MOODY'S

Insurance Solutions

CASE STUDY

Wildfire risk: Quantifying the impact of mitigation measures in the power sector

Company: Southern California Edison

Headquarters: California, US

Industry: Electricity Utility

Moody's Products:

- → Moody's RMS™ North America Wildfire HD Model
- → Moody's RMS™ North America Wildfire Climate Change Model
- → Industry Exposure Database (IED)

SOUTHERN CALIFORNIA EDISON®
Energy for What's Ahead℠

The goal

MEASURING IMPROVED OUTCOMES AROUND WILDFIRE RISK

Southern California Edison (SCE) is a retail utility company that handles electrical distribution and transmission serving 15 million people across a region of 50,000+ square miles.

SCE has been making targeted investments in risk mitigation measures both to reduce the chance of wildfires caused by its infrastructure and to refine the use of its proactive public safety power shutoff (PSPS) process to reduce the impact of shutdowns on customers.

SCE needed to update its existing wildfire risk model to include the risk reduction impacts of SCE's physical mitigation measures as well as the impacts from the use of PSPS.

The objective

PROVING THE VALUE OF MITIGATIONS AND IMPROVING PSPS

In 2018, following the Woolsey Fire, SCE began refining the PSPS program after recognizing that it needed to be more surgical in its approach and lessen customer hardship. The proactive PSPS mechanism is triggered by certain weather conditions that have the potential to cause significant wildfire spread.

SCE had also been implementing a range of mitigation measures in the highest risk areas of its network to reduce the occurrence of wildfires generated by electricity lines. This included the installation of wires with a protective coating, called covered conductors, and pruning vegetation near lines.

The company needed a method to show to its customers, regulators, and shareholders that the investments were balanced by a measurable reduction in wildfire ignitions from power lines and fewer incidents of PSPS activation.

Effective mitigation measures would also reduce the need for SCE to draw the state-backed risk transfer mechanism, the California Wildfire Fund, for property and liability claims. SCE could potentially bring down the cost of commercial wildfire insurance coverage, which has increased dramatically in recent years.

The solution

MOODY'S RISK MODELER AND THE MOODY'S RMS™ NORTH AMERICA WILDFIRE HD AND CLIMATE CHANGE MODEL

Risk Modeler™, part of the Moody's Intelligent Risk Platform™, is a highly flexible and cloud-native modeling application that includes the Moody's RMS™ North America Wildfire HD Model and Climate Change Model. Moody's recommended its wildfire model, in concert with the accompanying industry exposure database, to deliver an initial baseline view of wildfire risks in the region where SCE operates.

The process

SCE's baseline assumptions were refined to build a dataset that correlated wildfire exposures in the region with the precise location of SCE's power lines and distribution infrastructure. This would allow Moody's to assess where potential losses were most likely to be triggered and measure the impact of wildfire mitigation, including expedited grid hardening work to reduce the scope and frequency of PSPS.

Robert LeMoine
Director, Enterprise Risk Management, Insurance and Data Analytics, Southern California Edison

The stochastic modeling information Moody's gave us is powerful. We're now able to prioritize where we do mitigation work with a data-driven approach. We are able to understand bands of uncertainty in our assumptions, and, more importantly, rigorously test and challenge them. This allows us to communicate with the investment community, with confidence, about how much risk we've actually eliminated from the system, given the billions of dollars of investment [in mitigation measures] we've made since 2018, including PSPS.

COLLABORATING ON A FORWARD-LOOKING VIEW OF RISK

SCE supplied Moody's with data on the location of its distribution infrastructure, down to the level of individual poles; the risk profile of the region of operations, including high fire risk areas where there is abundant vegetation and prevailing weather conditions that are conducive to wildfire ignition; and ignition data reported to its regulator, the California Public Utilities Commission.

SCE also provided the location and scope of mitigation measures that had already been deployed, plus the company's assessment of their effectiveness. Finally,

SCE provided the details of how the PSPS program works: when it is executed and a variety of thresholds, including weather and fuel conditions, that trigger the process.

Using SCE's data, Moody's was able to deliver loss analytics that allowed insight into the company's loss distributions, over a 50,000-year simulation period, from wildfire events potentially ignited by its network. For each year, the Moody's model simulated multiple wildfire events, the total burn area, and loss total associated with the event (including the number of structures damaged or destroyed). Then it determined which of those events could be attributed to SCE's network.

The outcome

After generating the initial baseline wildfire model, which showed the loss distribution attributed to SCE with no mitigations in place, Moody's created a methodology that enabled rerunning the analysis to incorporate SCE's data on the scope and effectiveness of mitigations. Moody's was then able to quantify the difference in risk both before and after mitigation measures were put into place.

Based on SCE data, modeling, and the exposure database, findings estimated that wildfire mitigations had reduced the risk of $1 billion in wildfire losses over one year by 55% and reduced the risk of $3.5 billion in losses over three years by 65%.

Using this analysis, SCE could measure the effectiveness of its risk buydown program while assessing the potential for future wildfire losses, with a view incorporating the likely impact of climate change on weather conditions.

SCE ESTIMATES ITS WILDFIRE MITIGATION AND PSPS HAVE REDUCED PROBABILITY OF LOSSES FROM CATASTROPHIC WILDFIRES BY ~75-80%[1,2]

SCE expects to further reduce risk and decrease the need for PSPS with continued grid hardening investments

	Pre 2018	Year-End 2022	Estimated Risk Reduction	PSPS Contribution
Annual Risk of >$1.0 billion loss[3]	~5.2%	~1.2%	**~75% reduction** in estimated probability of accessing the Wildfire Fund	**Decreasing dependency on PSP** **~15%** of total risk reduction *vs. ~30% as of Q4 2021[4]*
Risk of >$3.5 billion drawn from Fund over 3 years[3]	~2.9%	~0.6%	**~80% reduction** in estimated probability of exceeding AB 1054 liability cap	

1 Baseline risk estimated by Risk Management Solutions, Inc. (Moody's) using its wildfire model, relying on the following data provided by SCE: the location of SCE's assets, reported ignitions from 2014–2020, mitigation effectiveness and locations of installed covered conductor, tree removals, inspections, line clearing, and PSPS de-energization criteria.

2 There are risks inherent in the simulation analysis, models and predictions of SCE and Moody's relating to the likelihood of and damage due to wildfires and climate change. As with any simulation analysis or model related to physical systems, particularly those with lower frequencies of occurrence and potentially high severity outcomes, the actual losses from catastrophic wildfire events may differ from the results of the simulation analysis and models of Moody's and SCE. Range may vary for other loss thresholds.

3 Includes (i) total potential insured losses estimated by Moody's, and (ii) total potential uninsured losses estimated by SCE based on management experience and consultation with insurance industry experts. "Fund" refers to CA AB 1054 Wildfire Insurance Fund. SCE used Moody's loss estimates along with its estimates of uninsured losses to quantify the reductions in estimated probability.

4 Moody's prior method of analysis regarding wildfire risk on the wildfire models was updated at SCE's request in Q2 2022 to incorporate Moody's newly available climate change models, leading to adjustments to pre- 2018 probabilities and in quantifying the current year-end 2022 probabilities.

In modeling the risk profile of all SCE's overhead lines in high fire risk areas and comparing that to mitigations, Moody's was able to deliver a number of use cases for the modeled data, including:

- → Measurable outcome of the effectiveness of current mitigation efforts in reducing incidents of wildfire ignition
- → Statistical basis for the net benefit of mitigation investment showing that the cost of mitigations reduces wildfire losses

All SCE stakeholders recognize the importance of wildfire mitigation work, but the Moody's RMS Wildfire HD Model enabled SCE to validate the success of measures for reducing wildfires and quantify the value of the investments the utility has, and will continue to, make. It also provided a basis for the company to identify areas to target expedited grid hardening work to reduce to hardship on customers who face frequent PSPS activations.

The project gave SCE a view of the likely effectiveness of future mitigations taking into account the effects of climate change, and the ability to assess the best mix of mitigation investments to reduce wildfire risk, such as areas where targeted undergrounding could provide benefits over the use of covered conductor.

SCE IS MAKING MEANINGFUL PROGRESS IN MITIGATING WILDFIRE RISK FOR ITS CUSTOMERS

Covered conductor has reduced faults, which could lead to ignitions

71% fewer

faults on fully covered circuits[1]

Expanded vegetation management and tree removal has reduced faults

54% fewer

tree-caused faults[2]

High fire risk inspection program has reduced remediation needs

63% fewer

defect find rate[3]

Today's PSPS use majority of damage from past wildfires

>90% reduction

of structures damaged[4]

On segments where SCE has covered bare wire, there has not been a CPUC-reportable ignition from the drivers that covered conductor is expected to mitigate

1 Measured by faults covered conductor is expected to mitigate per 100 circuit miles on fully covered circuits as compared to bare circuits in 2021 in HFRA.

2 Measured by average monthly tree caused circuit interruptions in HFRA in 2020–2022 as compared to the average from 2015–2019.

3 Measured as Total Defect Find Rate of Top Ignition Drivers (percentage of inspections) in 2022 as compared to 2019 (inception of program) for structures inspected every year.

4 Measured as structures damaged or destroyed in wildfires greater than 1,000 acres associated with SCE's infrastructure during 2015–2020, using red flag warning days as a proxy for PSPS conditions. Please note, however, that a red flag warning, alone, would not necessarily result in a decision to implement a PSPS.

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An Edison International (NYSE: EIX) company, Southern California Edison (SCE) is one of the nation's largest electric utilities and a longtime leader in renewable energy and energy efficiency. SCE serves a population of approximately 15 million via 5 million customer accounts in a 50,000-square-mile service area within Central, Coastal and Southern California. SCE has provided electric service in the region for 135 years.