What Causes a Power Outage

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What Can Cause a Power Outage for Your Business?

From brief power disruptions that throw a wrench into our daily routines to widespread, prolonged grid failures, the experience of losing electricity has become a common occurrence across the U.S. When the power goes out, the effects can range from minor inconvenience (think no TV or air conditioning) to extremely costly (such as lost business revenue, damaged electronics and spoiled food). The consequences can even be downright dangerous; consider the interruption to life-sustaining medical devices or the inability to summon emergency service providers if cell towers are down.

There's no denying that the country's aging power grid, much of which was built in the mid-20th century, is in desperate need of an overhaul. But why, exactly, are we experiencing power outages on an ever-increasing basis?

Types of Outages That Businesses Experience

Electric companies point to three primary types of outages as the most common reasons why organization experience a halt in electricity:

- **Distribution failures** — One of the most common causes of power outages are distribution failures that are sparked by a wide variety of issues, from routine storms to wayward Mylar balloons becoming entangled in power lines to mischievous squirrels foraging for a new

home inside substation equipment. While the majority usually affect a relatively small service area, it is also possible for this type of failure to occasionally leave entire cities in the dark.

- **Transmission failures** — Failures with transmission systems, while rare, can have significant consequences if they spiral into larger issues. Many failures are caused by weather events, but it's also possible for issues such as equipment failure and computer glitches to contribute to these events.
- **Supply shortages** — This type of outage occurs when the demand for electricity exceeds the available supply. Supply shortages are most likely to occur on hot summer days when residents and businesses are blasting air conditioners and electricity demand is at its peak. Although grid operators take precautions to prevent outages when supply is short, occasionally they must implement rolling blackouts, in which power is turned off to a limited number of customers at a time. This measure reduces demand down to a level the utility is able to manage.

The Most Common Causes of a Power Outage

When the lights suddenly go out in the midst of a powerful storm, it's not difficult to ascertain the likely source of the outage. However, many times utility customers have no idea why they've been left in the dark. While wild weather is certainly a prime perpetrator, there are numerous other reasons for power outages. The most common causes of outages include:

Severe Weather

From devastating hurricanes to massive thunderstorms, the wrath of Mother Nature is responsible for impacting utility transmission and distribution systems and leaving millions of customers in the dark each year. Extreme weather events are increasing in frequency, duration and intensity, wreaking havoc on an already-vulnerable power grid. Although weather has always been a leading cause of power outages, experts say climate change is largely driving the escalation of severe weather events. Data compiled by Climate Central confirmed that between 2011 and 2021, the average annual number of weather-related power outages increased by approximately 78% compared to the previous decade.

Each season ushers in a variety of threats to the electric power system. In winter, for instance, power lines can snap under the weight of snow and ice buildup, while wind frequently causes line to rub together, resulting in a fault or short circuit. And don't assume you're safe during the summer; heat waves often cause transmission lines, transformers and

other equipment to overload due to increased demand. Extreme heat can also spark service interruptions by causing lines to sag, cables to fail and underground circuits to short out.

Fallen Trees

From tree-trimming efforts gone amiss to wild windstorms that blow branches onto power lines, trees are at the root of numerous power outages, no pun intended. Heavy snow and ice can also weigh down tree branches, causing them to snap and fall on power poles and wires.

Wildlife

They may be cute, but small critters are the culprits behind hundreds of outages each year. When squirrels, rodents, raccoons and other animals climb into or onto utility equipment such as transformers or fuses, it can cause a short circuit that interrupts the flow of power and subsequently causes outages. Bird activity is another frequent source of power cuts, either from fowl nesting on power lines or inadvertently flying into them. Other animals that have been blamed for blackouts include cats, beavers, chipmunks, snakes, frogs, iguanas and even swarms of bugs.

Motor Vehicle Accidents

Cars colliding with utility poles represent another common cause of outages, particularly in regions where snow and ice is prevalent. When vehicles come into contact with power poles, it can cause the lines to collapse and trip the circuit. Crashing into trees isn't much better, as branches can collapse on top of nearby power lines.

Equipment Failure

Considering the age of the U.S. power grid, it's not surprising that equipment failure ranks among the most common causes of power outages. From problems with underground cables, to issues with distribution systems, to short circuits in electricity equipment, aging or faulty equipment is a leading source of blackouts.

Natural Disasters

Massive power outages are often left in the wake of natural disasters, including hurricanes, tornadoes, earthquakes, floods, tsunamis, landslides and wildfires. At times, natural disasters

may also prompt preemptive power shutoffs by a utility company, such as when high winds threaten to fuel wildfires.

Construction Work

Accidents resulting from operator error with construction vehicles is yet another frequent source known to cause blackouts. Underground lines have been damaged by excavation digging that goes astray and by landscapers who inadvertently dig too deep. Furthermore, heavy equipment such as cherry pickers, tractors and bulldozers can set off a power outage by knocking down utility poles or wires.

Intentional Damage

There have been increasing occurrences of outage-inducing damage to utility equipment from vandals that cause deliberate destruction. In addition, the skyrocketing cost of metals has prompted thieves to steal wire and other components for the copper inside of utility company substations, often risking their lives to do so as the systems are usually energized.

High Energy Demand

Though fairly infrequent, there are times when a power outage stems from energy demand that exceeds the available supply. Supply shortages are most likely to occur on very hot days when consumers collectively blast air conditioners. To deal with high demand, utilities are sometimes forced to initiate power shutoffs known as rolling blackouts, an occurrence that has become almost routine in states such as California.

Planned Outages

With so many “natural” outage instigators, it may come as a surprise that there are times when a utility company intentionally shuts off power, either for a planned outage or as a Public Safety Power Shutoff (PSPS). During a planned power cut, a utility may need to temporarily turn off a certain portion of the grid in order to perform routine maintenance or make a needed repair or system upgrade, although many times maintenance can be performed without cutting power. PSPS events, which have been on the rise in states such as California, are initiated in an attempt to prevent wildfires from being sparked by transmission and distribution lines during dangerous winds. Rather than run the risk of being held responsible for a potential fire catastrophe, the electric company shuts off power preemptively.

Cyberattacks

The number of cyber-criminal operations targeting utility operations is on the rise, with experts revealing that multiple hacking groups have the capability to interfere with or disrupt power grids across the U.S., potentially resulting in massive outages that could leave entire cities in the dark. Nations and criminal groups pose the most significant cyber threats, according to the Director of National Intelligence. Not only are these threat actors increasingly adept at attacking the grid, but utility systems have become increasingly vulnerable to cyberattacks due to industrial control systems and the rise of distributed resources, according to research from the U.S. Government Accountability Office.

What Are the Types of Power Problems?

Power outages are responsible for costing businesses an estimated $150 billion per year in losses. But what many may not realize is, it doesn't take a complete loss of electricity to wreak havoc on sensitive electronic equipment. In addition to power failures, there are eight other power-related menaces capable of destroying electronic components, causing data processing errors and resulting in lost data, among other issues. The nine common power problems identified by the Institute of Electrical and Electronics Engineers (IEEE) include:

1. **Power failure** — Also known as a blackout, a failure represents a complete interruption of the electrical supply and can be sparked by a variety of sources.
2. **Power sag** — This sudden drop in normal voltage level is usually caused by faults on the transmission and distribution network, connection of heavy loads or start-up of large motors.
3. **Power surge —** These very fast voltage variations are triggered by lightning, line or capacitor switching, and disconnection of heavy loads.
4. **Undervoltage** — Also termed a brownout, this voltage drop typically lasts from a few minutes to a few hours and is often caused by overdemand or intentional "throttling" of electricity during peak demand.
5. **Overvoltage** — These momentary voltage increases are generally caused by starting/stopping of heavy loads, poorly dimensioned power sources and poorly regulated transformers.
6. **Line noise** — Electromagnetic interference or improper grounding most often produce these superimposed high frequency signals on the waveform.
7. **Frequency variation** — This loss of stability in a power supply's normal frequency of 50 Hz or 60 Hz most often results from heavily loaded generators.

8. **Switching transient** — These momentary changes in voltage or current can stem from lightning, switching of loads and capacitor banks, opening and closing of disconnects on energized lines, re-closure operations and tap changing on transformers.
9. **Harmonic distortion** — This distortion of the normal power wave is generally transmitted by unequal loads and can result in resonance, overload, and overheating of cables and equipment, among other problems.

What to Do If Your Business Experiences a Power Outage

Until the U.S. power grid becomes more resilient, experts warn that we can expect to endure longer and more frequent power outages. The best way to safeguard your organization against the potentially devastating costs and consequences of downtime is to properly prepare. Developing a business continuity plan (BCP) that includes defined power outage procedures — or ensuring that your existing plan has been recently updated — will help keep your equipment, data and operations optimally protected until the utility restores power. Interested in learning more about how to implement a BCP and establish power outage procedures for your business?

Contact Unified Power Today to Protect Your Business Against a Power Outage

While power issues have the ability to cause significant and costly damage, the installation of a proper power quality solution is your first line of defense against all nine of the most common power problems. For more than two decades, Unified Power has been providing nationwide critical power equipment and services, including preventive maintenance and emergency response. We offer comprehensive power solutions customized to fit the needs of every business, including UPSs, backup generators, DC plants, power distribution units (PDUs) and more. Our solutions and services can help you keep power losses from becoming business losses.

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