Comments Submitted: March 6, 2026

Technosylva Response to
OFFICE OF ENERGY INFRASTRUCTURE SAFETY (OEIS): WILDFIRE SAFETY ADVISORY BOARD (WSAB)
STAFF DRAFT: CONSIDERATION OF EXTREMES IN UTILITY RISK MODELS
FEBRUARY 2026

1. Section 4. Model Uncertainties Under Extreme Conditions

"The wildfire spread models most commonly used by utilities rely on equations developed using lower wind-speed laboratory data and do not capture ember-driven fire spread."

a. ***Inability to accurately model extreme wind speeds:*** *The wildfire spread models used by utilities rely on the Rothermel equations, which were developed using laboratory data with wind speeds below 12 mph (equating to roughly 30 mph in real-world field conditions). When facing extreme winds, such as the 100 mph gusts in the Los Angeles Fires, the models become less reliable and produce "severely elongated elliptical shapes due to the high eccentricity".*
b. ***Neglecting "ember casting":*** *The current spread models fail to account for embers being carried over large distances by high winds. Ember casting significantly alters the dynamics of fire spread and was a primary driver of the chaotic and destructive nature of the Los Angeles Fires.*

Technosylva Response:

Technosylva has evaluated 5,000+ fires and published findings in a 2023 paper (Cardil et al., 2023) [1] documenting model improvements for performance under extreme conditions.

Wind-driven fires are particularly well captured by our models; convective and fuel-driven fires are the most challenging to evaluate and widely recognized as such. Utility-related fires are typically wind-driven.

[1] Cardil A,m et all , 2023 Performance of operational fire spread models in California https://connectsci.au/wf/article/32/11/1492%20/86714/Performance-of-operational-fire-spread-models-in)

Models are continuously improved with each version release as additional data for validation becomes available. Notably, the 2026 release will introduce an urban model characterizing the rate of spread and fire encroachment distance into developed areas, as well as the potential for urban conflagration — rapid fire spread through densely populated areas, as seen in the Los Angeles Fires. Additional improvements model and quantify the probability of building loss in case a fire reaches the building. This is based on historical damage inspection data, weather conditions and geographical characteristics. Unlike standard models, Technosylva's Urban Conflagration and Dynamic Building Loss Factor (dBLF) models explicitly account for ember risk by using wind speed, dead fuel moisture, and canopy height as statistical proxies for ember generation, transport, and ignition — enabling building loss probability calculations without tracking individual ember trajectories.

2. Section 5.2 Planning Models: Historical Data Do Not Include All Realistic Extremes & Section 5.3 Planning Models: Relative and Absolute Risk Values

"Current deterministic wildfire spread models fail to accurately capture extreme, rare "tail risk" events"

1. **Section 5.2: Blind spots in historical data:** By relying on historical weather and fuel inputs, planning models are unable to scale individual variables independently. Relying strictly on a limited historical period fails to capture the full range of potential "tail risk" events, unobserved realistic extremes, and conditions altered by future climate change.
2. **Section 5.3: Poor correlation with real-world destruction:** Utilities have noted that wildfire spread models demonstrate a "poor correlation" between their results and real-world observations of actual structures destroyed. Even when utilizing updated fuel models, there is an average mean absolute percentage error of 37%.

Technosylva Response

This characterization does not apply to the Technosylva platform. Our system includes Monte Carlo simulations based on the selection of extreme weather days to capture extreme consequences, and probabilistic modeling for individual simulations to capture uncertainty in ongoing incidents (Ramirez et al, 2011)[2] . Neither approach is deterministic.

Also, the average mean value is considered poor, which is incorrect. As Cruz and Alexander (2013)[3] propose, *"A case is made for suggesting that a 35% error interval (i.e. approximately one standard deviation) would constitute a reasonable standard for model performance in predicting a wildland fire's forward or heading rate of spread."*

---

[2] Ramirez et al, 2021 New approaches in fire simulations analysis with Wildfire Analysthttps://www.researchgate.net/publication/272819948_New_approaches_in_fire_simulations_analysis_with_Wildfire_Analyst

[3] Cruz et Alexander, 2013. Uncertainty associated with model predictions of surface and crown f ire rates of spread. https://nrfirescience.org/sites/default/files/2023-07/09-S-03-1_CruzAlexander_2013_EMS_UncerModeledROS.pdf

The Technosylva platform has improved with constant evolution to achieve unprecedented accuracy for wildfire simulations that derive into wildfire risk. Our simulations were evaluated yearly using actual fire observations supported by data from CAL FIRE, right now with close to 10,000 wildfires , raising our accuracy to an average mean error of 25% for observed vs. predicted Rate of Spread, the usual metric to assess fire behavior modeling. It is the only platform that performs constant validations that can be provided under confidentiality conditions. Our risk metrics have been operationally validated also in the 2025 paper[4] by Cardil et al .

That said, there are recognized limitations worth noting. While our consequence models, and most notably updates with the Urban Conflagration (UC) models, deal with extreme, rare events to address Wildland Urban Interface (WUI) risk, simulations are currently focused on 8 or 24-hour spread windows and historical weather. Integrating Technosylva modeling with modeling focused specifically on tail risk and accounting for full burn duration would address this gap. For example, this could include the incorporation of models leveraged by KatRisk or Moody's RMS. Given the data limitations in select Fire Climate Zones (FCZs) and the fact that FCZs are not completely independent and follow the same general physical wildfire behavior, it is our recommendation to use a hierarchical modeling approach, preferably within the Bayesian framework.

[4] Cardil et al, 2025 Assessing the suppression difficulty of wildland fires for initial attack response. https://www.scopus.com/pages/publications/105024824784?origin=resultslist&source=sd-apx