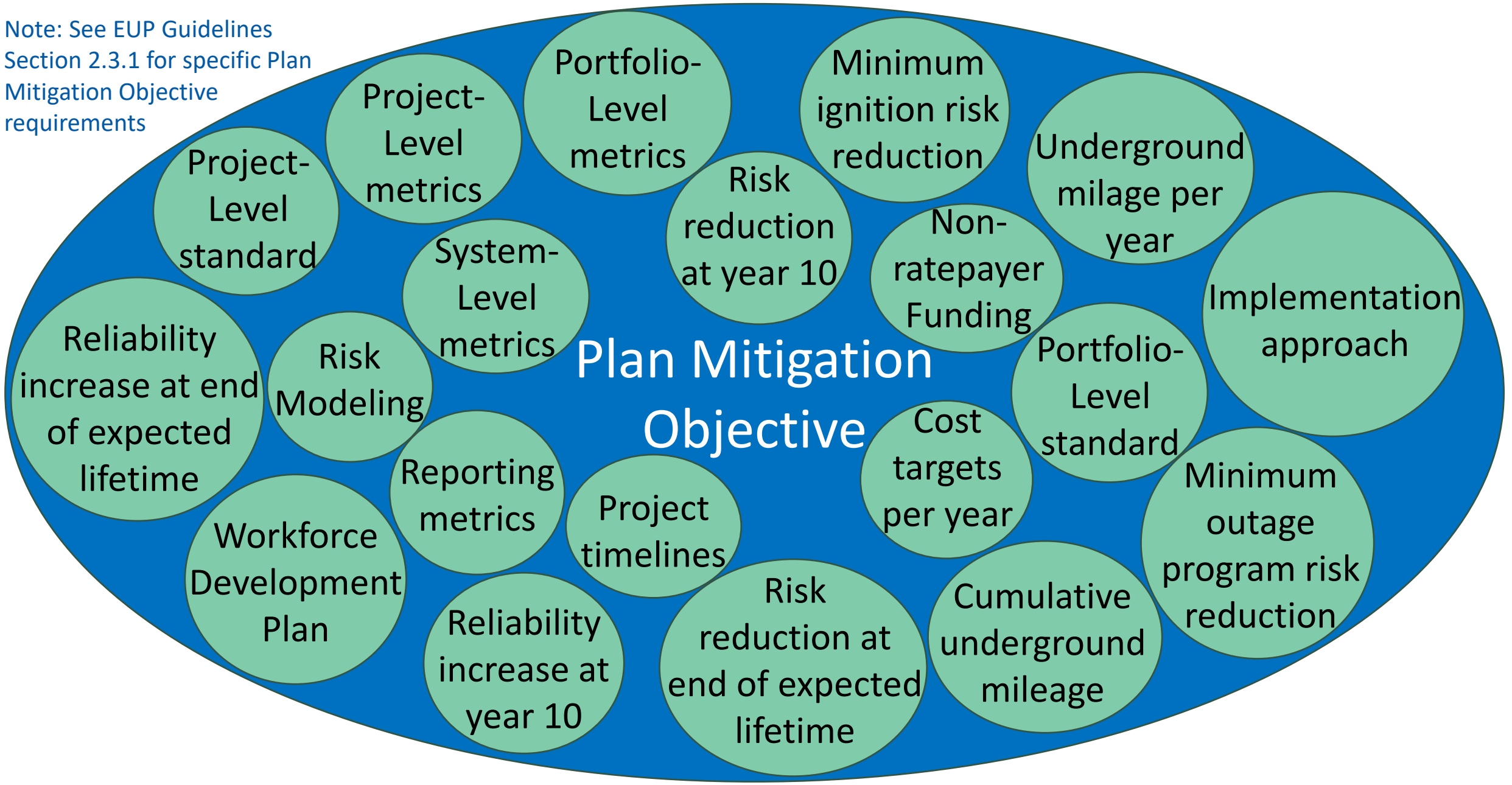
CLEARLY ARTICULATED GOALS

The Plan Mitigation Objective is the collective reduction in risk to be achieved by the plan

Some metrics include:

- Reduction in instantaneous Ignition Risk at year 10
- Cumulative Ignition Risk Reduction over lifetime of the infrastructure
- Reduction in instantaneous Outage Program Risk at year 10
- Cumulative Outage Program Risk reduction over lifetime of the infrastructure
- Additional metrics that support the above reduction in risk

Note: See EUP Guidelines Section 2.3.1 for specific Plan Mitigation Objective requirements



CLEARLY ARTICULATED GOALS

- Each plan must contain a Project-Level Threshold, which is the minimum level of risk that a Circuit Segment must have to be considered eligible for the program

- Each plan must also contain a Project-Level Standard, which is the maximum level of risk that can be left on a circuit after it has been mitigated/Undergrounded

CLEARLY ARTICULATED GOALS

Each plan must contain a Portfolio-Level Standard

- A Portfolio is the group of all confirmed projects
- This standard is made up of the "ignition risk decrease standard" and the "reliability increase standard"
  - The "ignition risk decrease standard" is the minimum decrease in ignition-related metrics that the plan must achieve to meet the required decrease in wildfire risk
  - The "reliability increase standard" is the minimum decrease in outage program-related metrics that the plan must achieve to meet the required increase in reliability
- These standards must be measured on a per-mile basis
- These standards are then included in the PMO

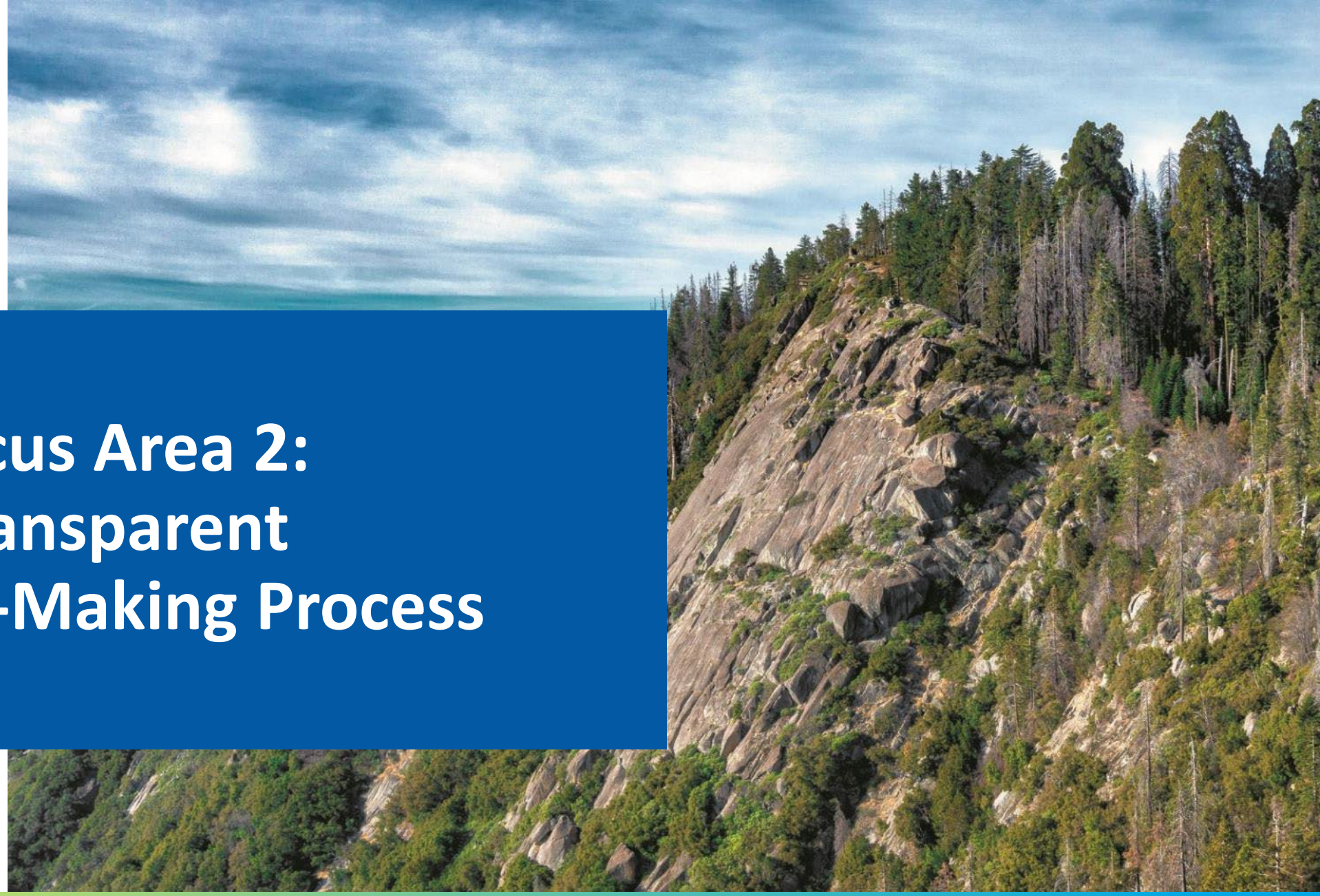
CLEARLY ARTICULATED GOALS

Portfolio-Level Standard

- The Portfolio-Level Standard is a measure of the average risk reduction per-mile of all selected projects (Portfolio of projects), whereas the PMO measures the cumulative risk reduction
- This Standard ensures that the plan risk reduction goal is met by undergrounding the circuit segments with the highest risk per mile

CLEARLY ARTICULATED GOALS

These three levels of goals (Project, Portfolio and Plan) are the key to ensuring that only the highest risk Circuit Segments with risk that can actually be mitigated get undergrounded, and are essential to a utility achieving a “substantial” level of risk reduction and reliability increase



Focus Area 2: Transparent Decision-Making Process

TRANSPARENT DECISION-MAKING PROCESS

- Each plan must also contain a Project Acceptance Framework that transparently demonstrates how the Large Electrical Corporation is selecting undergrounding projects
- Energy Safety will review this Framework when it evaluates the utility's plan
- If the plan is approved, the utility will use its Project Acceptance Framework to analyze Circuit Segments and select projects for construction during the 10-year period

TRANSPARENT DECISION-MAKING PROCESS

- Each plan must have a Project Acceptance Framework to present and analyze all the information for each specific Circuit Segment and the portfolio of projects . The framework must substantiate the utility's overall risk reduction and reliability increase goals
- The Project Acceptance Framework consists of four screens that are applied sequentially. Each screen surfaces and analyzes different project information. Screen 1 allows only location-eligible high-risk Circuit Segments to be considered for the program. The remaining screens examine increasingly detailed and specific project information and include Alternative Mitigation comparisons
- The Project Acceptance Framework shows which projects are consistent with the Plan Mitigation Objective for risk reduction, and which projects are not well-suited for the SB 884 program

PROJECT ACCEPTANCE FRAMEWORK

EC identifies a Circuit Segment

Screen #1

Circuit Segment Eligibility

Procedure for EC to create List of Eligible Circuit Segments

Is it in HFTD/Rebuild area?
Does risk score show need?

"Eligible Circuit Segment"

Screen #2

Project Information & Comparison

Alternative Mitigation Comparison + CPUC CBR info

Per circuit segment, but may use aggregated data, estimates.
Project Information Table

Circuit Segment can be an "Undergrounding Project"

Screen #3

Project Risk Analysis

Procedure to evaluate individual Undergrounding Project

Project-specific risk data
Project Index Table

Undergrounding Project is a "Confirmed Project"

Screen #4

Project Prioritization & Finalization

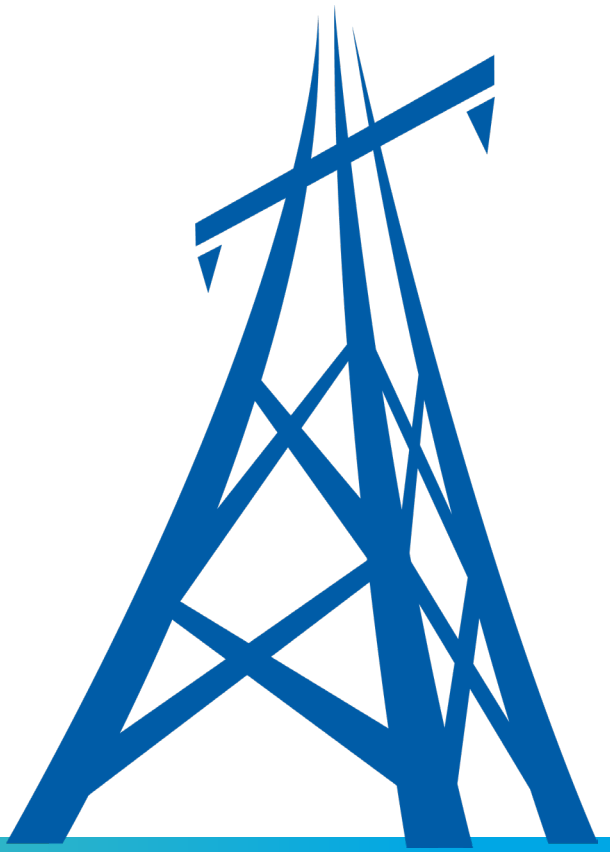
Procedure to prioritize Undergrounding Projects using 8388.5(c)(2) factors

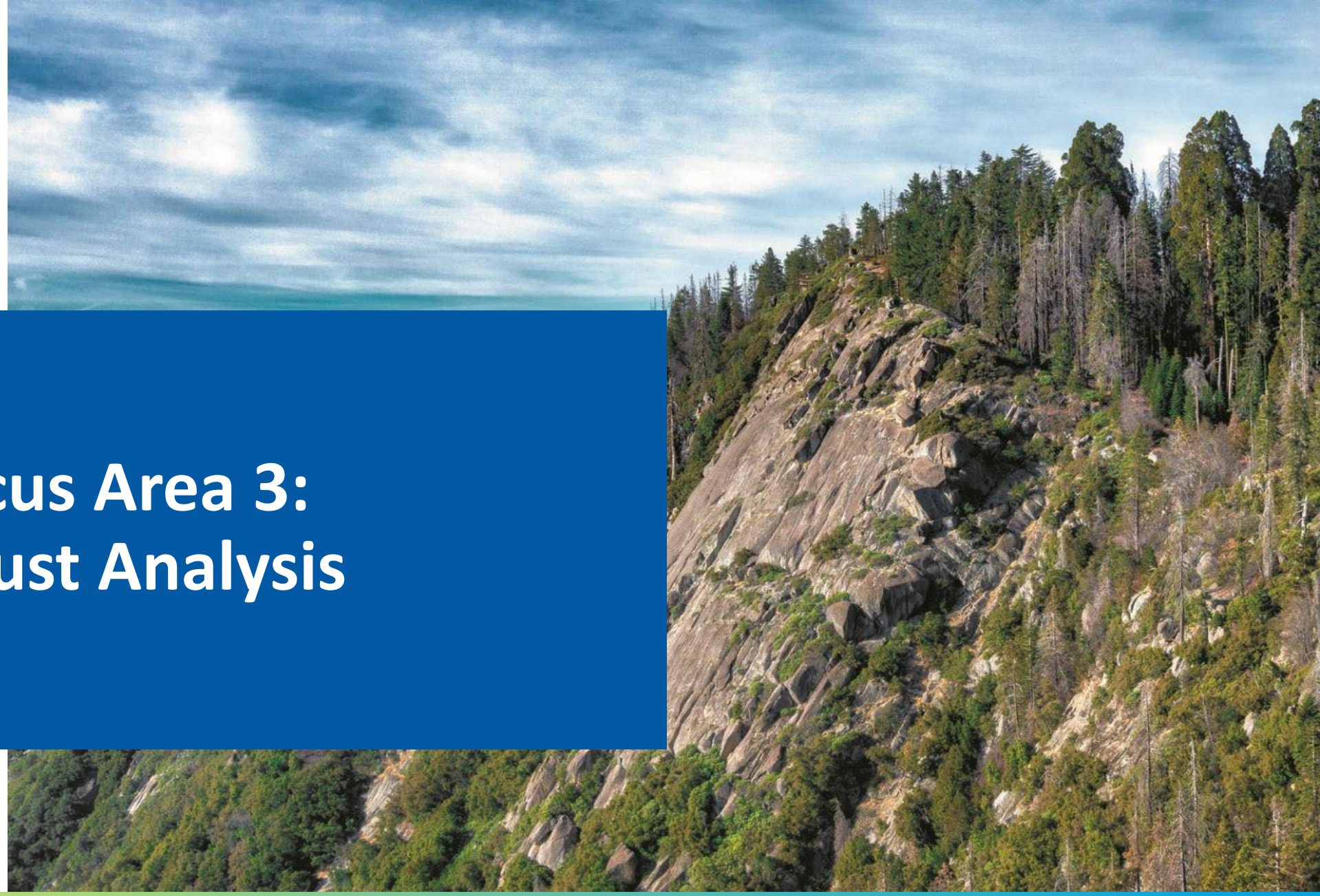
wildfire risk reduction, public safety, cost efficiency and reliability benefits

Confirmed Project can be a "Prioritized Project"

PROJECT ACCEPTANCE FRAMEWORK

This Project Acceptance Framework provides the Large Electrical Corporation with flexibility to select projects to meet its overall risk reduction and reliability increase goals, but also provides a high level of transparency and accountability in terms of how those decisions are made

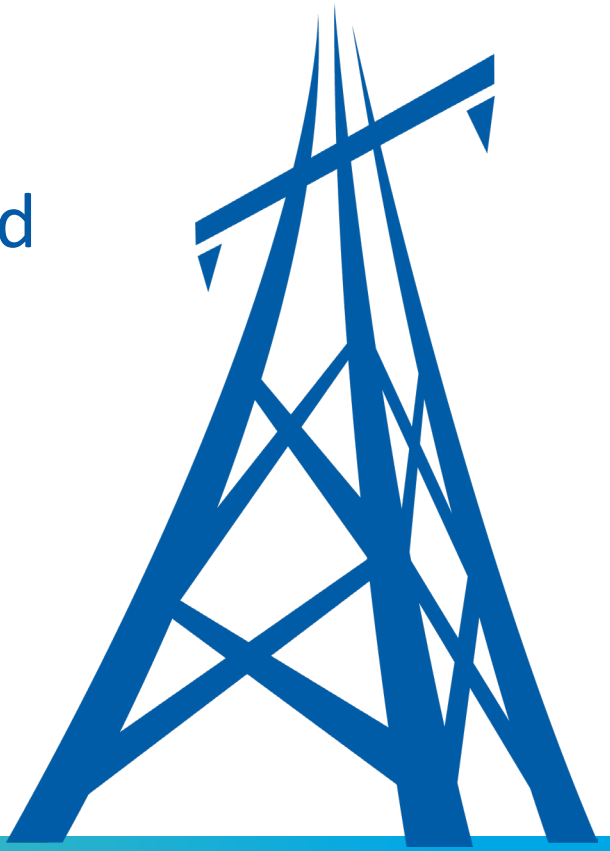




Focus Area 3: Robust Analysis

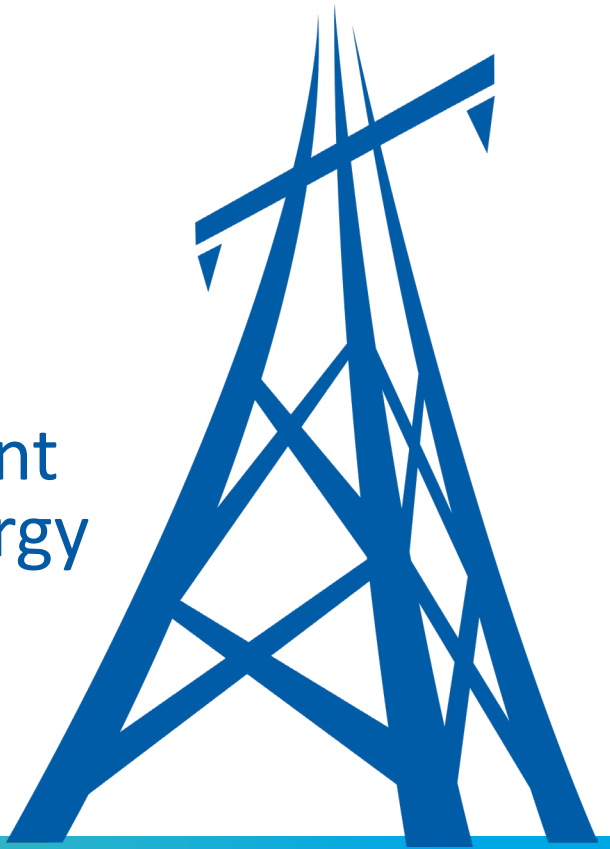
ROBUST ANALYSIS

- The entire premise of the Expedited Undergrounding Program is the substantial reduction of risk and the substantial increase in reliability
- Robust analysis through real world observations and transparent risk modeling ensures accurate measurement of risk at the start of the plan and of the risk reduction for each undergrounding project as well as the collection of all projects



ROBUST ANALYSIS: MODEL REPORTS

- The Guidelines require the Large Electrical Corporation to explain its Risk Modeling Methodology, which the Guidelines define as: “the collection of numerical models and algorithms that the Large Electrical Corporation employs to approximate the likelihood and consequences of utility related wildfires and wildfire related outage programs”
- The Risk Modeling Methodology is made transparent though **Model Reports** which are evaluated by Energy Safety and are publicly available



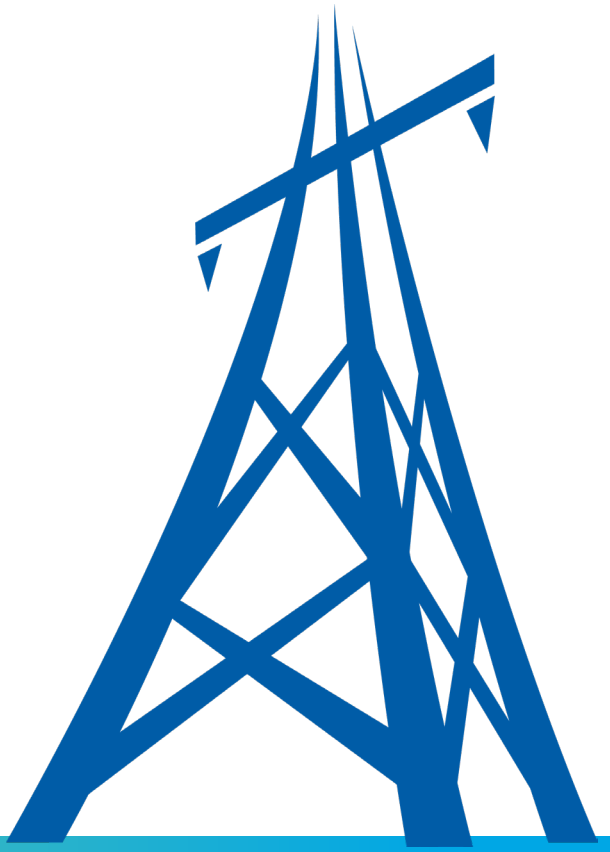
ROBUST ANALYSIS: KEY DECISION-MAKING METRICS

- The Large Electrical Corporation must base its framework on a set of **Key Decision-Making Metrics (KDMMs)** that can be measured based on observations of the real world
- KDMMs are the collection of top-level metrics that the utility proposes to use to evaluate the efficacy of an undergrounding project. They will be used for approximating the risk at the System-Level, Portfolio-Level, and individual Project-Level

ROBUST ANALYSIS: KEY DECISION-MAKING METRICS

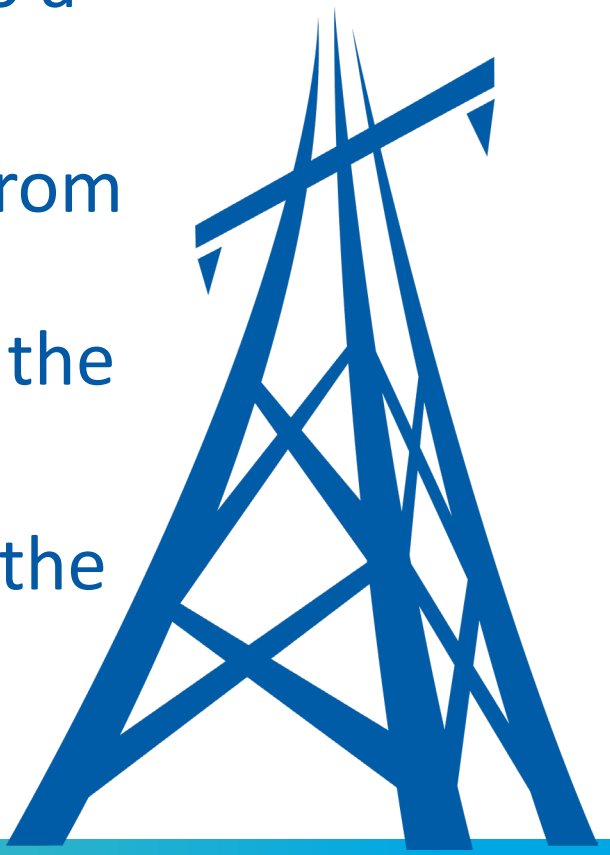
The Key Decision-Making Metrics are:

1. Overall Utility Risk
2. Ignition Risk
3. Ignition Likelihood
4. Ignition Consequence
5. Outage Program Risk
6. Outage Program Likelihood
7. Outage Program Consequence

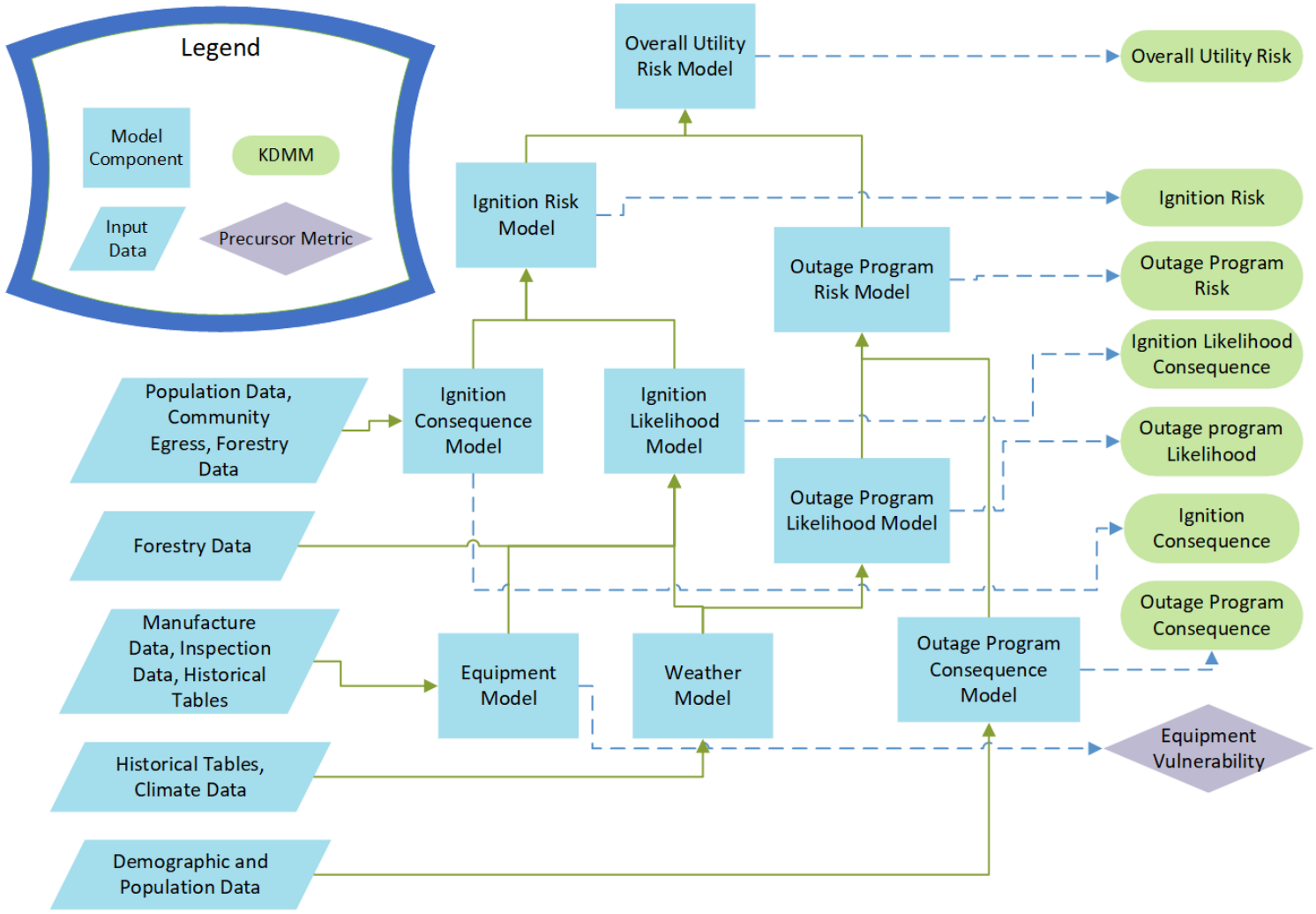


ROBUST ANALYSIS: KEY DECISION-MAKING METRICS

- A System-Level KDMM accumulates all of the information from the entire distribution system into a single number
- A Portfolio-Level KDMM accumulates information from every Circuit Segment on a Circuit that has one or more Confirmed Projects as well as their effects on the overall Circuit into a single number
- A Project-Level KDMM accumulates risk from all of the equipment on a single circuit segment



ROBUST ANALYSIS: RISK MODELING METHODOLOGY EXAMPLE



ROBUST ANALYSIS: CORE CAPABILITIES

- The Guidelines map out the Core Capabilities the Large Electrical Corporation must include in its Plan to ensure that the data-informed decisions are accountable and transparent
- Core Capabilities are defined as: the required use-cases that the Large Electrical Corporation's Risk Modeling Methodology must be able to achieve in order to make quantitative arguments about the risk reduction of Undergrounding and Alternative Mitigations

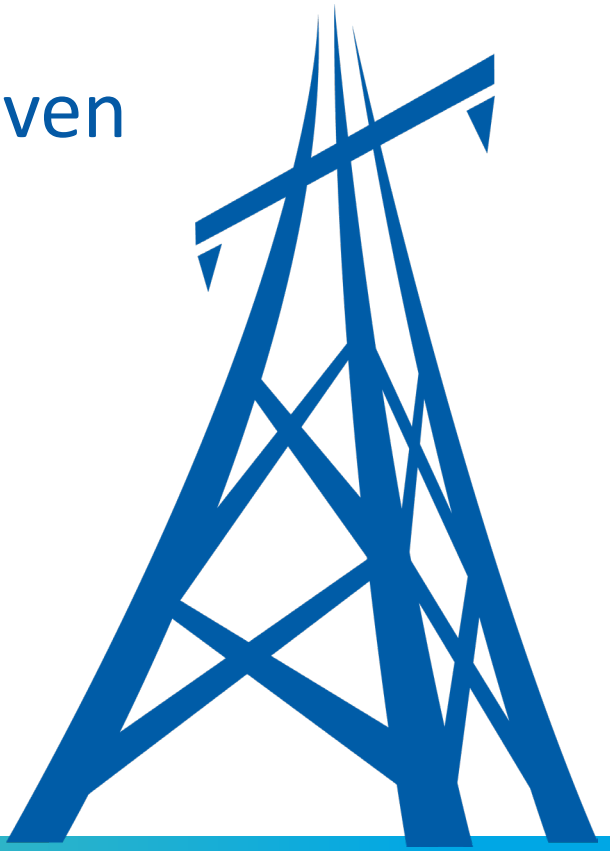
ROBUST ANALYSIS: CORE CAPABILITIES

The Core Capabilities are:

1. Project-Level Risk Analysis
2. Aggregate Risk Analysis
3. Separate and Collective Treatment of Wildfire And Reliability
4. Accumulation of Risk over Time
5. Multiple Mitigations and Subproject Attribution
6. Baselining and Back Testing
7. Mitigation Comparison

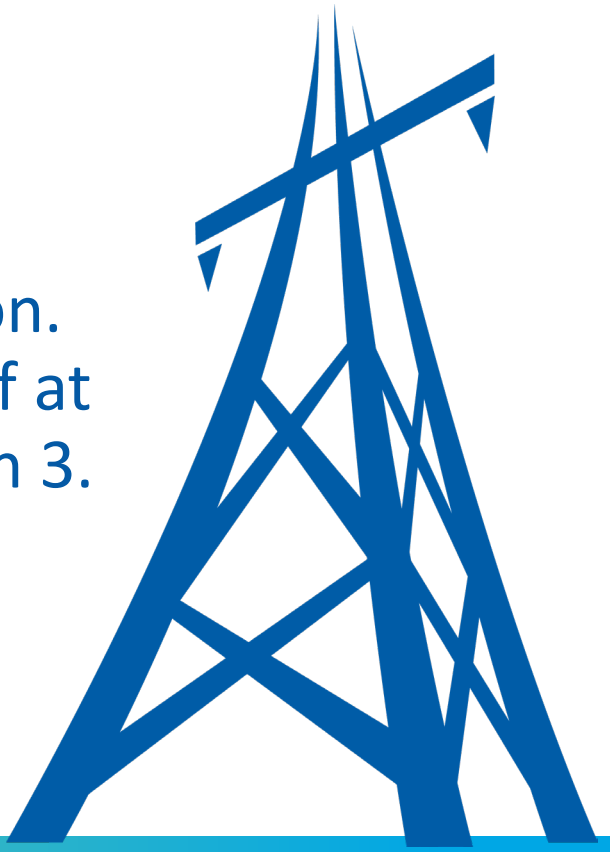
ROBUST ANALYSIS: ALTERNATIVE MITIGATION COMPARISONS

- Throughout the process, the Large Electrical Corporation will need to assess whether undergrounding is the right mitigation for any given circuit segment
- Starting in Screen 1, only the highest risk circuit segments can be selected and proceed to the following Screens where they are compared to alternative mitigations.



ALTERNATIVE MITIGATION COMPARISONS

- In Screen 2, projects are compared to at least two alternatives using the CPUC's Cost Benefit Ratio methodology. Each alternative must include multiple mitigation strategies
- In Screen 3, projects are in their scoping phase and more information is available regarding their exact configuration. This new information must be used for the comparison of at least one alternative combination of mitigations in Screen 3. The combination of mitigation strategies included in the comparison must consider location-specific information



ALTERNATIVE MITIGATION COMPARISONS

- In Screen 4, the Large Electrical Corporation must devise a prioritization methodology for project implementation. It must also update the CBR for the project and the alternatives considered in Screen 3, which provides another opportunity to evaluate the undergrounding project versus the alternatives

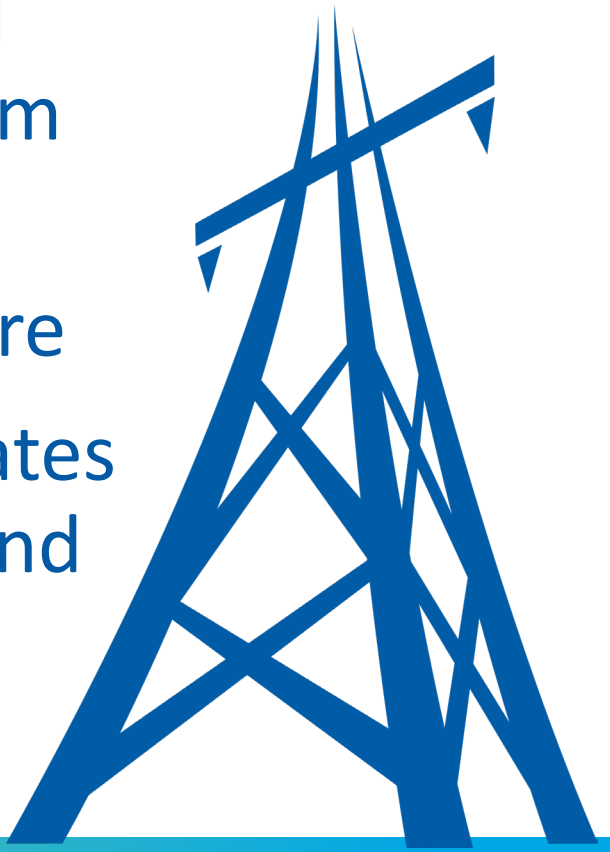
ALTERNATIVE MITIGATION COMPARISONS

	Comparative Metrics	Design Variations Compared	Alternative Mitigations
Screen 2	Total Cost and Cost Benefit Ratio	• 100% Undergrounded • **Alternative Mitigation 1** • **Alternative Mitigation 2**	**Alternative Mitigation 1:** • Aboveground Hardening • Covered Conductor • Protective Equipment and Device Settings **Alternative Mitigation 2:** • At least one different or additional mitigation • Meet or exceed Alt. Mitigation 1
Screen 3	Detailed Risk Analysis	• Project as Scoped • Undergrounding as Scoped • Baseline • **Screen 3 Alternative Mitigations**	**Screen 3 Alternative Mitigations:** • Aboveground Hardening • Covered Conductor • Protective Equipment and Device Settings • Any additional mitigations derived from project scoping and Screen 2 comparison
Screen 4	Total Cost and Cost Benefit Ratio	• Project as Scoped • Undergrounding as Scoped • **Screen 3 Alternative Mitigations**	**Screen 3 Alternative Mitigations:** • Same as above

Focus Area 4:
Consistent Granular Data

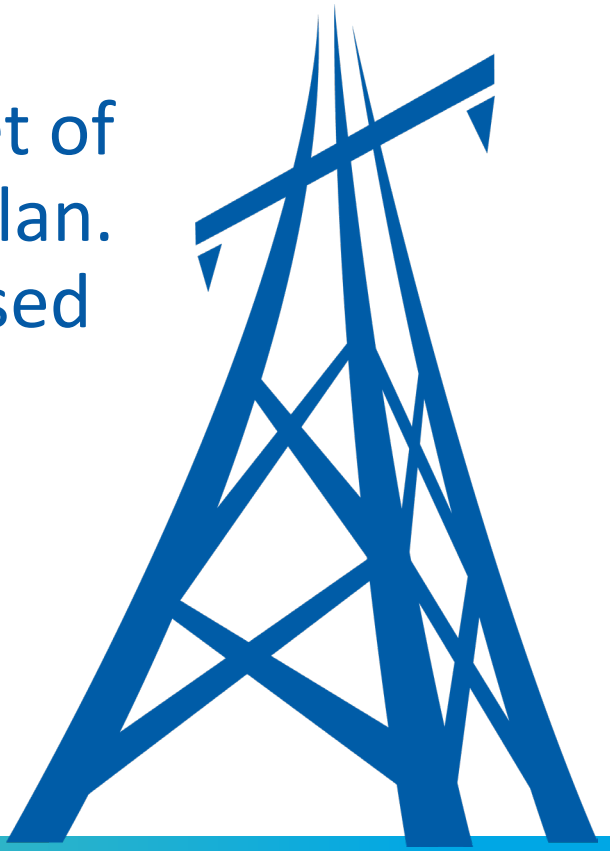
DATA

- Correct and precise data is an essential element of the plan and the tracking of the Large Electrical Corporation's progress over the 10-year program
- Appendix C of the Guidelines outlines the requirements for data organization and structure
- Energy Safety has provided sample data templates to facilitate submission of data that is correct and complete



DATA

- Data is collected via 15 CSV tables, 2 JSON files, and 6 GIS feature classes
- With every 6-month Progress Report, a uniform set of data is collected showing all development of the Plan. Its structure is identical to the initial submission used for evaluation, which is called Progress Report 0
- Data collection primarily takes place at the Circuit Segment or Confirmed Project level, making the available data as granular as possible



DATA OVERVIEW 1/4 – PLAN LEVEL TRACKING

The first dataset compiles summary numbers from the EUP in machine-readable format and tracks progress and evolution (of risk models, etc.) over time.

Table Name	Design
Table 1: Plan Table	Readable source for Project-level Thresholds
Table 2: KDMM Table	Tracking what variables are recorded and their definitions
Table 3: Risk Model Version History Table	Tracking risk models used over time with change notes
Table 4: Portfolio Table	Tracking progress of overall Plan over time
Table 5: Risk Model Backtesting Table	Tracking each Risk Model applied to each Portfolio over time, contains PMO evolution

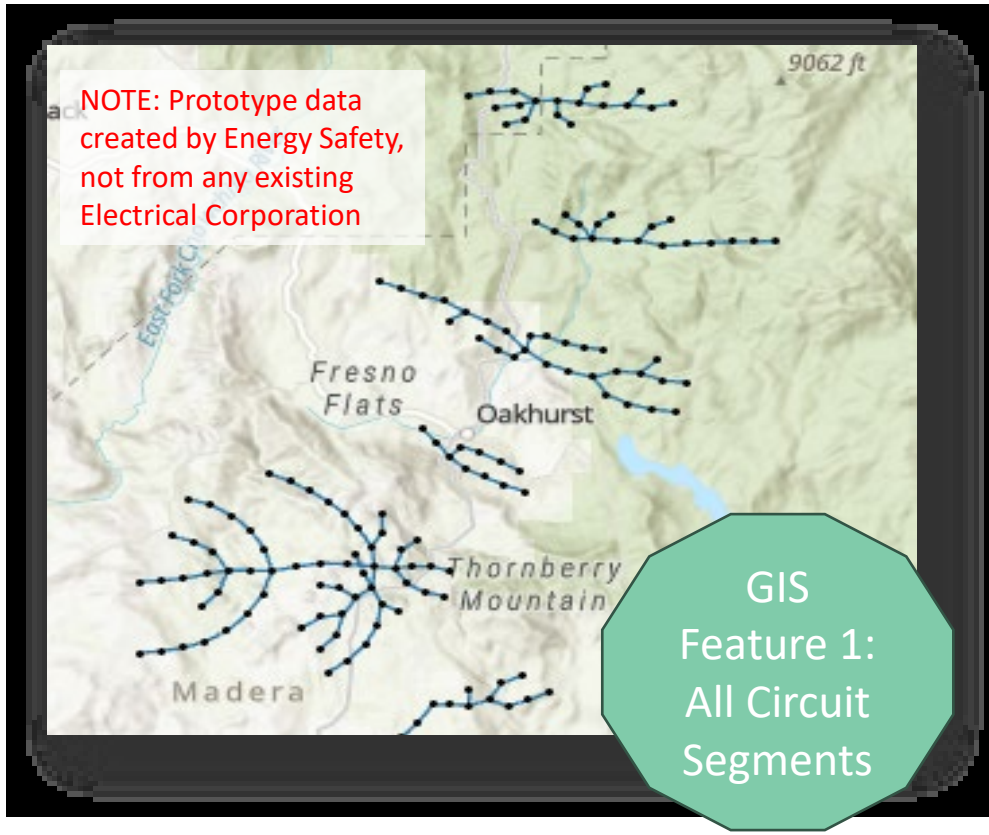
JSON 1: Project Variable Modifiers

- **Stores specifics on risk modeling submodel inputs/outputs**

DATA OVERVIEW 2/4 – CIRCUIT SEGMENT/PROJECT LEVEL TRACKING

The second dataset is at the Circuit Segment/Project level, allowing maximum transparency and granularity matching modeling details, as well as evolution of the system over time

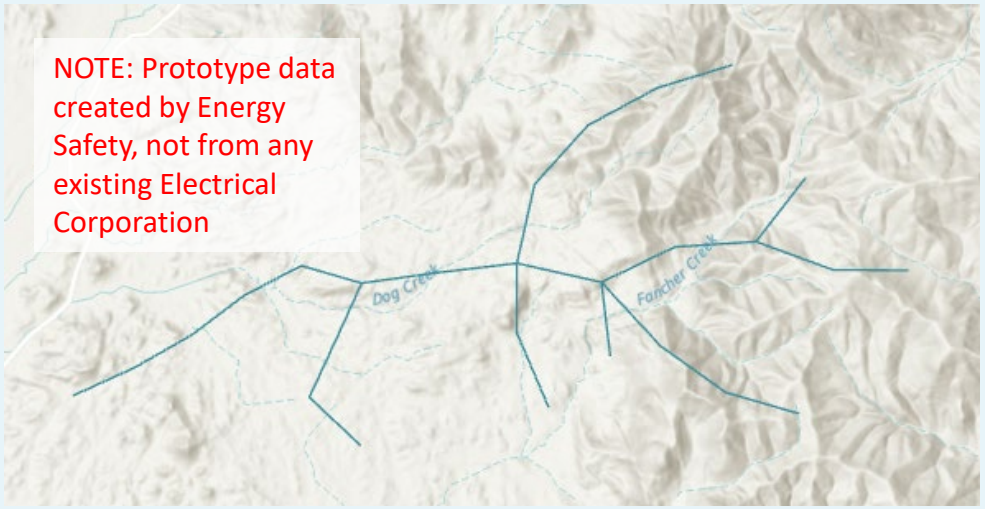
Table Name	Design
Table 6: Circuit Segment Table	List all current Circuit Segments and identifying info
Table 7: Circuit Segment Changelog Table	Track evolution and redefinition of Circuit Segments over time
Table 8: Circuit Segment Risk Score Table	All KDMMs for each Circuit Segment in territory
Table 9: Screen History Table	(Before screen 3) – track all projects passing through any screen
Table 10: Project Table	Define names and identifying info for all Undergrounding Projects
Table 11: Screen 2 Table	CPUC CBR info for all eligible Circuit Segments and alternatives.



CIRCUIT SEGMENT VS. CONFIRMED PROJECT

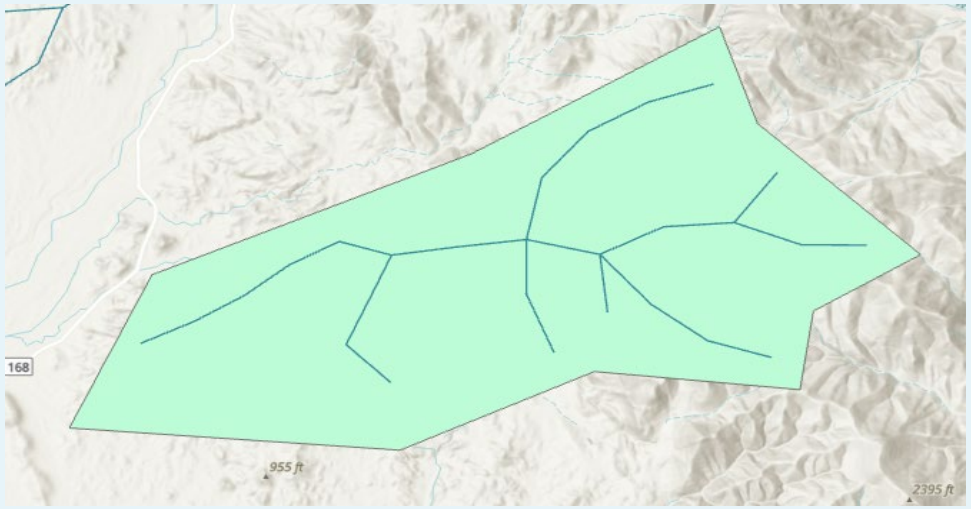
Circuit Segments:

- Basic unit of analysis in screens 1-2.
- May change with operational activity of utility
- Defined as line features within utility service territory which are isolatable



Confirmed Projects:

- Unit of analysis in screens 3-4.
- Fixed boundaries until Project completion, even if Circuit Segment boundaries change
- Defined as Polygon features within utility service territory drawn around a Circuit Segment



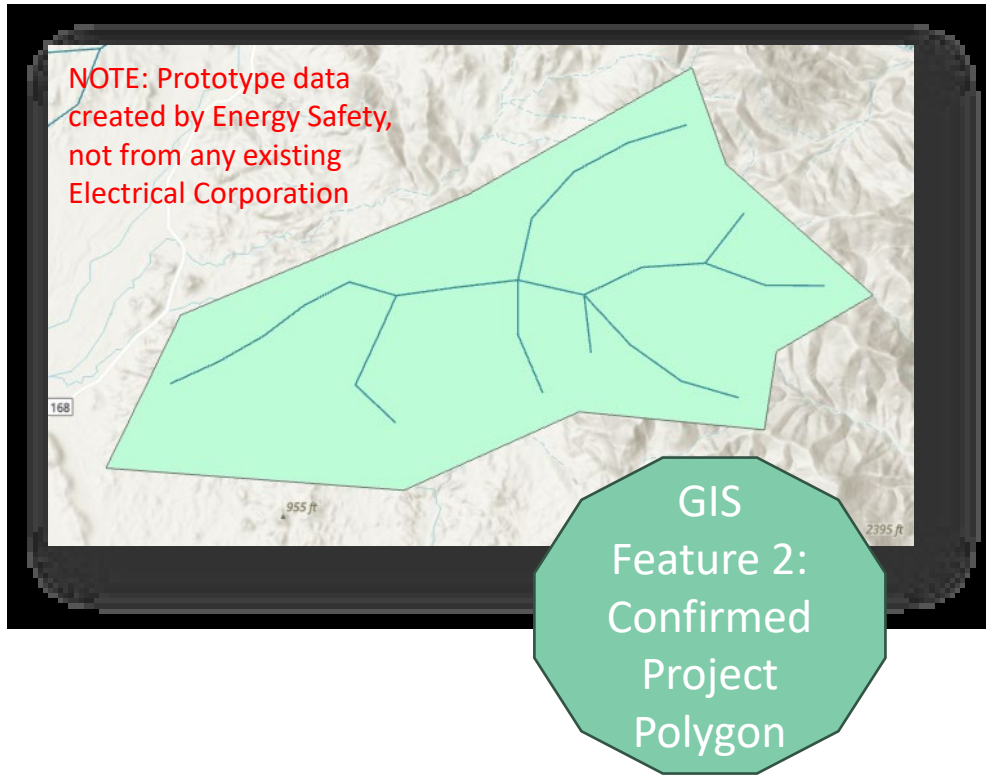
DATA OVERVIEW 3/4 – CONFIRMED PROJECT LEVEL TRACKING

The third dataset is at the Confirmed Project Level, giving details on projects as they are fully scoped while leaving flexibility for the details to change as needed

Table Name	Design
Table 9: Screen History Table	(after screen 3) – track all projects passing through any screen
Table 12: Screen 3 Table	Detailed modeling info of projects and alternatives after scoping
Table 13: Screen 4 Table	Prioritization and re-evaluation of CPUC CBR metrics after scoping

JSON 2: Model Risk Landscape

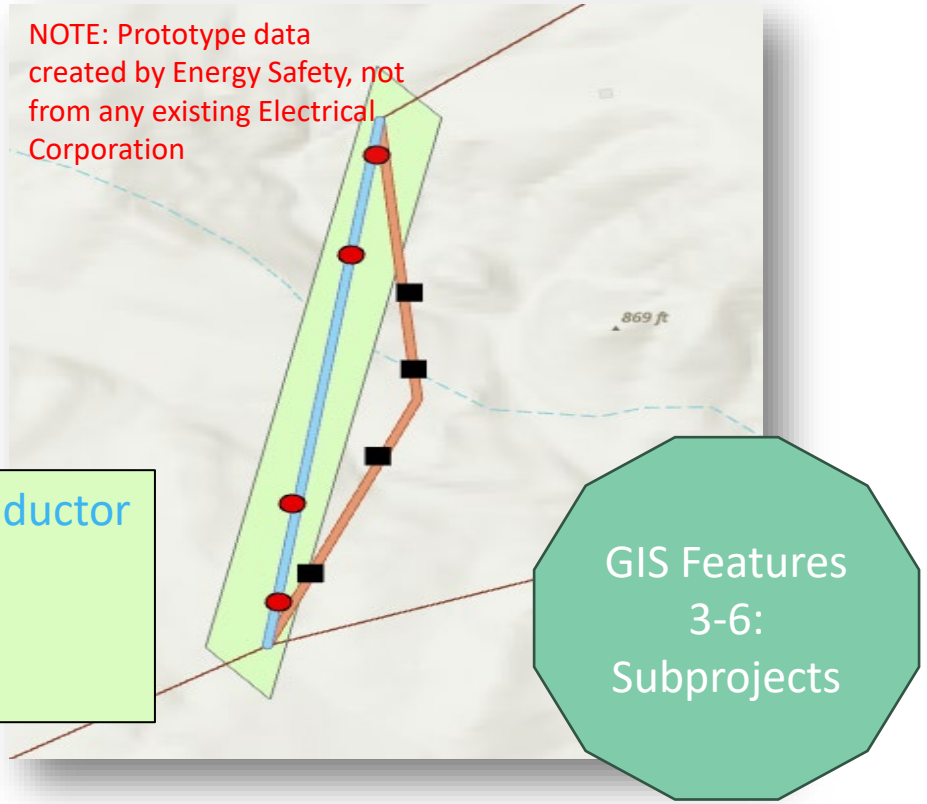
- **Stores details on risk projections and accumulation, and separate, collective, ablation studies**



DATA OVERVIEW 4/4 – SUBPROJECT TRACKING

The fourth and final dataset is even more granular, operating at the subproject level or the individual pieces of construction work. Spatial details are required for the pre- and post-construction line and assets.

Table Name	Design
Table 14: Subproject Table	Track individual subprojects which will be worked on individually, construction status



DATA SUMMARY – PROJECT INDEX TABLE

Final summary table compiles details of comparison process for maximum transparency and stakeholder accessibility

Table Name	Design
Table 15: Project Index Table	Simplified summary table with all projects, risk reductions, CPUC CBRs, and alternative comparisons condensed to one row per project

PUBLIC COMMENT ON GUIDELINES ADOPTION

If you wish to comment:

Press the “Raise Hand” button. Participants will be unmuted in order of hands raised.

Please limit comments to three minutes.

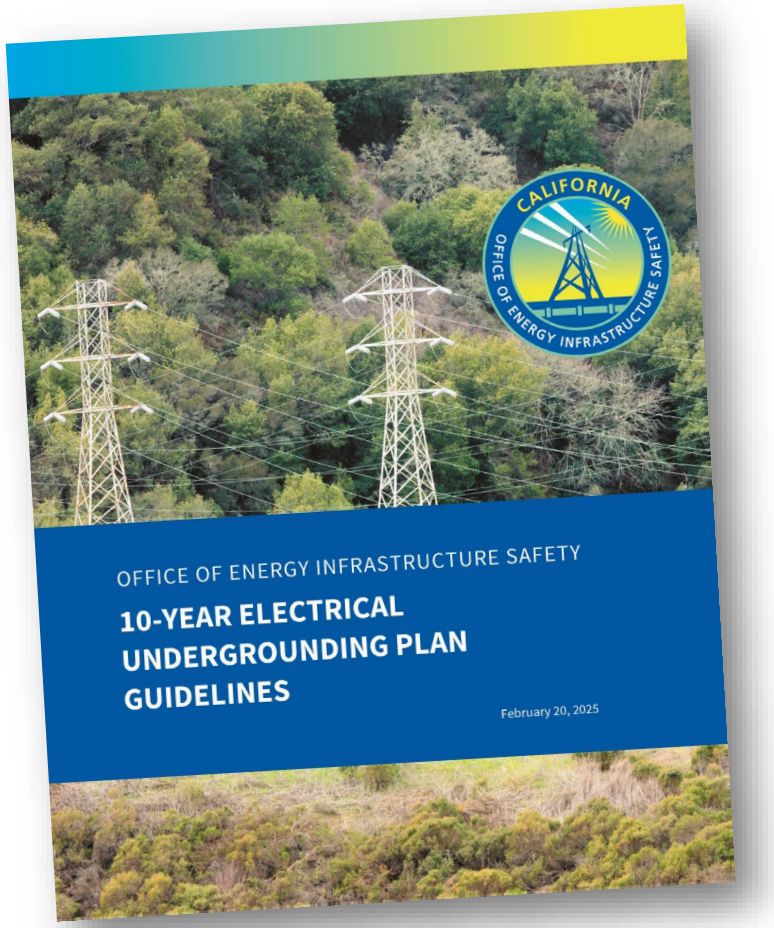
Adoption of the 10-Year Electrical Undergrounding Plan Guidelines

EUP GUIDELINES STAKEHOLDER COMMENTS

Date	Events / Documents	Comments Due
10/25/23	Energy Safety Invites Initial Stakeholder Comments	11/02/23
12/13/23	Energy Safety Invites Stakeholder Comments after November – December 2023 Workshops	Opening Comments – 01/08/24 Reply Comments – 01/18/24
05/08/24	Draft 10-Year Electrical Undergrounding Plan Guidelines	Opening Comments – 05/29/24 Reply Comments – 06/10/24
07/25/24	***Public Workshop on Revised Draft***	08/08/24
09/13/24	Update Revised Draft * 10-Year Electrical Undergrounding Plan Guidelines	Opening Comments – 10/03/24 Reply Comments – 10/04/24
01/06/25	2nd Revised Draft 10-Year Electrical Undergrounding Plan Guidelines	Opening Comments – 01/27/25 Reply Comments – 02/06/25
01/17/25	***Public Workshop on 2nd Revised Draft***	
02/20/25	10-Year Electrical Undergrounding Plan Guidelines	

*09/13/24 Update Revised Draft superseded 09/10/24 version

GUIDELINES ADOPTION



Energy Safety has considered written comments in developing the 10-Year Electrical Undergrounding Plan Guidelines.

The final 10-Year Electrical Undergrounding Plan Guidelines are hereby adopted.

A clean version of the final Guidelines will be published on Energy Safety's website and released on the EUP docket through Energy Safety's E-filing system with service to the associated service list by end of day today, February 20th, 2025.

DATA DRIVEN
FORWARD-THINKING
INNOVATIVE
SAFETY FOCUSED

www.energysafety.ca.gov

OFFICE OF ENERGY INFRASTRUCTURE SAFETY
A California Natural Resources Agency

715 P Street, 20th Floor
Sacramento, CA 95814
916.902.6000