MANAGING WILDFIRE RISK IN THE ELECTRIC UTILITY AND GAS TRANSMISSION INDUSTRY

WHITE PAPER

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THE WILDFIRE PROBLEM

The number of wildfires in the US has been slowly increasing over the past six decades, with over half of the largest fires occurring in the past two decades (Fig 1). Acres burned have dramatically increased in the past two decades as well (Fig 2). This could be in part due to rising global temperatures and drought conditions which dry vegetation, providing additional fuel for wildfires. The increase in wildfires and acreage is having an adverse impact on electric utility and gas transmission companies. Asset damage, major power outages and risk to utility crews are major concerns in urban, forest and remote areas. Dry vegetation, increased temperatures, high winds and other factors can rapidly increase the spread and direction of the wildfire, often giving utilities very little time to make decisions about the threat to their assets and the grid.

Like fire response teams, utility grid operators and emergency management groups also need to have easy access to accurate and detailed wildfire data as soon as possible so informed decisions can be quickly made about the threat to the grid. The vulnerability of each utility varies by the design and size of their grid, and potential businesses or communities impacted.

CONTAINMENT CHALLENGES

Utility transmission companies with lines in remote areas, especially a limited number of kV transmission lines which bring an increasing

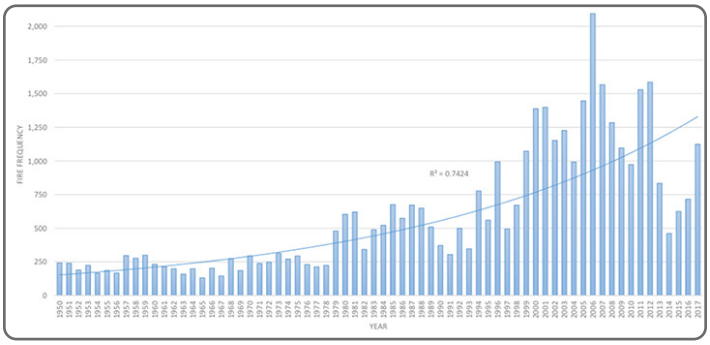

Fig. 1 NASA wildfire increases

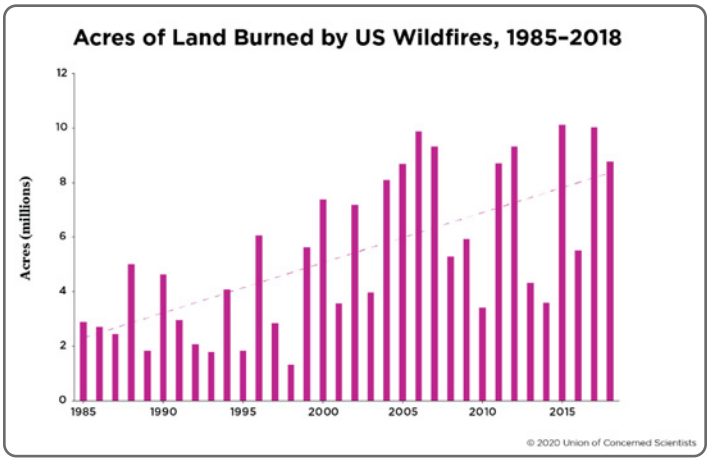

Fig. 2 Land burned by year

supply of essential renewable energy, have additional challenges. These areas are far removed from general populations and major roadways. They are often rugged and not easily accessible. The remoteness of these areas provides little opportunity to observe what is happening.

Wildfires in these regions make fighting and containment extremely difficult for fire response teams. Damage can be severe and can cause interruption to critical transmission which can seriously impact the planned electrical supply, limit grid balancing options and force outages. The cost of unplanned generation to replace energy lost from the fire can significantly increase the cost of replacement energy. If the wildfire hazard is severe enough, the cost in crew response and infrastructure replacement could reach into the millions (Fig 3).

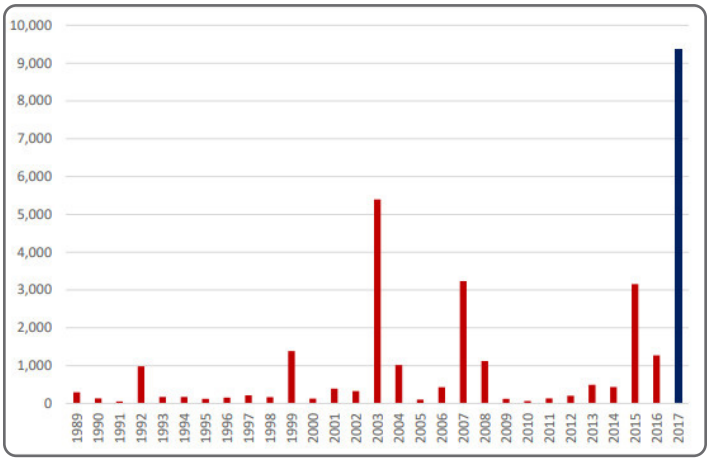

Fig. 3 Wharton University of Pennsylvania (Shows only structures destroyed by five of the 2017 fires (Tubbs, Nuns, Thomas, Atlas and Redwood Valley)

The threat of wildfires in the Western US has proven to be an issue in not so remote areas as well. Wildfires in densely populated communities can not only destroy transmission and distribution assets, but they have tragically cost lives, displaced families and destroyed businesses and homes. Urban expansion is blending city and forest, making it easier for wildfires in remote areas to spread to nearby communities.

The fire itself doesn't have to burn assets to cause interruptions to the grid. Dense smoke from wildfires beneath steel structures have been the source of flashover events between transmission lines causing momentary and sustained outages.

WEATHER IMPACT

Natural weather hazards by themselves often pose threats to electric utility and gas organizations across their service territories at any given time. A combination of weather hazards and a wildfire event can increase an already hazardous situation. In densely populated areas, combined events like wildfires and extreme winds can cause

exposure with very little warning. Changing winds can shift the wildfire direction, quickly endangering new communities and assets and sparking new fires.

For example, in the summer of 2017 High Pressure (HP) natural gas transmission groups in Colorado had to respond quickly to new wildfires which were exacerbated by shifting high winds. HP Gas crews had to respond quickly to shut off pipelines that were at-risk before those evacuated communities were closed by the authorities.

Weather always plays a major role in how a fire starts, grows, changes and dies out. Dry vegetation, wind speed and wind direction have a direct impact on how quickly or slowly the fire will spread in an existing area or whether embers will jump to new areas (Fig. 4). Rain and humidity can slow fire growth and aid fire and emergency response teams to set control lines, create firebreaks and evacuate communities. Utility assets already under threat from the wildfire have the potential added threat if a lightning storm develops. Lightning is not only dangerous to those fighting the fire, it can also spark new fires adding to the wildfire growth.

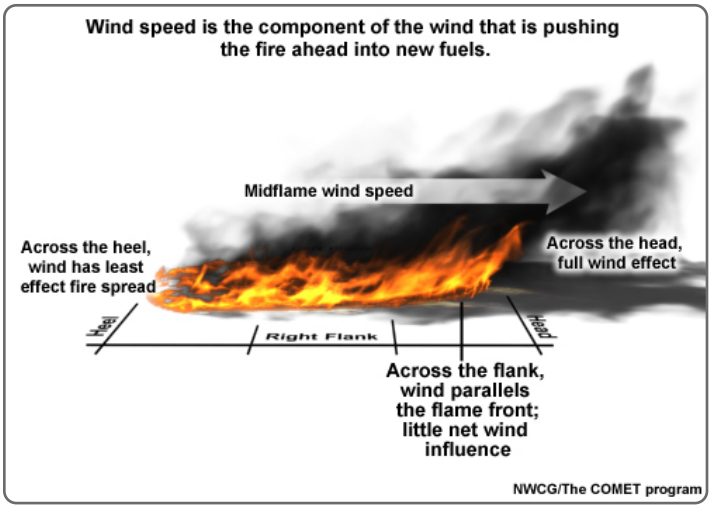

Fig. 4 Wind speed effect on wildfire movement

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TOOLS TO ASSESS WILDFIRE THREATS

Utility organizations not only need information to act quickly when a wildfire erupts or changes direction, they need information to make planned and informed decisions that will allow them to maintain grid stability, minimize outages and aid in reducing asset loss.

The good news is that there is an abundance of fire and weather data available. Weather agencies and expanded weather station networks can provide accurate real-time data for better forecast and impact models. Satellites can relay images providing a good view of the wildfire footprint and movement. Local, state and federal agencies as well as private companies provide a snapshot of what is happening at the fire source. Fire agencies can provide context to all this improved information, how it will impact operations and the communities or utility assets they are defending. Private companies and public agencies can provide accurate forecasting and tracking of lightning and storm data. National weather services across the globe provide real-time forecast models. NOAA's GOES satellites update every 10 minutes and their High-Resolution Rapid Refresh (HRRR) models are updated hourly to provide updated forecasting. The downside to having all this data available is compiling it into something that is easily understood and actionable.

Utility companies don't have the time or resources to find and view data from every fire and weather source to make informed operating decisions. A tool that consists of combined data from trusted, reliable sources in one easy-to-understand view in relation to their assets would provide the ability to focus on their assets under threat and make quick decisions on cost saving actions. Alert notifications when approaching threats are within defined thresholds, give advance notice enabling loads on lines to be adjusted to avoid outages.

SOLUTIONS FOR INFORMED DECISIONS

A tool like the Indji Watch Utilities Edition is a solution built to alleviate these problems. It has become the chosen solution by Grid Operators in fire prone service territories because its patented system actively monitors satellite hot spots and a variety of local, state and federal resources to plot these dynamic wildfires and alert operators to fires specifically approaching their transmissions lines and other utility assets.

Indji Watch sends threat alerts based on a proximity chosen by the customer and provides data on the size of the fire, containment and the distance the fire is from critical power lines and gas pipeline assets. Automated alerts update from early indicators like fire agency dispatchers and satellite hotspots as early as five minutes after the wildfire is reported, and update on changes in the fire status as soon as responding agencies report the latest data on size, areas of impact and containment.

Combined with wind, lightning, precipitation and other forecast data, Indji Watch arms users with real-time information to make informed decisions regarding wildfire threats.

CONCLUSION

Wildfires are a serious problem for electric utility and gas transmission companies. Up-to-date, real-time and forecast data is critical for minimizing threats to assets, reducing outages and providing cost savings. The good news is accurate wildfire and weather data is available, and there are tools that combine that data into one easy-to-use, reliable product that will allow users to proactively lessen the impact to assets, budget and help provide personnel safety.

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