In accordance with the OEIS Wildfire Risk Modeling Working Group Workplan Guidelines, Liberty provides the follow information concerning its Wildfire Risk Modeling.

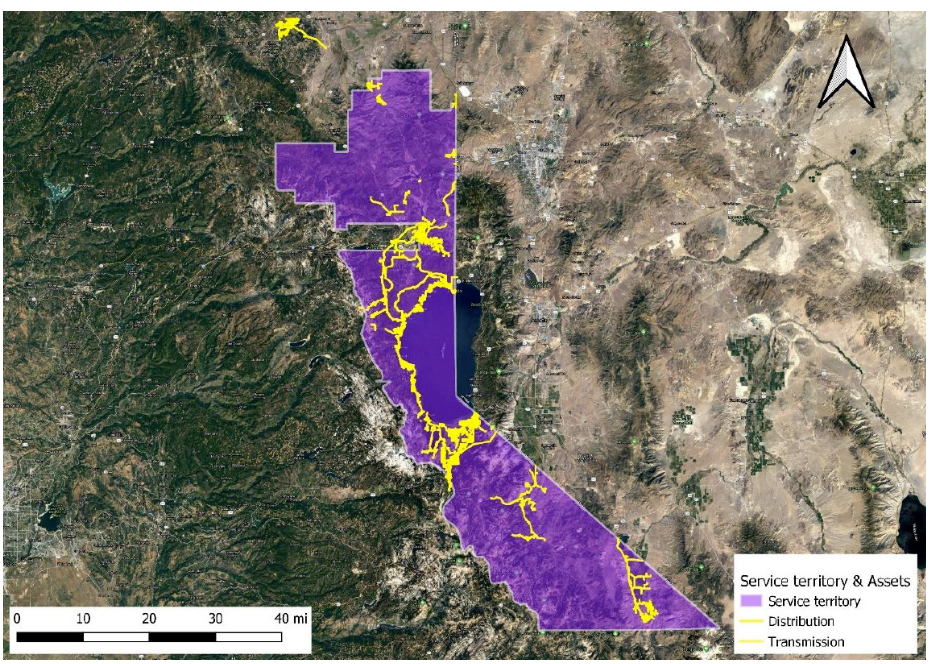
I. Data used, broken down by model

Liberty uses various data sources in its wildfire risk analysis. The Reax analysis and fire risk and consequence modeling efforts were used to formalize a targeted approach to assess and prioritize wildfire mitigation efforts. In addition, risk drivers such as risky trees, risky poles, and forced outages and their ignition-related events (sparking, smoldering, melting, arcing, burning, etc.) were used to assess wildfire risk. The results of the risk models provide an understanding of wildfire risk to help determine appropriate mitigation efforts.

Reax Engineering's fire spread propagation model informed an overall wildfire risk map of Liberty's service territory. The Reax model simulated the fire spread impact of hundreds of thousands of ignitions along Liberty's overhead lines using historical weather data, layering terrain and topography maps, fire suppression factors, and population/structure density data to analyze and group areas of concern. Polygons were created based on the wildfire risk results and were assigned a Reax wildfire risk rating of low, moderate, high, or very high.

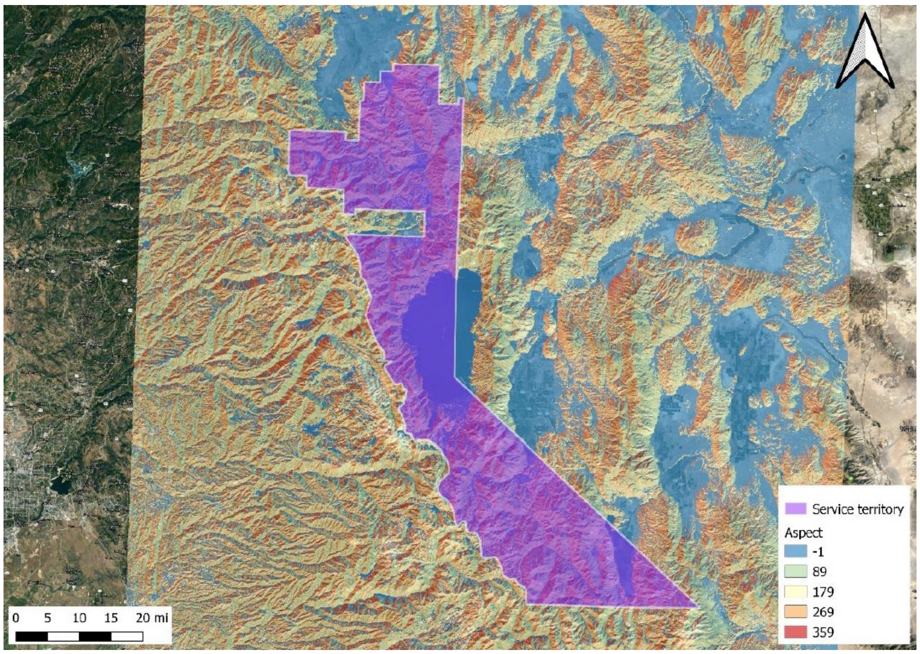
A. Scale and geographical context

Fire spread and risk modeling was performed for Liberty's entire service territory. Based on the resolution of various data used for the modeling, 30-meter resolution was used and overlaid with Liberty's GIS maps.



B. Topography

A topography layer covering Liberty's service territory was obtained from the LANDFIRE 2016 (LANDFIRE 2.0.0) database at a 30-meter resolution. The topography layer is a Digital Elevation Model (DEM) from which other pertinent features can be calculated using GIS. Other data from the LANDFIRE 2016 database, such as fuel and timber layers, were also used for model input. The figure below shows an example of the aspect attribute layer from LANDFIRE.



C. Quality of historical outage, fault, and ignition data

Liberty used six years of outage, fault, and ignition data (2015 – 2020) collected from its Responder Outage Management System (OMS) to categorize wildfire risk drivers. This data range was determined to have sufficient quality and quantity for risk modeling. The quality of the data used improves each year. Training dispatch crews and customer service personnel on how to properly classify outage events and increased monitoring of data collection helps to improve data quality. In early 2021, additional enhancements were completed on the Responder OMS data collection screens to improve the quality of data collected. An opportunity for improvement with data collection is updating how dispatchers input the cause data field. It can sometimes be difficult to adequately record the cause to avoid recording a cause of "other."

D. Usage of outage and fault events to augment ignition data

Liberty has limited ignition data. Therefore, forced outage data has been used as a proxy for potential ignition events while understanding that actual ignition events occur during a small percentage of the forced outage events.

Frequency of Wildfire Risk Drivers:
Liberty's outage history, tracked in its outage management system, forms the basis of tracking forced outages on its distribution system. Within the tracking of these incidents, a cause, location, time, feeder, and other incident characteristics are in the archived reports for analysis. By observing these reported incidents in the archived historical outages, Liberty can develop a database of number of incidents by type, location, feeder, customer minutes interrupted ("CMI"), asset, and other identifiers. These elements form the basis of targeting types of issues that contribute to the probability of an ignition event or constitute the population of wildfire risk-drivers for utility wildfire risk. By incorporating the data into the Liberty wildfire risk models, Liberty can score its controls/mitigations to reduce wildfire risk.

Other pertinent data includes data collected in Liberty's G.O. 95 and vegetation management inspections. This data augments the understanding of risk and areas where Liberty could achieve risk reduction. For example, finding many poles with identified fire condition code issues or trees that are dead and dying in an area for which fire spread and suppression costs are high would increase the risk of an ignition event, independent of asset risk. These features are combined with the forced outages reported in Liberty's outage management system to formulate a more holistic assessment of risk in a particular region or circuit within Liberty's service territory.

E. Integration of potential ignitions avoided due to PSPS events (to account for bias in ignition data post during PSPS events)

Liberty is evaluating use of historic weather patterns to backcast significant weather conditions against current PSPS thresholds to see if PSPS events would have occurred. This was originally done using weather station observations and Liberty is evaluating use of hourly Real Time Mesoscale Analysis (RTMA) gridded (2.5 km) meteorological data to provide greater spatial resolution

To date, Liberty has had no PSPS events and sets the baseline for risk reduction to zero historic occurrences to measure quantitative performance metrics against. Liberty has taken many steps to establish a formal PSPS program through the development of protocols, procedures, and the identification of specific PSPS event. The PSPS work over the last two years, in combination with an anticipated increase in fire weather events (*i.e.*, red flag warnings, longer fire season, high winds, etc.), may lead to more frequent use of PSPS over the next 10 years, although the scale and scope of potential events are unknown and can only be qualitatively assessed.

Liberty anticipates the following programs will reduce the likelihood and impacts of PSPS events in the future: the Customer Resiliency Program, situational awareness tools and FPI monitoring efforts in conjunction with installation of sectionalizing grid operation equipment, covered conductor, undergrounding, and customer and community outreach and engagement efforts. The main quantitative metric that Liberty plans to use to estimate the expected reduction in PSPS impact is the expected reduction in the number of customers impacted by a potential PSPS event.

There are no quantitative metrics available to demonstrate or measure reductions to the scale, scope, and frequency of PSPS events. The expected reductions in scale, scope and frequency of PSPS events cannot be quantified at this point because Liberty would be estimating expected reductions based on almost zero actual PSPS occurrences and because the programs listed above are either ongoing or not yet started. For instance, Liberty's Customer Resiliency Program, will mitigate customer impacts of PSPS. The quantitative impacts of the resiliency efforts are unknown at this point, but, in the future, PSPS events and impacts to customers can be quantitatively tracked with performance metrics by resiliency corridor or sectionalizing efforts.

Given that Liberty will be estimating expected reductions in PSPS scale, scope and/or frequency based on zero actual PSPS occurrences, Liberty is exploring methodologies that would rely on benchmarking statistics from the other IOUs in California with more PSPS experience.

F. Asset data (including asset age, health, inspection results, type, etc.)

In 2020, Liberty conducted a system-wide survey using G.O. 95 inspection codes and inventoried its overhead distribution assets using a GIS application called Fulcrum. The data was analyzed in conjunction with operations to identify poles at risk of failure that was used as an input for computing circuit risk.

Pole Risk Model:
The system survey data has helped identify assets in need of immediate remediation, repair, or replacements and served as a baseline for assessing asset risk of failure. Liberty used pole/asset inspection data, layered over the analysis conducted by Reax, to formulate an “asset risk” profile for each circuit. Liberty confirmed at each step during the compilation of data that the circuit scoring and results from inspections and fire propagation models were reasonable and connected with the experience of planning, engineering, and operations on the system.

Liberty anticipates that the survey will vastly improve the accuracy of Liberty’s GIS system. More accurate data will help improve future inspections and reduce the risk that assets in the field are missed due to mapping errors. The data from the survey will also improve operational awareness by allowing field crews and managers to see assets digitally before being dispatched to the location.

G. Impacts of system hardening and other initiative efforts

Liberty is very early in its system hardening efforts for wildfire mitigation. Once another year of forced outage data is collected and analyzed, actual results of wildfire mitigation efforts can be measured and realized. While construction is in progress on various projects, forced outage events can temporarily increase while the system is in non-typical configuration to accommodate the construction.

Liberty is pursuing a targeted approach for its future covered conductor projects that involves the following steps: identify at-risk wildfire areas, gather and organize risk-related data by circuit and analyze data, develop a plan for each circuit, and track performance of covered conductor program by circuit or segment using visualization applications. Liberty’s project scope and design for covered conductor projects include replacing and installing new overhead assets, in addition to new crossarms, lightning arrestors, fuses, and other hardware. The vegetation management group also inspects the proposed line installation route for capital jobs to evaluate the need for additional tree work.

H. Climate conditions (including historical wind conditions, relative humidity, temperature, etc.)

Liberty engaged Reax to conduct precise modeling of historic fire weather conditions to help analyze wildfire risk. Wind and weather data were used as inputs for Monte Carlo fire spread modeling. The weather data used came from the North American Regional Reanalysis (NARR) data set, which includes data that is maintained by the National Centers for Environmental Prediction, the National Weather Service, and the National Oceanic and Atmospheric Administration. This gridded meteorological dataset provides a "snapshot" of the atmosphere every three hours at approximately 32-kilometer resolution. The data includes surface observations of temperature, relative humidity, wind speed/direction, precipitation, weather balloon observations of wind speed/direction and atmospheric, sea surface temperatures from buoys, satellite imagery for cloud cover, and precipitable water. This data is available back to 1979.

The NARR data was used to determine the historical fire weather days. A Modified Fosberg Fire Weather Index (MFFWI), which combines temperature, relative humidity and wind speed into a single index, was used to determine the significant fire weather days. The standard FFWI was modified to avoid having the index designate fire weather days in out-of-season times, such as during winter or after significant rains. The MFFWI was used to identify wind events that occurred simultaneously with low relative humidity and high temperature. The MFFWI filter was applied to 10-meter wind components, two-meter temperature, and two-meter relative humidity extracted from NARR weather data. Then those days deemed significant from a fire weather perspective were recreated at higher resolution using the Weather Research and Forecasting (WRF) Model.

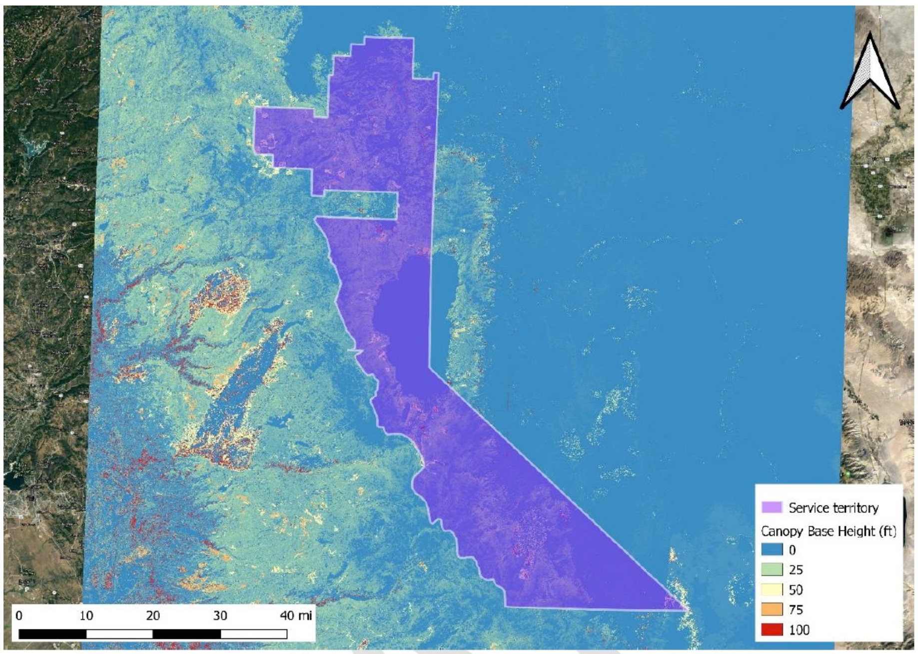
The WRF Model was used to recreate weather data for historical fire weather days. The climatology was created for 200 days, but, for modeling purposes, the most severe 50 days for a given location were used. High resolution (1.2 km) hourly gridded fields of relative humidity, temperature, dead fuel moisture, and wind speed/direction were extracted from this analysis and provided as input to the Monte-Carlo-based fire modeling analysis.

Liberty's Fire Potential Index (FPI) has been incorporated into its Fire Prevention Plan, which details work procedures that must be followed based on fire risk conditions. The plan is utilized daily during fire season to inform operational decisions. Liberty continually looks to improve FPI and PSPS forecast accuracy and will incorporate additional model forecast data into the existing tools where possible.

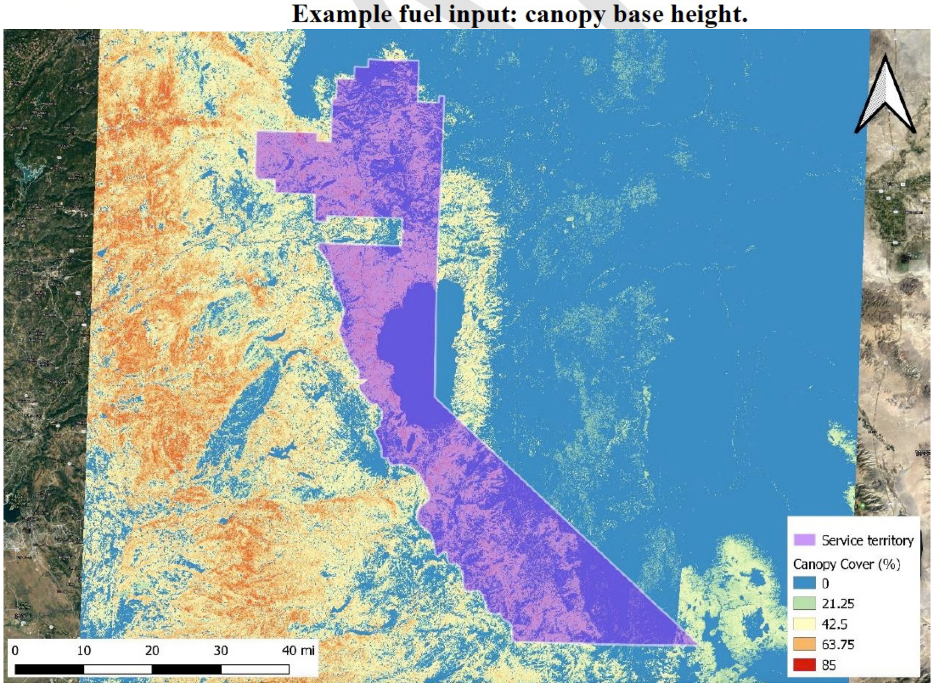
I. Vegetation (including type, density, height, etc.)

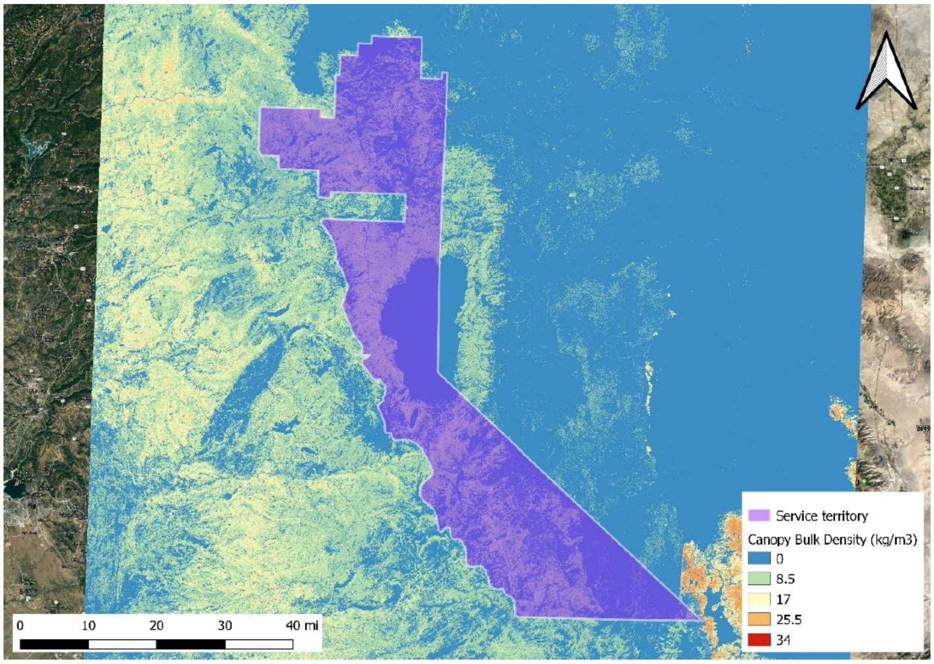
The vegetation data used for wildfire risk modeling is derived from visual tree inspections and completed vegetation management work. Liberty maintains a Vegetation Management System (VMS) database in which historical inspection and tree work data is retained. Trees are inventoried in the VMS when remediation is required based on the inspection. Therefore, a new tree is only added to the vegetation inventory when it is accompanied by a work request for pruning or removal. Once a record is created for a tree, the tree is assigned a unique ID for future inspections and for tracking work history. Trees that require removal remain in the inventory of completed tree work. Vegetation risk is effectively mitigated at the time tree pruning or removal is completed, but the mitigation is temporary. Vegetation growth studies conducted throughout Liberty's service territory indicate vegetation management work provides effective mitigation for an average of three years. Areas with an historically high occurrence of vegetation threats tend to remain at higher risk of tree-related conflicts with electrical infrastructure. The inspection data and history of tree work maintenance provides the basis for predicting current and future vegetation risk at a location.

In addition, the Reax fire propagation model included input layers to account for canopy height, canopy base height, and canopy bulk density. See below for examples of each input layer.



Example fuel input: canopy base height.

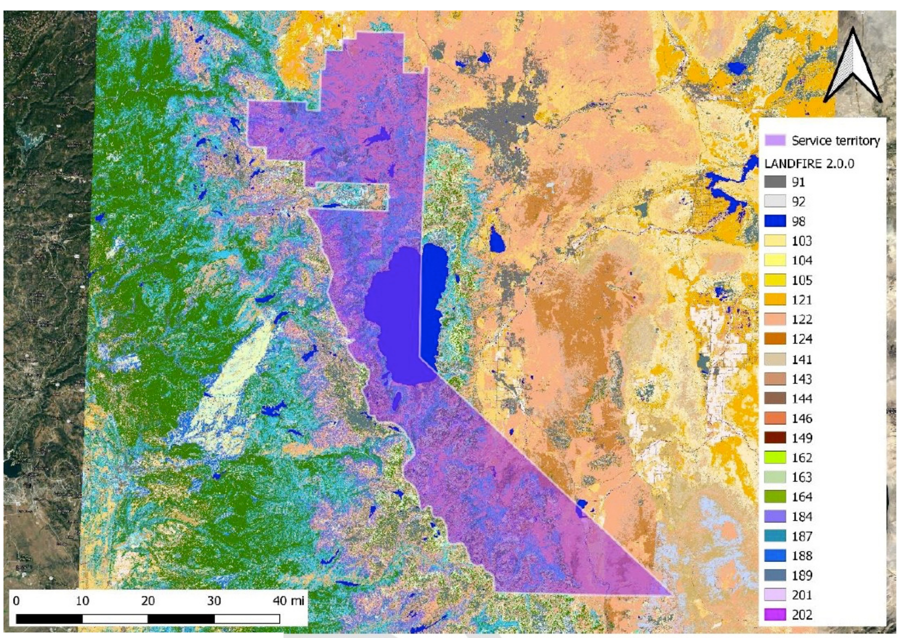




Example fuel input: canopy bulk density.

J. Fuel characteristics (including load, size, continuity, vertical arrangement, moisture, etc.)

Fuel layers were obtained from the LANDFIRE 2016 (LANDFIRE 2.0.0) database at a resolution of 30 meters. Fuel layers include surface fuel models from the Scott and Burgan 40 system.



Example fuel input: surface fuel model.

K. Impacts of Routine and Enhanced vegetation management activities (including tree-trimming, tree-removal, inspections, etc.)

The effectiveness of vegetation management activities is based on the assumed risk increase should the mitigation cease to occur. Industry research performed on the cost of deferred vegetation maintenance at electric utilities historically focused on economic impacts (*i.e.*, cost per unit of measure increasing over time) and effects on system reliability. Using a similar approach, impacts of vegetation management activities can be applied to wildfire risk. Liberty has significantly increased its investment in vegetation management in recent years and will be able to compare data over time to better evaluate the correlation between vegetation management and wildfire risk.

L. Frequency of updates to datasets and inputs, including any associated triggers to determine the need for updates

Liberty conducts annual updates for each year's WMP filing.

Weather Data – Because weather data is analyzed on a long-term basis, updating that data set will likely be done on a time period greater than every year and may be done every five years. In the event significant trends are noticed, updates will be done more frequently. Continued and intensified drought would indicate the need to update the weather data set for items such as fuel moisture content.

Forced Outage and Ignition Data - Liberty is planning to update its forced outage and ignitions data set on a calendar year annual basis.

Data Analytics – With recent technological advancements and visualization tools more readily accessible, Liberty will assess the frequency of modeling data inputs and automating processes.

Liberty is evaluating current modeling assumptions of all wildfire risk inputs and may update studies and assessments as needed.

M. Accuracy and quality checks for data and inputs

Liberty has not yet established a formal program for quality checks for data.

II. Model descriptions for ignition, consequence, and PSPS models

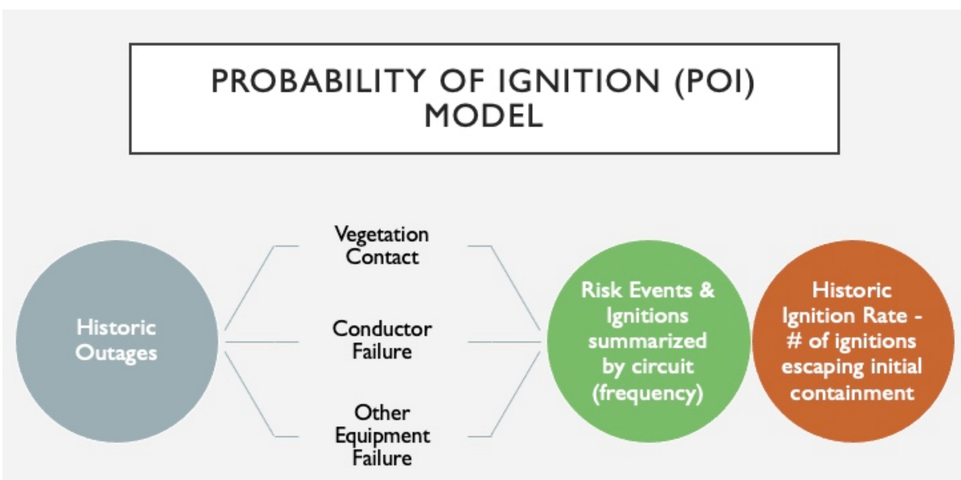
Model: Probability of Ignition – Wildfire Risk Model

A. Algorithms used and machine learning capabilities

The probability of ignition is not explicitly modeled. This is an enhancement planned for implementation in 2022.

The probability of ignition modeled in Liberty's 2021 Update uses the following data inputs and summary calculations:

1. Historic forced outage data for the years 2016-2020 – approximately 800 records.
2. Analysis of primary wildfire risk drivers (*i.e.*, vegetation contact).
3. Annual summation of wildfire risk driver by Liberty's circuit numbers to calculate frequency of events.
4. Subset of this data set are historic ignition events (*e.g.*, pole fire) – totaled 47 events.
5. Analysis of historic fire events that escaped initial containment to derive an ignition event rate of 2.13%, or one fire out of 47 potential wildfire events.



B. Impact of climate change

Impact of climate change was not factored into the probability of ignition model.

C. Ingress and egress

Ingress and egress were not factored into the probability of ignition model.

D. Modeling components, linkages, and interdependencies

Liberty's primary modeling components are various Excel files summarized and linked by circuit. The historic outage frequencies by driver type links to the wildfire circuit risk assessment and the probability of ignition rates are used to qualitatively rank circuit risk.

E. Weight of each data components and inputs

Weights of data components and inputs are not factored into the probability of ignition model. The model weights the likelihood of the fire event equally across all risk drivers and measures the average annual frequency of risk events.

F. Automatization implemented

Liberty's probability of ignition model is a manual and analytical process that relies on interpretation of the outage code records and dispatcher notes to properly assign wildfire risk drivers.

G. Frequency of updates to modeling, including the basis for updates

Liberty plans to update the outage data and analysis annually for the WMP update filing.

Model: Fire Potential Index (FPI)

The FPI is intended to communicate daily localized wildfire potential using easily understood classifications (low, medium, high, very high, and extreme) to forecast conditions for the next week. Liberty uses FPI assessment tools to inform operations of elevated fire risk days and is evaluating the use of historic FPI to help assess probability of ignition events by circuit and/or segment and for assessing fire risk.

A. Algorithms used and machine learning capabilities

Liberty's FPI is calculated from two National Fire Danger Rating System[1] ("NFDRS") indices. The first index, Energy Release Component[2] ("ERC"), quantifies intermediate to long-term dryness. The second index, Burning Index[3] ("BI"), quantifies its proportion to flame length of a head fire and is directly related to fire suppression effectiveness and difficulty of fire containment.

ERC is calculated from Remote Automated Weather Station ("RAWS") observations as part of the NFDRS. A given ERC value is 4% of the energy per unit area, in units of Btu/ft2, that would be released during a

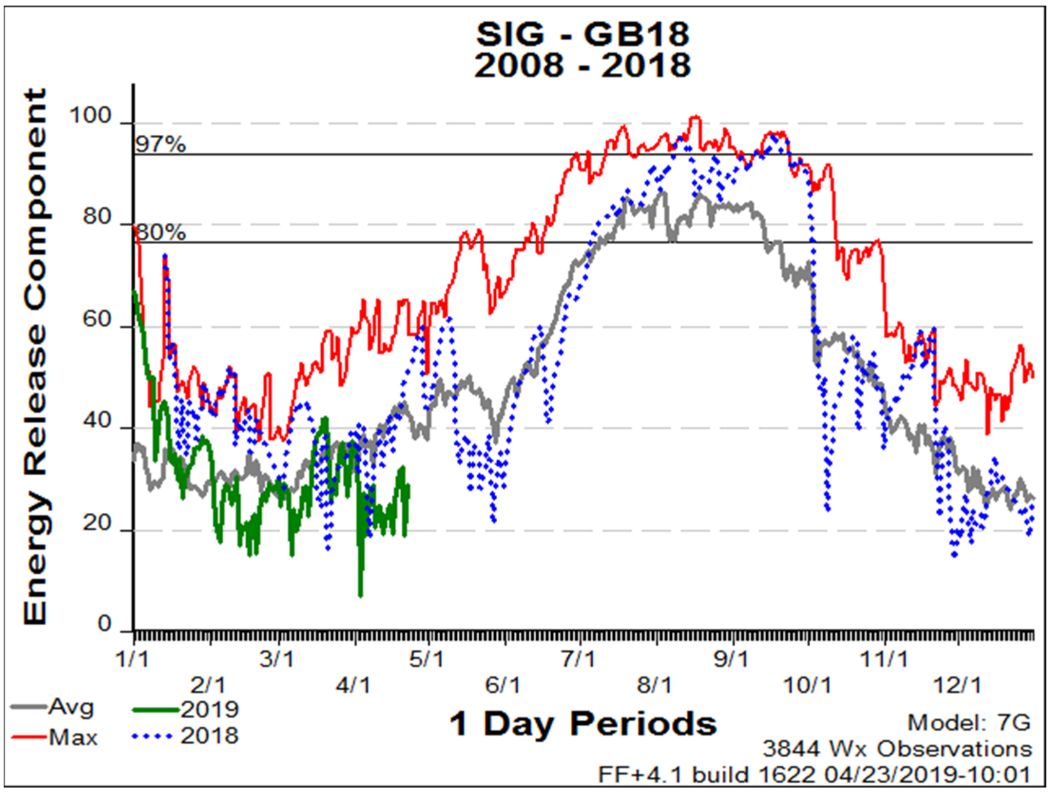
1 United States' fire danger rating system intended to quantify fire threat and relative severity of burning conditions.

2 The computed total heat release per unit area (Btu/ft2) within the flaming front at the head of a moving fire.

3 An estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire.

fire. Therefore, multiplying an ERC value by 25 gives the number of Btu per square foot that would be released in the flaming front of a fire. ERC depends on live and dead fuel loading by size class (as characterized by an NFDRS fuel model), as well as fuel moisture content of live and dead fuels. In addition to dependence on fuel loading assigned to each fuel model, ERC varies due to changes in moisture content of both live and dead fuels, which are, in turn, dependent on prior precipitation, relative humidity, and temperature. Figure X below shows a representative yearly variation in ERC in the Western United States. Because ERC depends on fuel loading/fuel model at each RAWS, absolute ERC values are usually converted to percentiles to facilitate comparison of seasonal ERC trends between RAWS stations with different fuel models.

Representative Yearly Variation in ERC in the Western US



BI is conventionally interpreted as head fire flame length, in feet, multiplied by 10. For example, a BI of 80 corresponds to a head fire flame length of approximately eight feet. BI is more sensitive to short-term fluctuations in environmental conditions, particularly wind, than ERC.

For fire danger rating purposes, ERC and BI are often normalized against historical weather conditions so they can be reported as percentiles, which may provide a better indication of fire danger than absolute values. For the purposes of calculating Liberty's FPI, ERC and BI percentile forecasts are obtained from the U.S. Forest Service ("USFS") Wildland Fire Assessment System ("WFAS") (https://wfas.net).

B. Impact of climate change

Although not directly identified in the analysis, climate change impacts will be embedded in historic FPI variations.

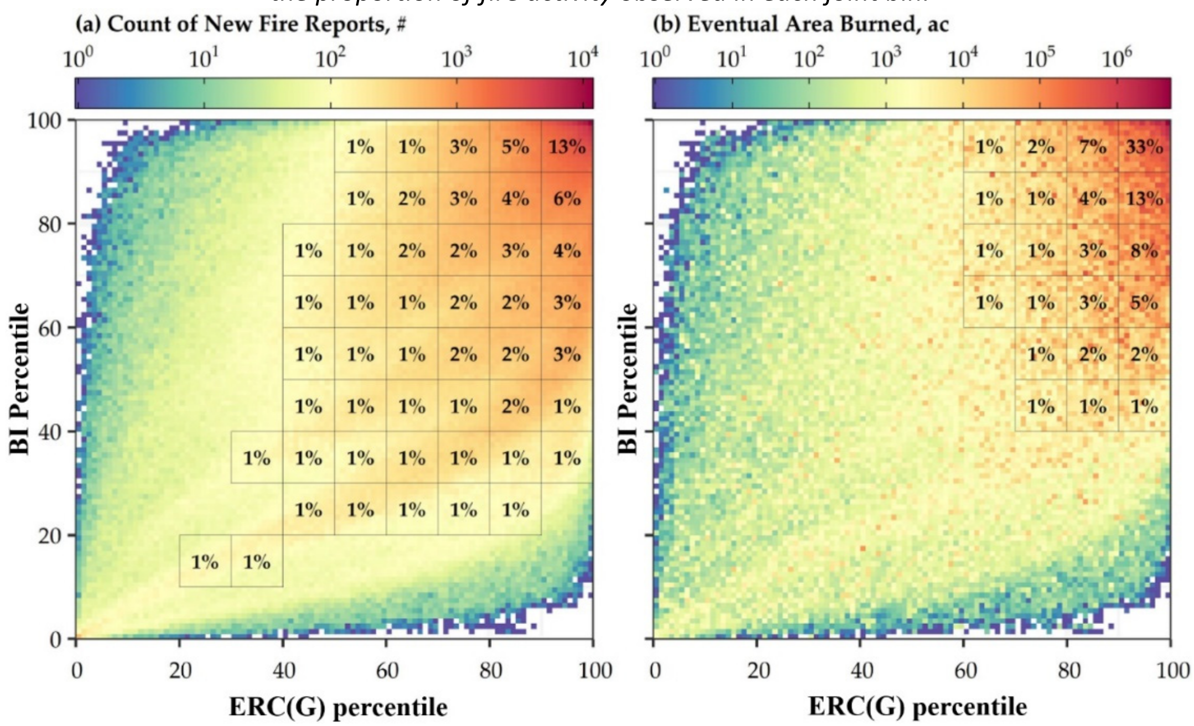
C. Ingress and egress

Liberty has not yet incorporated ingress and egress as a modeling input. It is, however, a qualitative consideration that will continue to be considered.

D. Modeling components, linkages, and interdependencies

A 2019 United States Forest Service (USFS) study demonstrated that a simple fire danger index that combines ERC and BI percentiles is strongly correlated with historical fire occurrence and ultimate fire size. Analysis of historical fire records (Figure X) has shown that 13% of new fires and 33% of eventual burned area occurred when fires were ignited when ERC and BI were both above 90th percentile. Similarly, 28% of new fire reports and 57% of eventual acres burned occurred when both indices were above the 80th percentile.

New fire reports (a) and eventual acres burned (b) as a function of ERC and BI percentiles.
Color scales indicate the amount of fire activity observed in each joint bin, and the percentages indicate the proportion of fire activity observed in each joint bin.



Leveraging these findings, Liberty's FPI is calculated by converting ERC and BI percentiles obtained from the USFS WFAS into FPI rankings to use for assessing wildfire risk for operations planning.

BI Percentile

BI Percentile						
BI Percentile	97-100					Extreme
	90-97				Very High	
	80-90			High		
	60-80		Moderate			
	0-60	Low				
		0-60	60-80	80-90	90-97	97-100
		ERC Percentile				

E. Weight of each data components and inputs

See Figures above in Section D which explain how ERC and BI are combined into the FPI rating.

F. Automatization implemented

FPI is updated automatically on a daily basis.

G. Frequency of updates to modeling, including the basis for updates

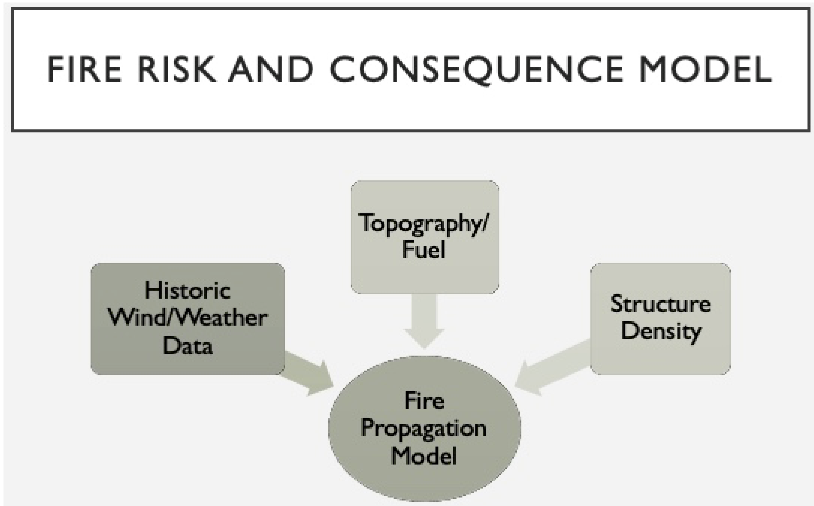
FPI is updated daily.

Model: Fire Propagation and Consequence Models

A. Algorithms used and machine learning capabilities

Monte Carlo fire spread modeling:

- Historic wind/weather data analyzed;
- NARR data used for determining days of historic weather significance;
- WRF model then used to generate wind and weather data for significant weather days;
- High resolution hourly weather data included RH, temp, dead fuel moisture, wind speed and direction;
- Fire spread analysis conducted using ELMFIRE – inputs included weather data, topography/fuel, timber, structure density, and population data.



Ignitions were randomly selected within a one-kilometer buffer of Liberty's overhead distribution lines and modeled with random climatology over six hours.

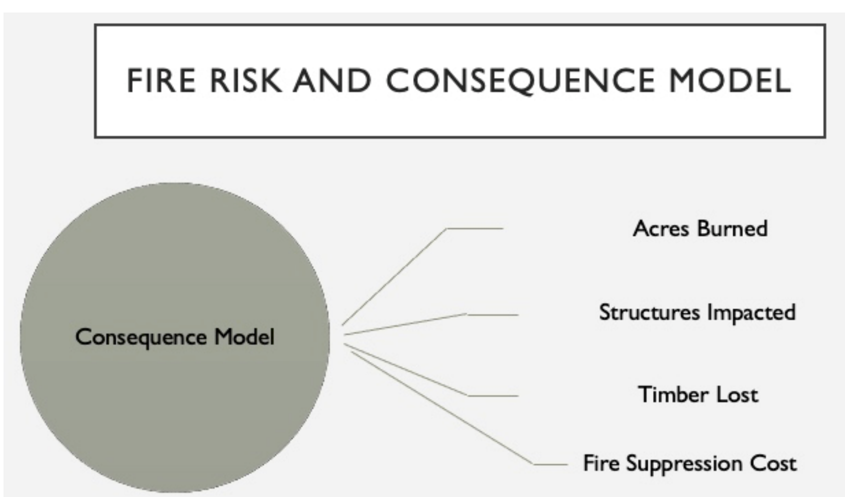
Fire volume was used as a proxy for fire probability of escaping initial containment.

Fire consequence was estimated using criteria such as negative impacts in structures, timber, sensitive habitats, and fire suppression cost.

Fire risk was calculated by multiplying the quantified probability by the quantified cost for every 30-meter pixel.

Results were tallied by wildfire risk polygon ID and included maximum and mean fire size (acres), fire volume (acres/ft), number of structures-at-risk, and timber lost.

For fire risk modeling, Liberty used Monte Carlo analysis using the ELMFIRE (Eulerian Level Set Model for Fire Spread) computational engine to quantify landscape-scale burn probability.



Quantitative Consequence Outputs from Fire Model

Consequence Category	Description	Polygon A	Polygon B	Polygon C
Data	Length of overhead lines (miles)	9	13	44
Fire area from a powerline ignition within the polygon	Maximum from single ignition location	745	1,508	575
	Mean fire area per ignition (zero-value data excluded)	36	127	30
	Cumulative fire area of all ignition locations	146,801	510,672	360,221
	Normalized fire area per unit length of infrastructure	17,024	40,451	8,251
Structures - houses impacted	Maximum from single ignition location	28	15	42
	Housing value per Zillow data estimates	5,521,320	3,020,713	19,120,536
Businesses impacted	Estimated as adjusted ratio of residential to commercial customers	2	2	3
	Estimated business value ($1,000,000 per unit)	2,000,000	2,000,000	3,000,000
Timber impacted	Maximum from single ignition location (acres)	105	123	219
	Estimated timber value (per $1,000 unit)	6,311,556	7,352,362	10,733,870
Fire suppression costs	Estimated cost recovery value	5,068,609	5,172,828	5,262,766
Sensitive habitats impacted	Maximum from single ignition location	-	-	-
Population impacted	Maximum from single ignition location	27	13	72

For probability computations for forced outage and ignition events, the Cristal Ball Excel addon software was used for probability computations and resulted in system-wide baseline MARS risk scores for maximum consequences and average consequences related to financial impacts, safety impacts, and potential customer reliability impacts. From here, select wildfire mitigations were evaluated individually to measure effectiveness of reducing overall wildfire risk, namely reductions to forced outages by risk event drivers. The resulting cost benefit analysis were Risk Spend Efficiencies (“RSEs”) for the selected wildfire mitigations. Liberty is re-evaluating the risk scoring models and assumptions made to derive the RSE amounts. RSEs can be useful for prioritizing wildfire mitigation projects and is one data point Liberty plans to use for future risk informed decision-making. Other risk factors are needed for planning overall wildfire mitigation efforts and targeted mitigation plans.

B. Impact of climate change

Climate change was not factored into the modeling.

C. Ingress and egress

Liberty has not yet incorporated ingress and egress as a modeling input. It is, however, a qualitative consideration that will continue to be considered.

D. Modeling components, linkages, and interdependencies

Liberty used numerous models consisting of various summaries of analysis performed and data files supporting all calculations.

E. Weight of each data components and inputs

Liberty had many data components and inputs calculated for the fire risk and consequence modeling efforts that had varying weights applied.

F. Automatization implemented

N/A

G. Frequency of updates to modeling, including the basis for updates

Liberty anticipates making incremental updates / enhancements to its risk mapping at a frequency of two to three years to address:

1. <u>Advancements in wildfire risk modeling</u>. Example: quantitative ignition modeling procedures have been developed since Liberty conducted its original risk modeling work.
2. <u>Disturbances</u>. Example: In 2021, the Tamarack Fire and the Caldor Fire burned tens of thousands of acres in Liberty's service territory. These areas are currently not capable of supporting fire spread, but, as these areas grow back, they will eventually be able to support fire. Therefore, fuel inputs will have to be updated to reflect current and future fire spread potential.
3. <u>Changing weather / climate</u>. Example: Prior to 2021, no fire in California ever burned from the west slope of the Sierra, over the Sierra Crest, and down the east slope of the Sierra. However, in 2021, this happened twice (Caldor Fire, Dixie Fire) due to the unprecedented combination of drought, prolonged southwest wind events, and atmospheric instability.

III. How model outputs are analyzed and utilized for each model

A. Confidences for each modeling component, including how such confidences were determined

Because this is Liberty's initial effort for wildfire risk modeling, confidences have not yet been evaluated.

B. Range of uncertainty for model outputs, including how those ranges are determined and how uncertainty is minimized

Because this is Liberty's initial effort for wildfire risk modeling, range of uncertainty has not yet been evaluated.

C. Systems used to verify the model outputs, including verifier (subject matter experts, third-party) and description of implementing lessons learned

Liberty has not verified model outputs but has discussed the results of the risk study analysis with subject matter experts from engineering and operations who are familiar with the service territory and asset risk.

D. How uncertainty affects the interpretations of model outputs

Liberty understands that there are uncertainties with its initial wildfire risk modeling and intends to quantify and reduce these uncertainties.

E. Determination of highest risk areas based on model outputs

Highest wildfire risk is based on the results of Reax's fire propagation and consequence modeling efforts. Wildfire risk polygons are defined by the Monte Carlo fire ignition simulations. Liberty analyzed quantitative results and consequence fire model outputs to qualitatively assess and rank circuit risk. See below for an example.

Qualitative Circuit Risk Ranking

Risk Category	Polygon A	Polygon B	Polygon C
Circuit # Rank	19	19	1
Area & Asset Risk	Low Risk	Low Risk	Very High Risk
Overall WF risk rating	Low	Moderate	Very High
Pole Risk	High Pole Risk	Low Pole Risk	High Pole Risk
Timber	Moderate	Moderate	Moderate
Cost recovery incurrence risk rating	Low	Moderate	Very High
Structures	Low	Low	Very High

Polygon Qualitative Analysis

Polygon A	Area X and surrounding areas. Little modern fire history. Good ingress egress. Roads break up fuel continuity.
Polygon B	Transmission line from Portola. Some potential for rapid fire spread under extreme weather. Low potential for structure impacts as most structures are not in timber.
Polygon C	Fallen Leaf Lake to Hwys 50 and 89. Potential for large-scale structure loss like 2007 Angora Fire.

F. Use of subject matter expertise for inputs and further verification

The use of subject matter experts (SMEs) has been the primary source for estimating the effectiveness of the various wildfire mitigation efforts. Liberty plans to improve the effectiveness of SME input with training and augment effectiveness estimates with other sources.

IV. Description of any collaborations previously undertaken among the utilities, as well as details on consistency across utilities

Liberty discussed data sharing capabilities and modeling strategies with two utilities: Bear Valley Electric Service, Inc. (“BVES”) and Southern California Edison Company (“SCE”). Liberty, BVES, and SCE discussed how to best use data points from their respective utilities to improve data modeling capabilities in the other utilities’ models.

Much of the peer utility data Liberty evaluated from SCE was made available through RAMP/S-MAP and GRC filings. Relevant peer data points may prove useful to include in Liberty wildfire risk models. For example, while Liberty has not experienced a large enough sample size of ignitions escaping containment, data from other utilities is available to estimate this probability. Furthermore, reliable data from Liberty’s outage management system only dates to 2015, while other California utilities have decades’ worth of data points. Liberty also examined effectiveness scores from San Diego Gas & Electric Company (“SDG&E”) and SCE wildfire risk models used in determining control and mitigation effectiveness and used these results to inform Liberty's own scoring. These effectiveness scores form a basis for the level of risk reduction applied to each of the wildfire risk-drivers targeted from each control/mitigation.

SCE held multiple calls with Liberty to discuss what has and has not worked for SCE, as well as SCE's progression in modeling wildfire risk in terms of data and technologies used. SCE discussed its augmentation of using Reax's research in its service territory with Technosylva technologies. While Liberty's resources may not yet be ready to take advantage of Technosylva's advancements, the discussions were useful to understand the benefits SCE outlined in its 2021 WMP filing. Liberty is in an earlier stage of wildfire risk modeling, and, as its modeling capabilities grow, data sharing and modeling methodology sharing will increase.

V. Description of any collaborations previously undertaken and/or ongoing with other entities

N/A

VI. Anticipated changes to any of the models between now and the 2022 WMP Update

Liberty anticipates the following changes:

- Run a second iteration of models that includes forced outage data updates through the end of 2021. In addition, the probability and consequence of PSPS events will be evaluated.
- Use of CAL FIRE Redbook fire incident reports to measure likelihood of fire for utility operator and potential fire size (acres burned).
- Use of LiDAR reporting capabilities and detailed targeted results will refine tree risk assessment at the line segment level.
- Evaluate ways to study and prioritize mitigation efforts in high wildfire risk areas to assess vulnerable segments of circuits.
- Along with updating model inputs for recent recorded activity and qualitatively ranking risk, evaluate the use of updating weather data using Real-Time Mesoscale Analysis ("RTMA") data observations to assess PSPS risk of de-energization events.

VII. Attachments of any internal or third-party validations completed, and description of any peer review utilized

Liberty has not yet conducted any validations or peer reviews for its risk modeling.