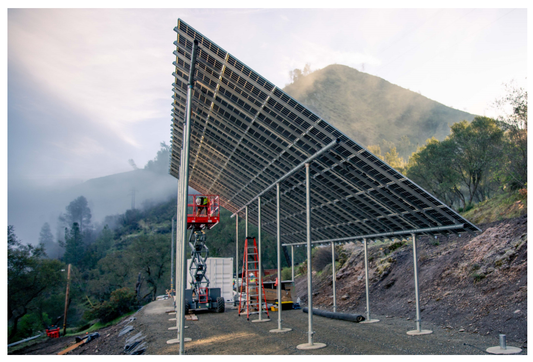
Remote Grids: A Safe and Cost-Effective Solution for Wildfire Mitigation

Why Remote Grids?

As of June 2021, California utilities reported that nearly 40,000 miles of bare powerlines exist in high fire-threat areas. According to CalFire, eight of the ten largest California wildfires have occurred within the past five years. These include the 2017 Thomas Fire and the 2021 Dixie Fire, which were both sparked by utility equipment. In addition, naturally caused wildfires also pose a threat to energy security because they often destroy powerlines and force energy providers to perform scheduled outages or Public Safety Power Shutoffs (PSPS). These statistics — combined with the fact that wildfire season in the Western U.S. is becoming increasingly warmer, drier, and longer due to climate change — are some of the main reasons why both the government and the public are urging utility companies to build a more resilient and reliable grid. One common way utilities are attempting to mitigate their wildfire risk is by undergrounding their power lines. This process, however, has proven to be both costly and time-intensive, as utilities estimate that hardening costs can range from $2-$5 million per mile.

Case #1: PG&E Remote Grid

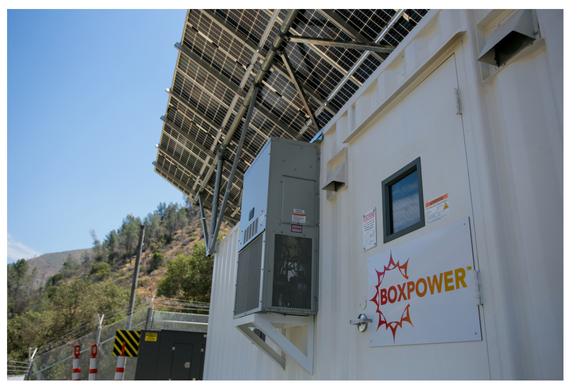


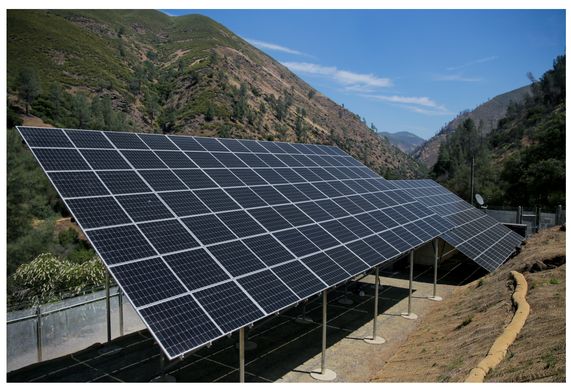
The Problem:

Traditional wires-and-poles infrastructure carries the risk of transmission-sparked wildfires – a major concern across California, and particularly in areas like Briceburg, a remote community located at the end of a long set of distribution lines that ran through forested terrain. Communities served by the grid are also subject to Public Safety Power Shutoff (PSPS) events as part of wildfire mitigation efforts. In 2019, a major fire destroyed the lines that served Briceburg. Installing an integrated solar, battery, and generator SPS represented an opportunity to not only address the utility-related wildfire concerns, but also to increase grid resilience and to reduce greenhouse gas emissions. This solution offers PG&E significant savings over continuing to power the Briceburg site with a diesel generator (the utility's temporary solution) or rebuilding and improving the distribution lines that were destroyed in the 2019 fire season.

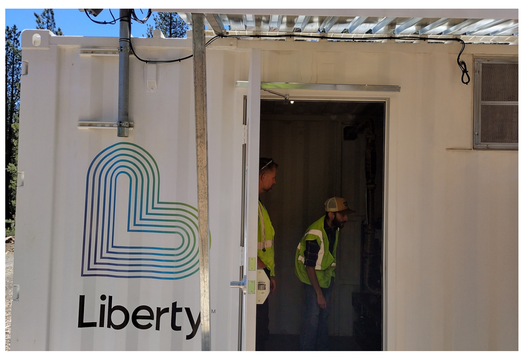
The Solution:

BoxPower developed a dual solar array – one ground mounted and one container mounted – with a nominal PV power of 36.5kW and a 69.12 kWh lithium ferro phosphate battery bank. It can provide up to 27.2kW of continuous power output and a surge capacity of up to 48kW. The system has two integrated 35 kVA propane prime power generators as backup and a fire suppression system to protect the hardware – an especially important feature in this high fire-risk area. PG&E and BoxPower will be able to remotely monitor and control the system via satellite, with performance monitoring, reporting, and automated propane delivery capabilities. To date, this system has experienced 100% relibaility even amidst the recent river storms, snowstorms, and the Oak Fire.





Case #2: Sagehen Field Station Microgrid (Liberty)



The Problem:

In the face of escalating wildfire threats in California, Liberty Utilities sought an innovative solution for the remote Sagehen Creek Field Station, the largest privately operated experimental research forest in the U.S. While traditional wildfire prevention measures like grid hardening were explored, the $3M estimated cost for Sagehen alone proved prohibitive. Through a competitive RFP, BoxPower was brought on board to design and implement an integrated solar, battery, and generator microgrid system, enabling the station to function 'off-grid' during the six-month-long fire season. This resilient solution not only sidestepped wildfire-induced Public Safety Power Shutoff events but also bolstered grid resilience, reduced greenhouse gas emissions, and yielded substantial savings for Liberty Utilities.

The Solution:

BoxPower engineered an advanced islandable microgrid capable of completely powering the Sagehen Creek Field Station during the fire season. The system, encapsulated in a climate-controlled 20' shipping container, comprises a 20kW solar array, 68.4kWh of lithium ferro phosphate battery storage, and a 35kW prime-power propane generator, along with a 14kW bi-directional inverter and a site controller. The system also features an advanced remote monitoring and control system, ensuring autonomous operation and enabling complete remote control and diagnostic capabilities. An essential addition, given the location's high fire-risk, was a fire suppression system designed to protect the system's hardware. The Sagehen system endured the full force of California recent series of storms and operated at 99.9999% reliability.