EXTREME WEATHER

Californian Wildfires | USA | 2017 & 2018

This case study is part of an extreme weather impact project, in partnership with Swiss RE Corporate Solutions and Marsh & McLennan Companies, which aims to identify and share best practice within the energy sector to enable more agile and adaptive response to extreme weather and natural hazard impacts on energy systems and supplies.

CASE STUDY AT GLANCE

WEATHER EVENT
Fire

ORGANISATION
California Public Utilities Commission (CPUC)

INDUSTRY SUB-SECTOR
Regulator

RESILIENCE RESPONSE
Physical

RESILIENCE COSTS
$50bn in direct costs

RESILIENCE BENEFITS
Protection of human life, assets and vegetation

California experienced the worst wildfires in its history during the last two fire seasons of 2017 and 2018. Not only has this led to devastating loss of life, it also impacted vast areas of land, property and infrastructure. The California Public Utilities Commission (CPUC) is the regulatory agency overseeing Californian utilities. Utilities have played a role in the prevention, response and causation of wildfires in the state. This case study considers preventative, response and recovery processes to address wildfires in California, as well as key lessons learned for resilience in the face of future events and.

> **FIRES ARE THE TOP ISSUE THAT WE ARE FACING AS A STATE**
>
> **- Elizaveta Malashenko, Deputy Executive Director for Safety and Enforcement Policy, CPUC -**

CONTEXT

ORGANISATIONAL PROFILE: CPUC

- Regulatory agency overseeing utilities. Deals with electric, natural gas, telecommunications and some transport utilities.

- Undertakes audits, inspections and incident investigations. Also works on utility policy.

CALIFORNIAN WILDFIRES 2017 & 2018

- The 2017 season started in early July running through to December. Large fires started in mid-July during the 2018 season and on 28 July, President Trump declared an emergency in the state of California.

- Roughly 17,000 fires blazed during these fire seasons. 2017 was the deadliest fire season on record, before it was surpassed by the impact of 2018.

- 151 people, including eight fire fighters died. Three million acres of land were burned. 28,000 structures were destroyed.

ENERGY IMPACTS

Infrastructure losses: There have been a lot of facilities destroyed and in need of replacement.

Nexus between fire ignitions and energy industry: About 10% of all ignitions are caused by utility infrastructure. When considering the most devastating and destructive wildfires, utility infrastructure involvement is much higher than 10%. This is because high winds increase the probability of ignition of a utility facility, and also help to propel the fire.

Liability costs: The role of utilities in ignitions are putting significant strain on utility business models and their financial liability.

With temperate to hot climates, coastal winds and an abundance of forests, wildfires are a natural part of the Californian ecosystem. However, several factors are making them more destructive than ever:

- **Fuel accumulation:** Drought and a bark beetle infestation created a mass of dry fuel. The bark beetle infestation led to 120 million dead trees in the Pacific Northwest and Sierras alone.

- **Wind:** California is experiencing a change in wind patterns with stronger and gustier winds throughout the state.

During these wildfire seasons there was a lot of fuel with very dry weather conditions, high temperatures and gusty winds. In these conditions, fires spread very quickly, and created their own weather systems.

RESILIENCE: PREVENTION AND RESPONSE READINESS

The State of California and the CPUC have implemented many different types of short-and long-term prevention measures; vegetation clearance regulations (the most stringent in the country), development of fire threat maps, policy developments around fire-resilient forests, and long-term strategic planning. Utility-specific work has also been undertaken to drive down utility ignitions. This includes the use of coated conductors, undergrounding wires and new legislation on mitigation plans. From 2018, utilities must develop a wildfire mitigation plan with review from CPUC. These plans provide details on utility system design, construction, maintenance and vegetation management.

Response measures include emergency alerting systems, weather analytics, modelling and de-energisation programmes - utilities can proactively shut-off power as a last resort. Breakthroughs in modelling and analytics are being used to develop more effective response practices. For example, satellites can monitor fuel conditions and track fire perimeters but this produces a large volume of data, making processing complicated. Machine learning helps to improve processing and can be used as a big data solution alongside data from sensors, aerial patrols, LiDAR and other advanced surveying techniques. Expanded use of advanced technologies can enable more robust risk management.

During wildfire events, information flow has been critical; dissemination to industry as well as elected officials and the public.

CPUC specifically worked closely with utilities and emergency response partners, such as CalFire, on fire issues ahead of the wildfires. CPUC is currently working on building cross-sectoral partnerships, for example between policymakers, industry and topic experts, as different perspectives are required to develop solutions to prevent and respond to future wildfires. CPUC has brought these stakeholders together to work on action plans.

CASE STUDY:
WEATHER ANALYTICS AND MODELLING

One example of improving weather analytics is San Diego Gas & Electric. It has deployed a weather station in every circuit in the high fire-threat zone. They collect temperature, humidity and wind data which is sent in real-time for monitoring, response and detailed modelling around fire-threat level.

CPUC'S ROLE IN RESPONSE

CPUC coordinates and disseminates information during wildfires, as well as overseeing the utility sector participation. This includes ensuring telecommunications are available and that power is shut off when applicable. CPUC's other role is focused on consumer protection of those affected by wildfires.

RESILIENCE: TIMELY RECOVERY AND ABILITY TO BOUNCE BACK

From CPUC's perspective, recovery was focused on rebuilding the grid as quickly as possible – a process that it oversaw, ensuring utilities did their part to help restore infrastructure. The scale of impact was significant. For example, the October 2017 wildfires led to 350,000 PG&E customers losing power and more that 42,000 gas customers being cut off due to safety concerns. Recovery took close to two weeks. The November 2018 Campfire left 25,000 PG&E electric customers without power, and gas cut for 12,200. Most customers had their power restored within a month, but reconnecting gas supply took several months for many. In some cases, communities impacted by wildfires had their bills suspended under consumer protection. CPUC has been investigating utilities to decide if there were any violations when an event happened, and if liability claims can be passed onto consumers.

Insurance is a growing challenge. Insurability has become a problem across the board as a result of the level of destruction experienced through recent wildfires. Utilities have a difficult time obtaining insurance, as do other sectors and property owners. Preliminary claims data indicated $9.05 billion in actual losses for the 2018 wildfires.

BARRIERS

Working cross-sector: It can be a challenge to break out of silos, but complicated issues like this need communication across response groups, technical experts, government and industry to jointly develop frameworks.

Cost and balancing priorities: Some actions can be in opposition to one another. Spending quickly on a solution does not always address long-term challenges.

Financial/environmental/technical performance tradeoffs: Considering the balance of tradeoffs from the perspective of risk and risk mitigation helps guide resilience decision making. There needs to be a comprehensive way of vetting different approaches.

Scale: Reduction of utility ignitions is complicated due to the scale of infrastructure in California (over 260,000 miles of transmission and distribution lines).

ENABLERS

Technical innovation: Weather analytics, forecasting, satellites, Artificial Intelligence (AI), and machine learning will all improve information quality and understanding.

ANTICIPATION OF FUTURE EVENTS

> **WE ARE SEEING MORE EXTREME WEATHER EVENTS, AND FIRE IS JUST ONE OF THEM.**
>
> **- Elizaveta Malashenko, CPUC -**

Climate adaptation requires looking at the big picture, and CPUC is adopting this longer term mindset. Climate adaptation and long term resilience is also coming to the forefront of operators' minds, but still lacks an established model implementation framework. More extreme weather events are being witnessed, with fire amplifying some of them; the ground gets impacted by wildfires, in turn making areas more susceptible to flooding and mudslides. Analytical frameworks and multi-hazard risk assessments need to be developed to work through these issues.

> **2017 AND 2018 FIRE SEASONS HAVE SHOWN US THAT THE TRADITIONAL APPROACHES ARE FAILING.**
>
> **- Elizaveta Malashenko, CPUC -**