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California Power Outages

Mitigating the Effects of Planned Blackouts on Small and Mid-Sized Businesses

White Paper 116

Life Is On Schneider Electric

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In 2019, a large California power provider announced that it would cut power to communities when risks of wildfire are high. The blackouts that followed disrupted business operations and impacted the region's economy. Planned outages are expected in future years. This document describes outage impacts and presents options for installing backup power equipment at small and mid-sized businesses.

IMPACTS OF OUTAGES ON SMALL AND MID-SIZE BUSINESSES

In 2018, wildfires ravaged areas of California, fueled by dry conditions and seasonal high winds. By the time the fire season was over, more than 7,500 fires had burned more than 1.6 million acres.[1] As a result, many thousands of people were evacuated from their communities. In the aftermath, communities dealt with lack of electricity, shortages of goods, and disrupted business activity. For many, recovery would require weeks or months. Post-event estimates placed insured losses at more than $11 billion.[2] Figure 1 shows where fires occurred in 2018.

Subsequent investigations found utility transmission lines to have caused some of the fires.[4] To avoid future wildfires, California utilities announced that they would preemptively depower transmission lines during times of high wildfire risk.[5] This would result in blackouts in towns and regions served by affected transmission lines.

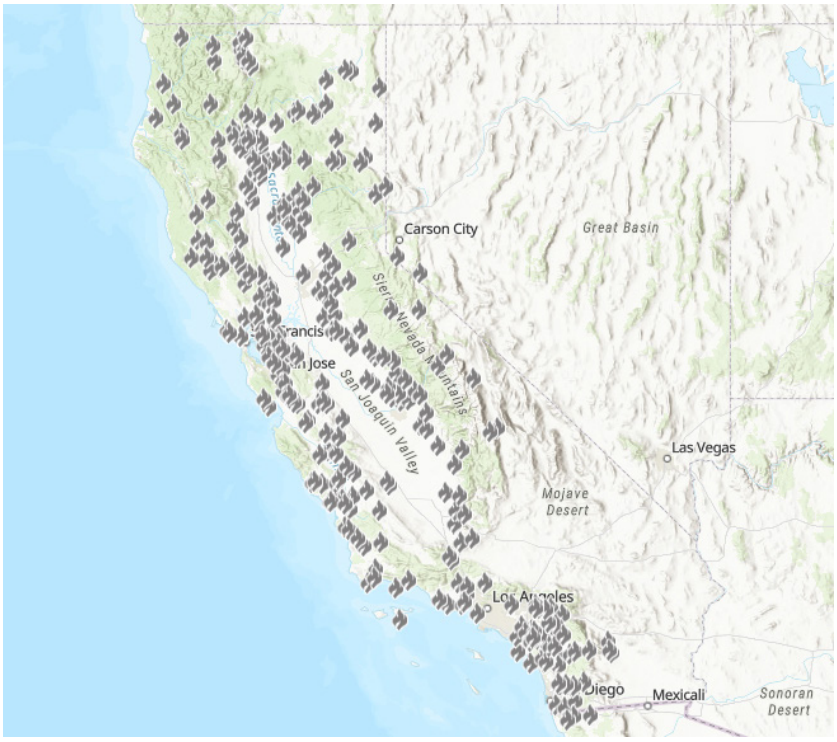

Figure 1: California fire locations in 2018[3]

[1] California Department of Forestry and Fire Protection. 2018 Statistics and Events. 2020. https://www.fire.ca.gov/stats-events/. Viewed February 20, 2020.

[2] R. Gonzales. *California Wildfire Insurance Claims Total $11.4 Billion For November 2018*. National Public Radio. January 28, 2019. https://www.npr.org/2019/01/28/689494921/california-wildfire-insurance-claims-total-11-4-billion-for-november-2018. Viewed February 20, 2020.

[3] California Department of Forestry and Fire Protection. *2018 Incident Archive*. 2020. https://www.fire.ca.gov/incidents/2018/. Viewed February 20, 2020.

[4] P. Evans, I. Penn. *California Says PG&E Power Lines Caused Camp Fire That Killed 85*. New York Times. May 15, 2019. https://www.nytimes.com/2019/05/15/business/pge-fire.html?campaignId=7JFJX. Viewed February 20, 2020.

[5] Pacific Gas and Electric Company. *PG&E Submits 2019 Wildfire Safety Plan*. February 6, 2019. https://www.pge.com/en/about/newsroom/newsdetails/index.page?title=20190206_pge_submits_2019_wildfire_safety_plan_with_additional_safety_precautions_and_significantly_expanded_public_safety_power_shutoff_program. Viewed February 25, 2020.

In 2019, utilities shutdown power in areas of high fire risk. The largest of these included shutdowns in October and November of 2019 that affected hundreds of thousands of customers, leaving some without power for several days.

Anecdotal descriptions of impacts to businesses abound. Some businesses such as fuel stations closed during the outage, reopening after power returned. However, for food-based businesses such as restaurants and supermarkets, the impacts of the outages lingered. Without power, some could not preserve perishable inventory, causing them to remain shuttered until spoiled inventory was removed, and new supplies could be obtained. For many businesses, these types of loses may not be reimbursed by insurance sources. And without point-of-sales systems, retailers found it difficult or impossible to transact business.[6] Industrial firms were similarly impacted by outage-related issues.

Some businesses found creative ways to cope.[7] Despite scarcity, some businesses connected purchased or rented generators to their most essential loads. Retailers relocated perishable inventory to refrigerated transport trailers located in their parking lots.[8] Some companies enabled staff to work from their homes, at least those with homes located outside of outage areas. In one instance, a university laboratory supervised the NASA's launch of a satellite using power hastily connected to its campus cogeneration system.[9]

While the full economic impacts of California's planned outages may not yet be fully realized, the effects on small and mid-sized businesses demonstrated a consistent pattern: *Businesses without access to backup power closed and languished; those that stayed open did so by accessing secondary (if sometimes off-site) power sources.*

Not every business can relocate people and inventory to access power. Many small and midsize businesses do not have an emergency power supply system for their building. Nevertheless, the situation in California may reoccur – the chief executive of California's largest utility indicated that it could take years to reduce the frequency of planned outages.[10]

[6] R. Fong. *Public Safety Power Shutoff*. California Grocers Association. Letter dated October 11, 2019. https://www.cagrocers.com/wp-content/uploads/2019/10/PSPS-Letter-to-Gov-and-PGE-10-11-19.pdf. Viewed February 20, 2020.
[7] R. Haber. *How Some California Companies Got Creative and Dealt with the Power Outages*. Inc. October 17, 2019. https://www.inc.com/matt-haber/coping-with-chaos-for-california-businesses-blackouts-are-becoming-norm.html. Viewed February 20, 2020.
[8] R. Fong. *Public Safety Power Shutoff*. California Grocers Association. Letter dated October 11, 2019. https://www.cagrocers.com/wp-content/uploads/2019/10/PSPS-Letter-to-Gov-and-PGE-10-11-19.pdf. Viewed February 20, 2020.
[9] J. Duncombe. *How to Launch a Satellite During a Blackout*. Eos. January 29, 2020. https://eos.org/articles/how-to-launch-a-satellite-during-a-blackout. Viewed February 20, 2020.
[10] R. Gonzales. *California Can Expect Blackouts For A Decade, Says PG&E CEO.*. National Public Radio. October 18, 2019. https://www.npr.org/2019/10/18/771486828/california-can-expect-blackouts-for-a-decade-says-pg-e-ceo. Viewed February 20, 2020.

ACCESSING BACKUP POWER

In general, larger facilities are more likely to be constructed with a backup power system, many with sophisticated designs and functions to ensure reliable operation commensurate with their business case. For smaller businesses without a backup power system, the most direct way to limit the impacts of outages is to establish access to an onsite source of secondary power.

Obtaining secondary power requires several tasks. First, it is necessary to evaluate which loads should be powered by a backup supply. The most essential loads are associated with life safety and legally required loads, such as the systems and devices that enable people to exist and reenter a facility safely. Next are systems that are essential to the functioning of the business, such as point-of-sale systems that enable retail transactions. Refrigeration systems are essential for any facility that handles perishable inventory, such as a supermarket, warehouse, winery, or food manufacturer. Specific systems can be selected following evaluation of a facility's most critical business needs.

A qualified person or organization can assist in this assessment and then design and provide a backup system to handle the selected loads. Additional information on *National Electrical Code®* (NEC) requirements for supplying loads can be reviewed in ASCO's document entitled ***National Electrical Code Requirements for Emergency Power Transfer Switching***.

Regardless of the eventual backup power system, the solution must provide capabilities for connecting a secondary power source and then switching to and from it when public power fails and restores. Two approaches are available for doing so.

Option 1: Install a Simple Permanent Backup Power System

A simple permanent backup power system is composed of a secondary power source, a transfer switch, and the cabling and equipment to connect them. The most common power source is a diesel generator, most often mounted on a concrete pad outside of the building it powers. Transfer switches can also be mounted on a concrete pad outside of the building, but are most often located indoors. Figure 2 shows a simple permanent system with a transfer switch downstream of the service entrance.

In Figure 2, the transfer switch can be either a manual or automatic model. Manual models require a person to start the generator, then operate the transfer switch to connect loads to the generator. After utility power is restored, a person must retransfer loads to utility, then shut down the generator.

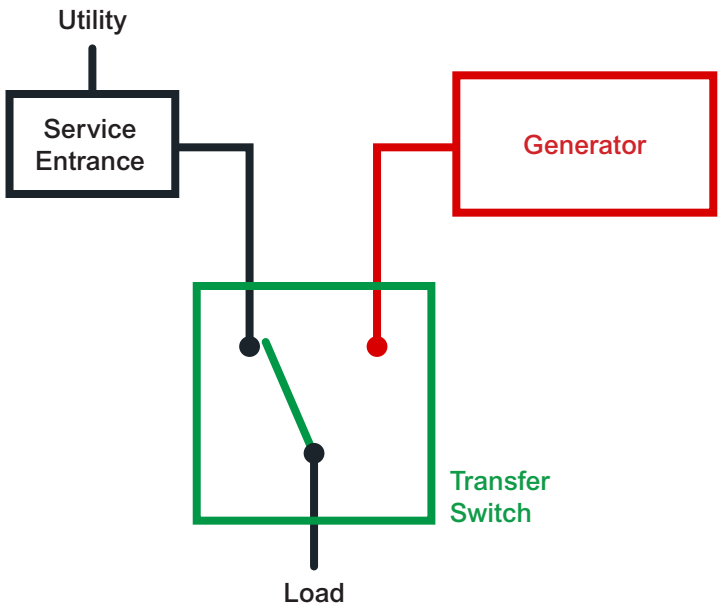

Figure 2: A simplified backup power system

Manual transfer switches offer simplicity and low cost. Because they operate only when a person is aware of the changes in utility status, facilities could be without power until someone executes the transfer, which could be a concern in unattended facilities. In addition, the facility could unnecessarily remain on generator power long after utility power is restored.

Alternatively, automatic transfer switches sense an outage on the normal source, signal the generator to start, then transfer load as soon as the generator produces acceptable power. When utility power is restored, the switch automatically retransfers load and shuts down the generator. Because they operate automatically, facilities can bring backup power online a few seconds after a utility outage commences. Since they operate unattended, facilities are unlikely to experience protracted outages and unnecessary generator run-time.

Transfer switches are available in a wide range of configurations, ranging from advanced customized units that can provide extensive options and capabilities to simpler preconfigured units that can be procured and installed quickly. These latter types are available at lower cost and can offer small and midsize businesses a path for obtaining backup power with less complexity and expense. In either case, these switches bring a permanent solution that avoids the need to procure power generation equipment when outages occur. An example transfer switch is shown in Figure 3.

Figure 3: ASCO SERIES 300 Transfer Switches are preconfigured models suited for commercial and light industrial applications.

Option 2: Install a Low-Cost, Temporary, Backup Power System

When installing backup power equipment, the generator is typically the most expensive item. For facilities where low cost is especially important, or for businesses where immediate backup power is less critical, providing connections for a temporary generator can make sense. When outages are planned, a generator can be rented from a commercial supplier or obtained from another facility. This avoids initial capital outlay as well as the cost of testing and maintaining a permanent generator. Conversely, it requires that provisions be made to obtain, connect, and operate the generator when planned outages are announced or unplanned outages occur.

The key difference for backup power systems that use a temporary power source is that they require a means of connecting the generator when needed. This is provided by installing a manual transfer switch and a connection panel for this purpose. When a generator is brought to the site, cables from the unit are simply connected to the panel, and the system is operated as a manual system. The cost for the panel is far less than the capital cost of a permanent generator.

Connection panels are available as stand-alone units or can be integrated into a transfer switch. These allow facilities to locate each device according to site characteristics and needs. For instance, a manual transfer switch could be installed indoors, while the connection panel is located at the edge of a parking area where the temporary generator would be placed. Alternatively, a site with little room for outdoor equipment could mount a connection panel on an exterior wall, or locate an entire integrated unit outdoors if interior space is limited. Notably, these devices are usually available in indoor and outdoor-rated enclosures. Examples of stand-alone and integrated equipment are shown in Figures 4 and 5. A quick connect panel is shown in Figure 6. For guidance on selecting transfer switches and enclosures, see ASCO documents entitled ***ATS Selection Basics*** and ***Equipment Enclosure Classifications***, respectively.

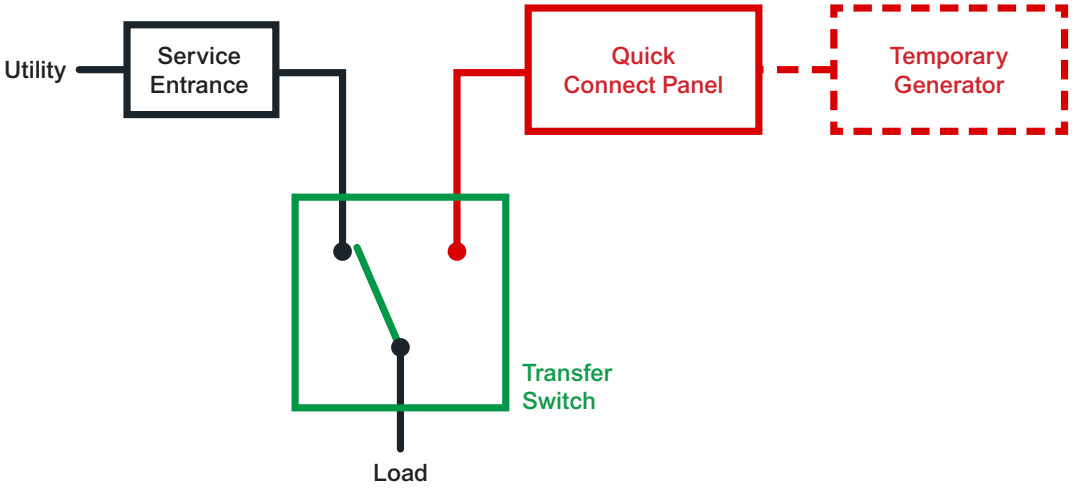

Figure 4: Separate devices provide location flexibility.

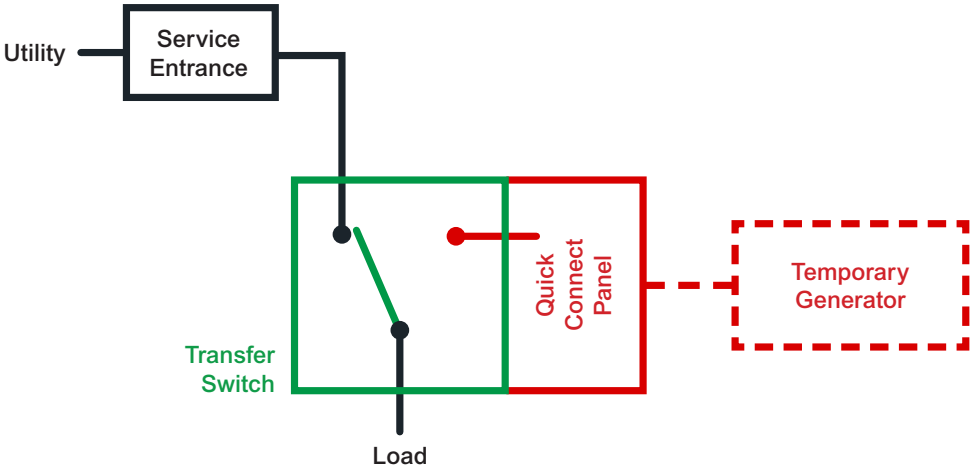

Figure 5: Integrated units offer a compact footprint and streamline installation.

Figure 6: An ASCO Quick Connect Panel

While providing a connecting means enables use of temporary equipment, this solution relies on the availability of a temporary generator when outages are announced and occur. If an outage affects a significant area, temporary generators will be in high demand and could be unavailable. Facilities using this solution should enter into agreements with equipment providers to ensure that generators will be provided when needed.

ADDING TO EXISTING SYSTEMS

Facilities with existing systems may find that their backup systems were not designed to operate for the duration or frequency of outages that may occur under current wildfire prevention practices. For facilities with an existing generator and transfer switch, redundancy may be increased if a second transfer switch and connecting panel is used to add a temporary generator. This can provide a "backup-for-the-backup" that can be used to ensure that backup power remains available when a permanent generator is taken offline for service. Figure 7 shows such a system.

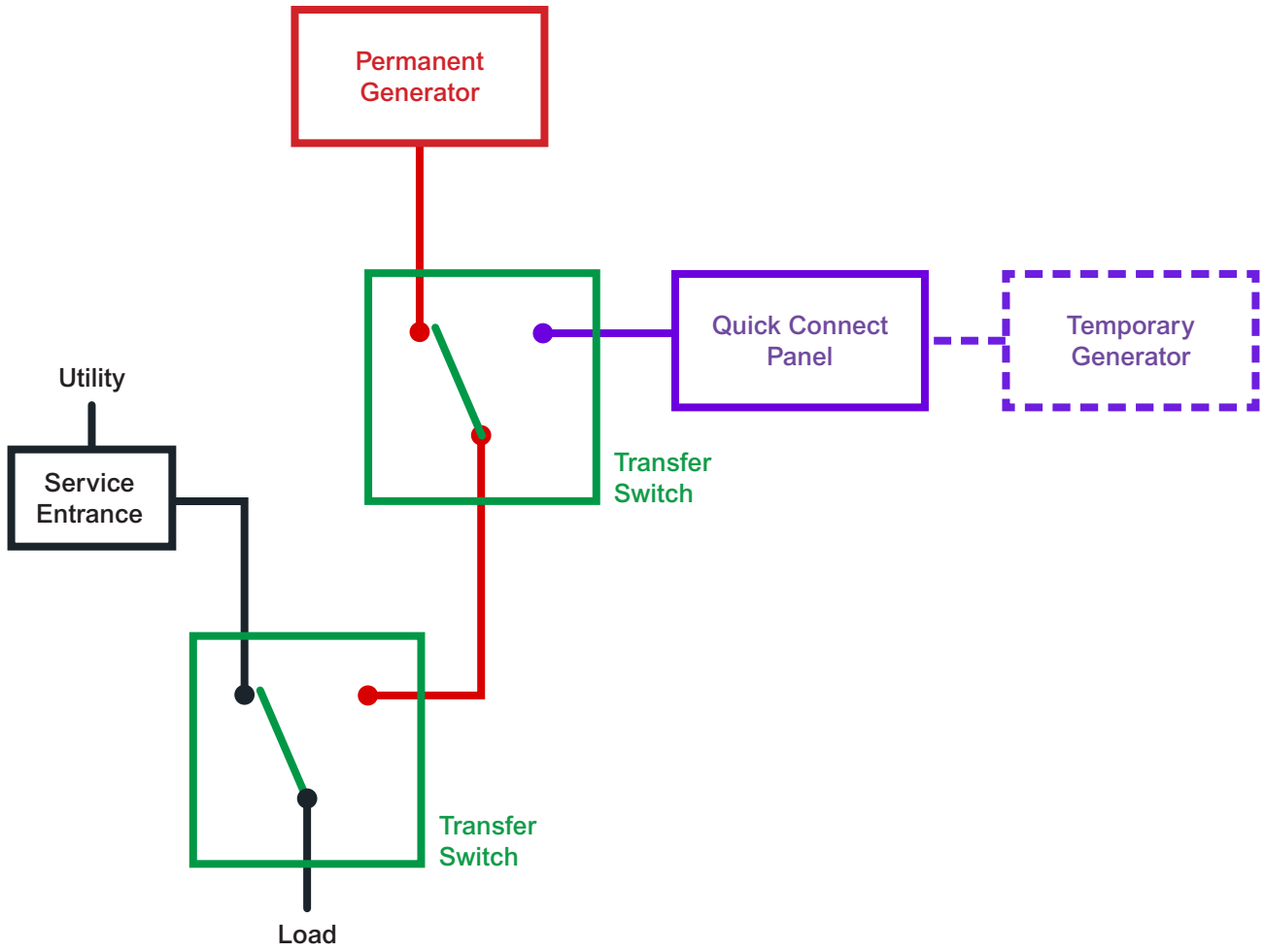

Figure 7: Adding capability for a second transfer switch can increase redundancy.

SUPPLYING FUEL AND ARRANGING SERVICE

Backup generators offer reliable backup power ... as long as they have fuel. When planning to install a backup power system, two fuel considerations are required. First, enough fuel capacity must be provided to assure adequate run-time, particularly as specified by any applicable government regulations or industry codes. In addition, facilities should retain a fuel provider that will provide fuel on a priority basis when outages occur. Likewise, a similar service agreement with a qualified generator service firm may be needed to repair equipment if it should malfunction during an outage. Qualified generator dealers can provide guidance.

SUMMARY

Over the coming years, California utilities foresee additional outages to mitigate wildfire risks when dangerous conditions exist. Small and midsize businesses can access backup power by installing simple backup power systems using preconfigured equipment to power life safety and critical loads. Permanent systems offer the highest assurance of bringing backup power online quickly. Facilities that provide temporary connections can obtain backup power at lower initial cost. Adding a transfer switch and connection panel to an existing backup power system can increase redundancy. With any system, reliable arrangements for fuel delivery and equipment service are necessary to ensure that systems will provide backup power throughout planned and unplanned outages.

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