

PG&E Has Not Sufficiently Prioritized Its EVM Work Based on Risk: This Is Due to Using a Completely Inadequate Wildfire Risk Model

The PUC should not allow PG&E to exit Step 1 of its Enhanced Oversight Process.

The PG&E wildfire risk reduction process used in their EVM Program has not been successful in the past and will not succeed in the future due to several basic flaws pertaining to its inadequate Wildfire Risk Model, the key component.

1. Useless Risk Models. PG&E has developed and used three different wildfire risk models in the past few years in their EVM process. These critical models are apparently based on very different theories, as the results from them are incompatible. For example, comparing the circuit zone risk rankings from model v. 2 (2020) with those from model v. 3 (2021) show nearly random changes, that is the circuit zone rankings change so drastically that the new rank order is random when compared to the old one. This tells a statistician that one or both of the models are incompletely specified or are based on poor theory. OEIS has suggested in the past that PG&E study the models in use by the other large IOUs, SCE and SDG&E, in order to benchmark (compare) their model to ones that seem to work well.

In the draft PUC Resolution M-4864, PG&E is cited as saying that their 2020 Risk Value Overlay model “did not exclusively focus on wildfire risk as the basis for determining where EVM work was to be performed in 2020.” (p.9, at fn 13). For their 2021-22 work, being evaluated here, PG&E used their Tree-Weighted Prioritization List “in conjunction with its Wildfire Distribution Risk Model (pp. 9-10). PG&E did not perform a comparison of the zone rankings before and after applying the new model in the 2021 EVM work (p. 10). It is a simplistic model, based on wildfire probability and tree density. The fundamental mistake here is the hidden model design assumption that “trees cause fires”, when in fact “power equipment causes fires.” PG&E continues to divert attention away from their old and obsolete equipment. Last, I note that PG&E intends to modify their wildfire distribution risk model again (p. 14) and so the approved Corrective Action Plan will then be obsolete, as it is based on the 2021 model and its zone rankings.

2. Outside Review of Model.

Valuable expert and independent insights may be gained from reading the E3 Review of PG&E’s 2021 Wildfire Risk Model (found in a footnote in the present Resolution). E3 is a major energy engineering and economics consultant located in San Francisco that has completed many major studies for the PUC and other California agencies. The April 27, 2021 report found that:

1. PG&E has several groups developing separate models (E3 PowerPoint on company web site, p. 8). I found that this is a very bad approach in my research projects designing and implementing similar models at UC Davis 1990-2010, including non-spatial and spatial (GIS) models. It is very important to use one team to design all models that feed into one another, to avoid theoretical inconsistencies, missing functionality, and dataset mismatches.
2. PG&E did not compare the ranking results from their 2020 and 2021 models (p. 9). This is standard validation practice in all modeling and shows a weak effort at PG&E.
3. E3 stated that there was not enough evidence to evaluate the 2020 model. Again, this means that PG&E had not done basic validation studies, an essential part of model testing. The PUC cannot consider PG&E's efforts to prioritize EVM work zones as complete when the model it is based on fails to document its validity. After all, the purpose of the modeling is to correctly prioritize the riskiest zones.
4. PG&E's method of predicting wildfire ignitions directly from vegetation type and overhead conductor characteristics and not from the condition of other equipment prevents them from evaluating all types of equipment failure. (p. 13). About a third of ignitions are caused by equipment other than overhead conductors. As E3 states, this model's results then "are less directly tied to mitigation measures" (p. 16). In other words, this model cannot predict failures in non-conductor equipment that ignites fires, such as the C-hook that started the Camp Fire!
5. PG&E did not record "non-reportable" ignitions (charring, no flames) until 2018 (p. 19). That means they lack important data for estimating their model, since in a higher wind some of the charring events could have become fires.
6. Apparently, PG&E's model does not include wind speed projections as predictive variables, which is unusual (p. 21). The consultants find this difficult to justify and recommend that the PG&E engineers stop talking about this in meetings. (You don't see this kind of recommendation in model reviews very often.)
7. The purpose of the model is unclear in the poor documentation provided (p. 35). As a long-time model developer I must say that the lack of a clear set of objectives normally dooms any modeling effort to be slow and useless. This is a rather incredible level of incompetence.
8. PG&E did not perform an uncertainty analysis of their model's predictions (p. 32). Again, this is a basic method for testing a model to see if it is abnormally sensitive to certain inputs. If it is, you search for more explanatory theories and more data.
9. Inadequate data exploration of maps (p. 27). Normally, you explore maps of ignitions and of equipment failures to develop working hypotheses about what causes wildfires. Not doing this is again a very basic mistake.

10. The model gives “simplistic” fire consequence ratings (p. 22). There are only three categories for degree of consequences. Limiting final outputs to so few categories often indicates that a model proves to be inaccurate when validating it with more categories. This limitation may be due to the many mistakes in model design noted above.

[I have suggested a broader improvement to the whole WMP process elsewhere (comments on the pending WMP guidelines at OEIS), which is to put a State agency in charge of the risk models, weather models, vegetation mapping, and all related data used by all utilities in their WMPs. This would bring more expertise to the problem, produce consistent statewide datasets and maps useful to the utilities but also other agencies, reduce utilities “gaming” the system, allow cross-sectional comparisons across utilities’ risk maps, and allow longitudinal comparisons (through time) of any one utility’s risk maps. The data and models would be much more useful than the individual unique utility models are.]

3. Poor Focusing of Veg. Mgmt. Efforts. As discussed in several agency reports and PUC documents, PG&E has not focused their veg. mgmt. efforts onto their higher-ranked (riskiest) circuit areas. Using the most-recent two risk models to produce circuit area risk rankings did little good in terms of leading to a rapid reduction of overall risk from distribution conductors, because PG&E never followed their own rankings. This was possibly done to increase their mileage of lines completed each year.

4. Slow Performance. PG&E also never has come even close to meeting their objectives for line-miles of circuits treated per year with the veg. mgmt. program (1/1/21-6/30/22). They have given several excuses for this slow performance, but the other large IOUs seem to have done much better, when facing the same market for tree contractors and the same management problems.

5. Countervailing Side Effects. PG&E recently changed their policy and now leaves trunk sections, large slash, and chips on the site of the tree felling even if the owner requests full removal. Slash and chips are recognized by CalFire, the State Fire Marshall, and UC Extension as increasing wildfire risk due to their flammability. Slash pieces can even become burning embers during windstorms and so ignite other vegetation downwind. Furthermore, leaving trunks and slash behind puts many landowners in the position of then being in violation of the Defensible Space requirements.

6. Violating State Law. For three years, PG&E has generally not met the requirements in the statutes (Public Resources Code) to notify landowners before removing trees and giving owners an opportunity to be heard, that is, some reasonable form of appeal. Many newspaper articles in the last two years quote owners who were not notified or given any sort of appeal process. Policy at the PG&E regional level has been inconsistent. Policy on the ground, with county-level veg. managers has been inconsistent too, county-to-county and through time.

7. Vegetation Management Program Is Not Effective. The data in the 2021 (final) and 2022 (draft) WMPs show that PG&E's veg. mgmt. program has not reduced wildfire ignitions substantially. In contrast, the SCE and SDG&E evaluations show large percentage drops in ignitions because they understand that "trees don't start fires, equipment does." As a result, they have spent their funds on insulating existing distribution lines in high-risk areas and adding computerized circuit breakers to those circuits. These two actions almost completely eliminate sparking and hot metal from short circuits. They shut off the circuit before the line can hit the ground. These are not reclosers as used in the PSPS program, but newer equipment that reads radio signals in lines to detect perturbations.

I have calculated that the funds required to underground 10,000 miles of lines, which PG&E has committed to doing, is sufficient to insulate all 33,000 miles of lines in their Tier 2 and 3 areas and to install most or all of the necessary rapid-action circuit breakers. That is because insulating lines costs about 1/7th of what undergrounding does, per mile. Undergrounding works, but is too expensive.

I urge the PUC to not permit PG&E to exit Step 1 of the Enhanced Oversight Process. Their main risk model is too inaccurate to properly prioritize their EVM work.

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