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INSIGHT

California Wildfires and Bulk Electric System Reliability

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Introduction

Many regions of the United States are susceptible to wildfires during droughts, with lightning being a frequent cause. California has been particularly affected in recent years. Since 2000, California has experienced 15 of the 20 most destructive wildfires in the state's history. However, according to the California Department of Forestry and Fire Protection, electric utilities in California were responsible for several of these wildfires. In 2007, San Diego Gas and Electric was blamed for several wildfires in San Diego County, and in 2017, Southern California Edison was blamed for the Thomas wildfire. One of the largest California wildfires was the Camp Fire in 2018, which was attributed to faulty electric transmission and distribution lines equipment belonging to the Pacific Gas and Electric (PG&E).

The 2019 California wildfires have resulted in a statewide emergency declaration. Earlier this year, PG&E announced a new wildfire mitigation plan in response to California Senate Bill (SB) 901 requiring all California electric utilities to prepare plans on constructing, maintaining, and operating their electrical lines and equipment to minimize the risk of catastrophic wildfire, which could involve shutting down power to thousands of customers to reduce the risks of wildfire. On October 8, 2019, PG&E implemented its plan, shutting off power to about 525,000 customers. Other California utilities announced similar outage plans in anticipation of strong winds of hurricane-force strength.

Electric transmission lines travel from power plant substations to electric distribution substations via utility easements called rights-of-way (ROW). To mitigate the risks of power outages or damage, the ROW is kept clear of trees or vegetation that can contact the transmission line. Nevertheless, when combined with prevalent arid conditions and the seasonal high autumn winds in California, trees or branches falling on transmission lines can still cause power outages or wildfires. High winds can also cause power lines to contact each other causing electrical arcs with sparks or hot molten materials that can cause fires in dry grasses underneath them.

As residential communities continue to be built in areas prone to wildfires, the wildfire risk to human life and property is increased. According to a recent peer-reviewed study published in the proceedings of the National Academy of Sciences, the wildland-urban interface (WUI), the area where houses sit within or

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directly adjacent to natural vegetation, increased by 33% between 1990 and 2010 nationwide. The study states that "WUI growth often results in more wildfire ignitions, putting more lives and houses at risk. Wildfire problems will not abate if recent housing growth trends continue."

Federal Regulation of Reliability

Under section 215 of the Energy Policy Act of 2005, the Federal Energy Regulatory Commission (FERC) is responsible for the reliability of the bulk power system. The North American Electric Reliability Corporation (NERC) is the Electric Reliability Organization that establishes and enforces the reliability standards, subject to FERC review. NERC issues reliability standards addressing vegetation clearance requirements for electric transmission ROWs. NERC's vegetation clearance requirements generally apply to overhead transmission lines operating at a voltage of 200 Kilovolts (kV) and above. The requirements also apply to overhead transmission lines operating below 200 kV, if these lines are identified by the Western Electric Coordinating Council (WECC), a regional reliability entity under NERC, as a major WECC Transfer Path in the bulk electric system. FERC has been working with WECC in monitoring the power outage situation in California with regard to reliability impacts. The Department of Energy's Infrastructure Security and Energy Restoration division is responsible for coordinating the protection of critical energy assets and assisting federal, state, and local governments with disruption preparation, response, and mitigation, and has mandatory reporting requirements for power outages.

However, thus far, the transmission lines involved in the current wildfires do not appear to be under FERC's reliability jurisdiction. A violation of the FERC-NERC reliability standards would require corrective actions, and could potentially result in civil penalties of up to $1 million per day per violation.

Distribution lines that bring power directly to electric consumers are not subject to NERC vegetation clearance requirements. These lower voltage lines are on wood or metal poles generally operating below 100 kV, and are regulated by state utility regulatory commissions. Strong winds have knocked down distribution poles, which can be routed through woodlands without a cleared ROW, leading to direct contact with conductors or pole-mounted equipment like distribution transformers. California has its own vegetation clearance requirements, which mandate a four-foot minimum clearance to be maintained for power lines between 2.4 kV and 7.2 kV, and a 10-foot clearance for conductors of 150 kV and above.

Financial Considerations

PG&E declared bankruptcy as a direct result of the tens of billions of dollars in liabilities incurred from the 2017 and 2018 wildfires. Under the doctrine of inverse condemnation, California utilities may be held responsible for wildfire damage caused by their equipment, regardless of whether or not they were negligent. However, California has been considering reforms to this policy, as it contemplates how it can adapt its approaches to wildfire risks, and recently passed legislation to create a $21 billion fund to help utilities settle claims from wildfire damage due to electric utility equipment.

Mitigation Options

There are also other potential mitigating actions to reduce future wildfire risks from electric utility equipment. Tree trimming and vegetation management can help, but better management of the wildland-urban interface and adjacent forests to reduce wildfire risks may also be an option. Replacing the bare electric power wires (i.e., conductors) with insulated wires can help to reduce sparks from contact with vegetation. Some have advocated becoming more proactive with regard to wildfire risk from electric power lines, suggesting burying transmission and distribution lines

underground. But this is a high cost solution that could take many years to complete, and such a solution may not be feasible in areas where ground conditions may not be conducive to trenching. Others have advocated building microgrids, and deploying more distributed energy technologies to reduce the need for transmission lines. However, microgrids alone are unlikely to prevent wildfires.

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