**Stakeholder Comments on the**

**SB 884 OEIS Draft Guidelines (10/16/23)**

**and the CPUC SPD staff proposal (9/13/23)**

Kristin Ralff Douglas

Program Mgr., Electrical Undergrounding

Office of Energy Infrastructure Safety

715 P St., 20th Floor

Sacramento, CA 95814

BY EMAIL

Purpose

I comment here on the staff proposed guidelines from boththe OEIS and the CPUC. I do not reference questions from the workshops and I don’t reference specific items in these two drafts, because I am concerned mostly with an issue that is inadequately treated. I’ll comment mainly on the time period of analysis needed to capture the benefits and costs of undergrounding and otherwise hardening distribution circuits. Then, I’ll touch on Spatial Lumping of projects and Metrics to be used in economic evaluation.

A. Time Period of Analysis

SB 884 requires two quite different types of cost analysis and both agencies fail to provide guidelines for both of these methods.

1. The PU Code sec. 8388.5(c)(4) cost and risk reduction analysis is for “the duration of the plan” which will probably be for 10 years. This seems to be conceived as an engineering analysis, which is not appropriate for the examination of long-term costs from wildfires and other changes to the environment. Using circuit-level and segment-level risk factors derived from models based primarily on long-term estimates of wildfire ignitions attempts to include those long-range impacts, but suffers from narrow focus on this one type of impact. That is the mindset of an engineering analysis. These proposed methods are not appropriate for evaluating long-term impacts, but are appropriate for prioritizing projects by degree of wildfire risk reduction.

2. Sec. 8388.5(c)(6), however, requires a quite different type of analysis of costs and benefits “over the life of the assets,” which will be 40-80 years normally. PG&E runs a lot of equipment older than 50 years. Benefits here are not limited with any definition and so this brief paragraph seems to mean the sort of benefit-cost analysis required by CPUC Decision 22-12-027 which requires a broad analysis of all costs and benefits in all relevant time periods in CPUC proceedings. Many details are omitted in this Decision, but the method is labelled cost-benefit analysis, which is a well-defined method used worldwide. OEIS should also fulfill the (c)(6) requirement in this way. Both agencies should use identical cost-benefit techniques for their (c)(6) evaluations, to make their studies and decisions comparable.

I want to emphasize the (c)(6) analysis, because it is barely mentioned in the agency staff proposals. It requires not only the longer time period, but also, as a benefit-cost analysis will project the probable numbers of wildfires and estimate their costs in future years and then discount all data to the base year in the normal fashion for this type of analysis. This is different than the (c)(4) cost analysis that will use circuit-based risk coefficients derived from the utility’s wildfire risk model, itself estimated from such data but possibly inaccurately. Benefit-cost analysis uses these same predicted events that the risk model is estimated on, but directly in a fashion the reader can follow. This is a much-more transparent method and so easier to verify and easier for the pubic to understand. And it moves the utilities toward the D.22-12-027 process now required at the CPUC. This benefit-cost analysis method is appropriate for determining if the Plan is cost-effective overall and for determining if Alternatives are more cost-effective than the proposed projects, at the project level and at the plan level.

Benefit-cost analysis literature and Federal agency manuals agree that you look at all costs and all benefits for as long as they occur. Market and non-market costs and benefits of all changes in goods and services must be included. Services includes enjoyment of nature and other hard-to-quantify qualitative experiences. Beyond about 50 years, results are usually not affected by using a longer time period, due to discounting, but that should be tested. Also, discounting doesn’t apply logically to lives lost, damage to forests, and other changes and so some sort of totaling over longer time periods is helpful here.

Decision 22-12-027 does not address time period of analysis, but requires the use of the LBL ICE calculation tool (on a web site). The ICE tool caps some inputs at 40 years, implying that the analysis should be likewise capped there. Capping a wildfire risk analysis at 40 years, however, stops the counting of future wildfire starts while undergrounding is still likely being done. The use of a 50-year period would be better.

The staff proposals almost entirely discuss the (c)(4) process. This analysis is limited to the “duration of the plan”, which will be 10 yrs or less. This short-term engineering analysis is adequate for the (c)(4) project cost analysis only if the (c)(6) analysis is also done. The largest cost affected by undergrounding and alternatives like insulating distribution lines (“covered conductor”) will be the number of wildfire ignitions in the utility’s territory caused by utility equipment. For example, in PG&E’s territory, there has been a large wildfire every 2-5 years in the last 15 years, usually caused by their ancient and under-maintained equipment. Also, their outdated circuit breaker technology which cannot locate a line break or other equipment failure. These large wildfires have costs in the $10-30 billion range each and so will dwarf all other costs in the (c)(6) analyses. Some of the wildfire costs are not paid by the utilities, but they are still costs in a public benefit-cost analysis.

Here are illustrative calculations. One would expect large differences in future wildfire costs between (1) undergrounding, (2) insulation, and (3) networked computerized breaker systems. Undergrounding has a potential effectiveness of 100%, triple insulation around 70%, and networked breaker systems 50-70% by themselves and 100% when combined with insulated lines (data from WMPs, the Joint Utility CC Studies, and the PG&E GRC of 11/16/23). Triple insulation has been tested at SCE in the last few years and found to be 100% effective on the treated circuits, but a lower number is reasonable in the long term. Computerized networked breaker systems are being tested by SCE and by PG&E, but several systems are available and so conclusions regarding costs and effectiveness are a few years off. Some of these breaker systems are in widespread use in Europe.

Whereas their effectiveness seems high or very high, the time periods required to complete these short-circuit mitigation systems are very different. Insulation (Covered Conductor: CC) could be completed for all high fire-hazard areas by any utility in a few years (8-10) and is relatively inexpensive, looking at the SCE cost and completion data in their WMPs. CC can be done during pole replacement, which is otherwise required. Breaker system costs are uncertain, due to low uptake in Calif. and unclear supplies, but are likely to take about 10 years and are relatively inexpensive. This technology needs further testing. Undergrounding, however, is slow due to surface geology issues (rocks), steep slopes, negotiating the ROWs that are needed in most places, and potential lawsuits. ROWs will often be needed beyond existing road ROWs and this necessitates the acquisition of new property rights. Steep terrain also requires the trenching to zig-zag back and forth to make the grade. This increases the line-miles but also requires new ROW and tree removal. So, undergrounding is expensive, about 4X to 7X what insulation costs per line-mile, plus more for the added line-miles (often 50% more). The CEO of PG&E estimated that it would take 50-100 years, as quoted last May in the SF Chronicle, to underground the 10,000 miles then being touted. Another 10,000-15,000 line-miles will be needed, in order to include all lines in high fire-hazard districts. This is a difficult and expensive proposition, coming from a utility with a huge backlog of incomplete repair orders. The completion of Alternatives on time is therefore very important, in order to minimize costs. The much-longer time periods necessary for undergrounding must be property accounted for.

I provide illustrative calculations on Risk-Reduction-Years, as a generic metric, in the Appendix. I’m not using official metrics found in the guidelines, but just using a basic risk concept to illustrate the importance of time required for completion of all mitigation in high- fire-hazard areas. We cannot limit this analysis to 10 years as the Sec. (c)(4) analysis does, because that would prevent us from evaluating the impacts of various mitigation technologies on wildfires started by the utility, over the lifetime of the equipment. This is by far the largest cost of slow mitigation plans, more wildfires. So, let us then use a 50-year time period, to cover the lifetime of the assets, as required by AB 884 in Sec. (c)(6) the long-term cost comparison mandate.

I use a graphical analysis with a table to make it easy to check my numbers. I assume straight lines for project completion, meaning constant added line-miles per year. This allows me to use simple arithmetic, also. I give all assumptions and calculations in the table. If a utility can complete insulation in 10 years at 70% effectiveness, they reduce future wildfires by an average of 35% for years 1-10 and then after that by an average of 70% for years 11-50. If they add modern networked breaker systems in a second phase in years 11-20, risk is further reduced by an average of 15% for years 11-20 and then by 30% more from year 21 on. So, wildfires are eliminated (by 100%) in years 21-50. If they underground and it takes 50 years to complete all the lines in high fire-hazard areas, we get an average risk reduction of 50% for years 1-50. See the Table at the end.

Risk-Reduction-Years (All Totals for 50 Years)(Larger Values Mean Less Risk)

Please see the Table in the Appendix for a graphical analysis with tabular data for 5 time periods.

**Undergrounding: 25.0**

**CC : 31.5**

**CC plus Breakers: 42.5**

I conclude that Undergrounding has the lowest wildfire risk reduction years, due to its slow implementation. Insulation (Covered Conductor) is superior, due to rapid completion, even though it is less effective per year when completed. CC is from 1/3rd to 1/6th the cost per line-mile as is UG, however, and so facially is a superior method in terms of the cost/effectiveness balancing required at the CPUC. Better, CC can be followed by other phase 2 mitigation improvements. Installing modern electronic networked circuit breakers will also be less expensive than UG per line-mile.

A second conclusion is that following up CC with computerized breakers seems to be a robust Alternative. This is because the projections on which the first phase relies are quite certain. Utilities have adequate experience with CC to accurately project cost and time requirements. The 10 years assumed for phase 1 allow the utility to test networked breaker systems and choose one for implementation in phase 2. The two sets of guidelines encourage the utilities to identify projects that combine two or more mitigation methods. That would be good practice.

A third important take-away is that if a utility states that it can complete the undergrounding of all circuit miles in high fire-hazard areas in a certain time, that completion time must be guaranteed or not used. The only way that agencies can prevent gaming the calculations by a utility would be to require it to refund monies they were allowed to raise from customers, if it is later found that it did not complete their plan on time. Easier perhaps would be to simply disallow plan costs that extend beyond the date originally set for plan completion.

We need to include all costs and so the comparison must run out to the last year for the slowest alternative to mitigate all line-miles. This is the only way to count project effects on the frequency of large wildfires completely. I believe that the Sec. (c)(6) analysis requires this long-term benefit/cost method. It does not require a second project-level (10-yr) analysis. It calls for a comprehensive cost analysis. Benefit/cost analysis is the only method available for such comparisons.

For long-range impacts, the (c)(6) cost-benefit analysis for 50 years (or more) generally will be a crucial check on the short-term (c)(4) 10-year analysis based on risk modeling. The cost-benefit approach uses the utility data on projected wildfires more directly and so is easier to understand and verify against past wildfire frequencies. Both agencies should require that both types of analysis be done. The long-term analysis, however, will be more complete and more accurate.

B. Spatial Lumping of Projects

The OEIS draft guidelines recommend that planned projects and Alternative projects be lumped together so as to be adjacent. This constraint is not needed and will often require the inclusion of lower-risk circuits or segments and so reduce Plan risk reduction effectiveness, for any given number of circuits (projects). This lumping recommendation will also reduce the number of highest-priority projects that can be completed in the first 10 years, for any given number of circuits.

C. Metrics

In the comments submitted to the CPUC on their SPD Staff Proposal (9/13/23) and to OEIS on their SB 884 Guidelines (10/16/23) some experts would like OEIS to also evaluate costs using the RSE and B/C metrics, to fully evaluate project prioritization.  Doing this would also make the review procedures for SB 884 UG Plans, WMP updates, and GRC proposals more similar in critical ways and therefore easier to follow for interest groups and citizens.  This is a good idea, as it will improve methods and make it easier for interest groups and citizens to participate. This process will also focus agency attention on the (c)(6) long-term analysis, where the most-important impacts will be revealed directly, not buried in project risk coefficients, which are hard to understand.

Thank you for considering these comments.

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My Qualifications

I taught and did research on environmental planning issues at UC Davis, 1971-2005. Since then, I have been a local planning commissioner and a State conservancy board member. I have also done applied research for community groups. I have been an expert in federal NEPA lawsuits on urban growth impacts. I have been a consultant to many local, regional, state, and federal agencies and NGOs.

Some of my UCDavis research was funded by the Energy Commission, Caltrans, and other State agencies to perform statewide economic modeling, regional transportation modeling, build GIS modeling systems for specific programs, regional urban growth models, and various other kinds of public policy evaluation tools. My work included improving multi-objective evaluation methods used in water resources decision-making. I published research papers on benefit-cost methods, environmental assessment tools, and environmental justice. I helped the USEPA write the metro transport planning rule under the Clean Air Act.

In general, I advocate the use of public policy evaluation methods, which include benefit-cost analysis, focus on long-range and large impacts, include qualitative impacts, and pay attention to equity effects on different income groups.

Robert A. Johnston, Professor Emeritus

University of California, Davis

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rajohnston@ucdavis.edu

415 663-8305

**Appendix:** **Illustrative Calculations: Wildfire Risk Reduction (As a Fraction for Any Year)**

**and Wildfire Risk Reduction-Years (Areas Under the Curves), 2025-2075**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Technology** | **2025-34** | **2035-44** | **2045-54** | **2055-2064** | **2064-2075** |
| **1.Underground** | *0.1* 0.2  0 X | *0.3* 0.4  X | *0.5*  X 0.6 | X 0.8  *0.7* | X 1.0  *0.9* |
| **2.Insulation** | 0.7  X  0 *0.35* | X |  |  | 0.7 |
| **3.Insulation &**  **Fast Breakers** | 0.7  X  0 *0.35* | 1.0  X  0.85 |  |  | 1.0 |
| **4.Other** |  |  |  |  |  |
| **5.Other** |  |  |  |  |  |
| **WRR-Years per 5-Yr Period** | 1: 1.0  2: 3.5  3: 3.5  4  5 | 3.0  7.0  9.0 | 5.0  7.0  10.0 | 7.0  7.0  10.0 | 9.0  7.0  10.0 |
| **WRR-Years Cumulatively** | 1: 1.0  2: 3.5  3: 3.5  4  5 | 4.0  10.5  12.5 | 9.0  17.5  22.5 | 16.0  24.5  32.5 | **25.0 UG**  **31.5 Insulation**  **42.5 Insul/Breakrs** |
| **Comments** | Any point on a curve is the WRR fraction for that year.  We do these calculations by time period, to allow easy checking of the numbers. | Straight lines assume linear completion of each technology (in line-miles per year).  WWR fractions for the last year of a period are next to the right side of that box. | The areas under the curves are the WRR-Years. They can be calculated using geometry and straight lines. **Higher values denote less risk.** | For each 10-yr. period, multiply the mean WRR by 10 to get WRR-Years.  Mean values for time periods are at X’s and in italics. | All technologies are evaluated for the same time period. 50 years is needed, to include the lifetime of most assets and to capture wildfire starts, the largest cost. |

It is necessary to perform a B/C analysis for the SB 884 Undergrounding Plans, because they will actually take 50 years or longer to implement. Applying project-level methods, such as wildfire risk coefficients for line segments is inadvisable, due to the inherent inaccuracies of large-area wildfire statistics scaled down to small areas. Also, PG&E’s wildfire risk model is strongly biased against large wildfires due to the 8-hr. limit to the fire spread model, no basis on ignition causation data, the inadequate inclusion of wind speed, and other basic weaknesses. The advantage of B/C analysis is that it uses available data on large wildfires caused by utilities and applies it to the whole high-fire-hazard region. This preserves the most-important data, because the costs of wildfires are by far the largest cost of not mitigating equipment hazards. It is also the cost that varies absolutely the most among alternative mitigation methods. It doesn’t matter if the analysis uses utility-wide fire data, since risk projections for small areas are too inaccurate to use.