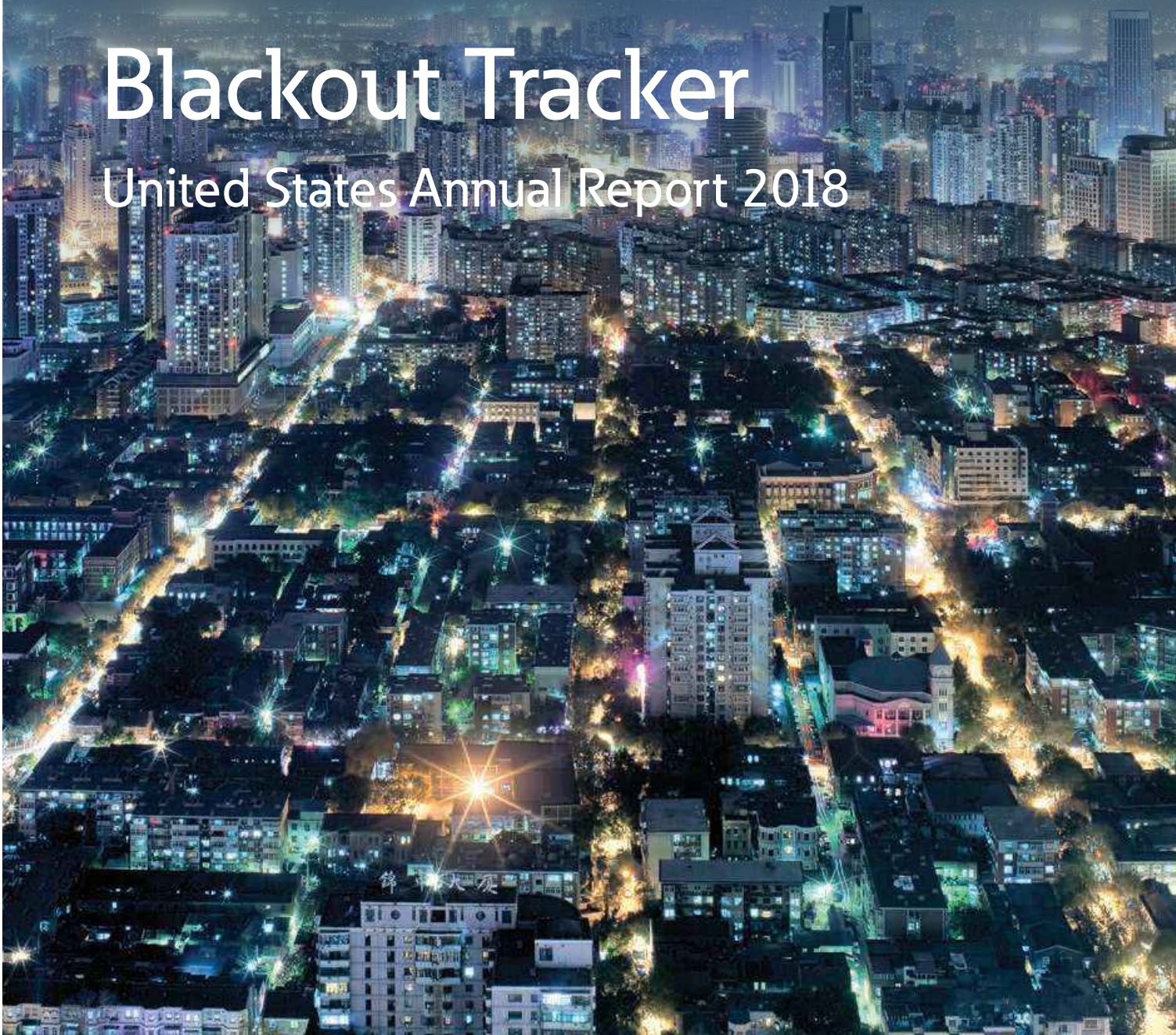


Power outage annual report

# Blackout Tracker

## United States Annual Report 2018



**EATON**  
*Powering Business Worldwide*

Switch  N to Eaton.

# Introduction

Those who have followed Eaton's annual reports over the past decade will undoubtedly notice some changes to this year's edition. To begin with, the 2018 report is significantly condensed, a stark contrast to our previous publications that averaged 70 pages.

## Table of contents

### 3 Power quality in the news

- Report says U.S. unprepared for "catastrophic" power outage
- New Uptime Institute study: good news, bad news
- Cyber threats take center stage among IT pros, utility companies
- Forget Russian hackers; your smart appliances could also take down the grid
- Smart grid investments improve reliability, slash outage restoration time
- Shift into revenue-generation mode with a dual-purpose UPS
- Earthquake gives Alaskan power supply a shakedown
- Power outages can be hazardous to your health
- From Black Friday to Blackout Friday
- Mylar mayhem

### 7 The impacts of 2018 blackouts by industry

- Data centers
- Education
- Healthcare
- Airports
- Government
- Sporting events
- Entertainment venues

### 9 A state-by-state snapshot of blackouts

### 10 The top 10 most significant outages of 2018

### 11 The top 10 most unusual outages of 2018

### 12 What you can do to protect your business

**We've opted to turn the page on the historic Blackout Tracker Annual Report and unveil this fresh new edition. In addition to sharing some of the year's most compelling stories associated with power, we explore the impacts of blackouts on a variety of specific industries.**

You will also find information about some of the biggest outages to wreak havoc on residential and business customers over the past year, all compliments of Mother Nature. And those eager to catch the year's most obscure blackouts won't be disappointed, as we once again divulge some of the strangest outage instigators of 2018 (spoiler alert: zombies!). Finally, we also provide some valuable information to ensure you and your organization are properly safeguarded against power outages that could affect you and your business.

As in the past, this document is based on reported power outages in the U.S., with data sources that include news services, newspapers, websites (including those of newspapers and TV stations) and personal accounts.

# Power quality in the news

## Report says U.S. unprepared for “catastrophic” power outage

**Large sections of the U.S. could be left without power for months or even years should a blackout of “catastrophic” proportion occur, according to a draft report released by the President’s National Infrastructure Advisory Council (NIAC) in early December. Tasked with considering the ramifications of this type of unprecedented event, the agency examined the country’s ability to respond to and recover from an outage “of a magnitude beyond modern experience, exceeding prior events in severity, scale, duration and consequence.”**

While the U.S. has never encountered such an event, experts contend it is not implausible that an outage of this magnitude could be sparked by a variety of incidents. Heading up the list is a sophisticated cyberattack causing severe physical infrastructure damage—a threat that has already emerged as one of the biggest worries among IT professionals. Other causes for concern include attacks timed to follow and exacerbate a major natural disaster; a large wildfire, earthquake or geomagnetic event; or a series of closely timed events that collectively create significant physical damage to the nation’s infrastructure.

Although local and federal agencies have greatly improved their ability to respond to severe weather and other emergencies, a blackout of this scale would quickly overwhelm resources. Furthermore, the report emphasizes that such an outage would present a “profound risk” to the nation, with cascading effects on sectors such as drinking water and wastewater systems, communications, transportation, healthcare and financial services.

Calling for a variety of actions, the report recommends clarifying the federal agency that would be in charge; identifying which agencies would be involved in the process; hardening critical infrastructure to meet new resilience standards; and establishing community enclaves that co-locate services and resources. NIAC also suggests developing a “flexible, adaptable emergency communications system” that is self-powered, protected against any potential disaster and can be used across multiple sectors. The organization deems the ability for power companies to communicate with each other and the government during a crisis as “the lynchpin” for restoring electricity, and emphasizes that the threat of a catastrophic power outage demands a clear national focus.

## New Uptime Institute study: good news, bad news

**An assessment released in 2018 by the Uptime Institute revealed that data centers are managing power better than ever before. But before kicking off any celebrations around this statistic, you may want to reflect on this: the report also found an increase in the rate of failures. The Global Data Center Survey, which probed nearly 900 data center operators and IT practitioners from facilities of all sizes, revealed that power usage effectiveness (PUE)—a measure of the power needed to operate and cool a data center—reached an all-time low of 1.58.**

This compares to an average PUE of 2.5 in 2007, 1.98 in 2011 and 1.65 in 2013. Yet, the Institute also exposed a concerning trend of power outages on the rise. In fact, the number of infrastructure outages and “severe service degradation” incidents increased by 6 percent, representing 31 percent of those surveyed having experienced an outage at their own site or at a service provider’s.

The discoveries drew questions about whether placing so much focus on PUE and efficiency is somehow leading to more—and bigger—outages. While acknowledging it’s “possible” the two are related, Uptime officials stopped short of correlating the findings, and instead suggested a different cause for the increased number of failures: the trend toward data center consolidation. Officials said as organizations move workloads from secondary to primary ones in a time-intensive process, they often fail to invest in the secondary site being decommissioned. As a result, wear and neglect creep into a data center, making it more likely to fail.

Another source for potential problems is the cascading effect, when one data center failure leads to others going down. In fact, 24 percent of Uptime survey respondents said they were impacted by outages that occurred across multiple data centers. This glitch can happen between two private data centers or in a hybrid situation where an on-premises center is connected to a third-party provider such as Amazon or Microsoft. Furthermore, the Uptime Institute predicts that the number of outages caused by cascading failures could escalate even higher as companies increasingly adopt multiple cloud services strategies, coupled with a growing interdependency of multiple IT services. While a hybrid architecture can make an organization more resilient, it can also decrease visibility and accountability, possibly leading to more outages.

The survey’s respondents reported that most of their organization’s downtime incidents lasted one to four hours, with leading causes identified as power outages (33 percent), network failures (30 percent), IT staff or software errors (28 percent), on-premises non-power failure (12 percent) and third-party service provider outages (31 percent). Interestingly, nearly 80 percent said their most recent outage could have been prevented.





## Cyber threats take center stage among IT pros, utility companies

**IT pros are losing sleep over cybercrime. In fact, a recent survey by digital threat management firm RiskIQ found that IoT and cybersecurity now rank among the biggest worries of IT professionals. Meanwhile, a separate survey revealed that almost half of power and utility CEOs believe a cyberattack on their company is inevitable, according to 2018 KPMG CEO Outlook: Power & Utilities.**

If these threats are not properly addressed, the implications can be grave; potential consequences of an IoT data breach include damaged reputation, downtime, the loss of sensitive personal or enterprise information, and distributed denial-of-service (DDoS) attacks designed to paralyze major websites. Considering the severity of possible outcomes, it's not surprising that the global cost of cybercrime is projected to reach \$2 trillion by 2019, representing a threefold increase from the 2015 estimate of \$500 billion.

Cybersecurity risks are growing not just in the magnitude of disruption but in prevalence, with attacks against businesses nearly doubling in five years, according to the World Economic Forum 2018 Global Risks Report. As these threats become increasingly common, organizations must ensure their connected technology is secure and resilient. With the proliferation of smart, connected devices linking together more elements of everyday life, it is essential for consumers to seek vendors who demonstrate an ongoing commitment to ensure their products meet the highest standards.

Eaton has already made cybersecurity a top priority, a commitment underscored by the new Gigabit Network Card (Network-M2), the first Uninterruptible Power Supply (UPS) connectivity device to meet the UL 2900-2-2 cybersecurity standard. Other endeavors we have taken to bolster our overall cybersecurity approach include collaborating with Rochester Institute of Technology to develop real-world cybersecurity training environments, as well as opening an innovation center in Pune, India, where products can be tested to aspects of the UL cybersecurity standards. This new lab complements our existing cybersecurity research and testing facility in Pittsburgh, which was the first lab approved to participate in UL's Data Acceptance Program for cybersecurity.

## Forget Russian hackers; your smart appliances could also take down the grid

**In recent years, the vulnerability of the U.S. power grid has come under widespread scrutiny. Perhaps most notably, in March, the Department of Homeland Security and the FBI blamed "Russian government cyber actors" for a multi-stage effort that targeted small facilities' networks with malware, spear-phishing and remote access into energy sector networks. Experts also believe the 2015 and 2016 Ukraine power outages were the work of cyber attackers in a "dress rehearsal" for executing the same plot on the U.S.**

This compares to an average PUE of But researchers from Princeton University believe hostile nations may not be the biggest threat to the grid. Instead, they suggest we should be more concerned about attacks from smart air conditioners and other internet-connected, high-wattage appliances.

If you're not buying into the notion of an Attack of the Killer Appliances, consider this: equipment such as smart air conditioners and hot water heaters have the ability to be looped into a botnet—a network of private computers infected with malicious software and controlled as a group without the owners' knowledge—then forced to amplify their electrical demands. As a result, the grid could quickly become overloaded, leading to potentially massive cascading blackouts. The researchers, who labeled the theoretical attacks BlackIoT, explain that an IoT botnet would give adversaries the ability to launch large-scale, coordinated attacks on the power grid.

After studying five possible variations of these attacks, the team estimated that in a power network serving 38 million people—a population roughly equal to the state of California—just a 1 percent surge in demand could be enough to take down the majority of the grid. Furthermore, they warn that a disastrous bump in demand could result from a botnet as small as a few tens of thousands of hacked electric water heaters or a couple hundred thousand air conditioners



## Smart grid investments improve reliability, slash outage restoration time

**It's no secret that the U.S. is in desperate need of grid modernization and improvements to the nationwide transmission line system. Yet, progress can be slow due to the cost and complexity of executing these upgrades. In the meantime, utility companies are increasingly deploying smart grid technologies to help speed outage restoration after major storms, reduce the number of affected customers and improve overall service reliability.**

Today's energy producers and distributors must be smarter and more efficient than ever; not only does the U.S. Energy Information Administration predict that by 2040 electricity consumption will skyrocket by 28 percent, but an estimated \$150 billion is lost annually to power outages. Clearly, increased reliability is vital.

To accomplish this, many utility companies are investing in smart grid technologies such as advanced metering infrastructure (AMI), automatic fault location, isolation and service restoration (FLISR) and automatic switching devices.

Georgia Power, for instance, credits smart grid technologies with improving reliability and helping the company avoid more than 280,000 hours of potential power outages for customers in one year. With more than 1.2 million customers across the state connected to an automated network with new upgrades, the network ranks among the most advanced in the country, with more than 715 self-healing circuits that can automatically isolate problems and restore power. The enhanced distribution technologies help the utility pinpoint the location of an issue, more efficiently dispatch crews and reduce overall outage durations for customers.

Three other utilities that participated in the U.S. Department of Energy's Smart Grid Investment Grant program enjoyed similar outcomes. By embracing outage management approaches that included the use of smart grid technologies, all three accelerated service restoration and limited the number of affected customers during major storms. Furthermore, because the utility companies required fewer crews during restoration and used repair personnel more efficiently, it reduced restoration costs and total outage time. In turn, business and residential customers experienced fewer financial losses since the reduction in outage time limited lost productivity, public health and safety hazards, food spoilage and inconvenience from schedule disruptions.

## Shift into revenue-generation mode with a dual-purpose UPS

**Imagine if data center UPS battery banks had the ability to help you bank some extra cash. Well, now they can, thanks to lithium-ion batteries and new technology developed by Microsoft and Eaton. In fact, by relying on dual-purpose technology, lithium-powered UPSs can help organizations reduce costs, create new revenue streams and support a wide array of grid initiatives, while still providing a vital backup solution...**

While most hyperscale, multi-tenant and other large data centers house significant battery banks to provide adequate runtime in the event of a blackout, they primarily sit unused because power outages occur infrequently. Lithium-ion batteries, which provide a longer lifespan and eight times the cycle rate of traditional VRLA batteries, enable large-scale data center operators to leverage these underutilized batteries, transforming their UPS into a profit center.

Here's how it works: the data center maintains control of its energy, choosing how much capacity to provide and when. By converting power backup into a grid-aware energy storage device, operators gain a range of benefits, including lower energy bills and optimized consumption. Potential grid initiatives include providing peak shaving discharges to help avoid or reduce demand charges; shifting energy consumption for time-of-use optimization; and relying on frequency regulation to help grid operators meet explosive growth demands.

The implications of the dual-purpose UPS are enormous, as the technology can be used to lower demand and peak time charges, as well as contribute to clean energy goals. Considering the fact that a 1 MW data center will devour 160M kW hours of energy over a 10-year period—equivalent to the amount consumed by 1,400 typical U.S. households in the same time span—substantial savings can add up quickly. With an estimated payback period of three to seven years, data center operators can use the technology to create a new revenue stream while simultaneously safeguarding critical IT equipment.

## Earthquake gives Alaskan power supply a shakedown

**It's fairly common for heavy snow or ice to blanket power lines, weighing them down and resulting in power outages. But sometimes Mother Nature comes in with more of a jolt. Such was the case on the morning of November 30, when tens of thousands of customers were left in the dark after a 7.0 magnitude earthquake struck Anchorage, Alaska—shaking buildings, damaging highways and prompting a tsunami warning.**

By evening, the four utilities serving the greater region were all supplying electricity to their service territories, but repairs to reconnect individual customers or co-op consumer-members were ongoing, according to the Alaska Power Association. Hardest hit was Matanuska Electric Association, which saw 16 of its 21 substations go offline immediately following the quake. With approximately 49,000 meters out of service, all available crews worked on reconnecting power, with almost all members restored within 15 hours of the earthquake.

Homer Electric Association reported that it experienced some outages from the earthquake tripping lines, but its power plants suffered no damage and generators were working as expected. The other two utilities, Alaska Village Electric Cooperative and Cordova Electric Cooperative, had no damage and continued operating normally.

# Power outages can be hazardous to your health

For most, the occasional blackout falls somewhere on a spectrum of inconveniences, from the nuisance of losing Wi-Fi and the inability to view a favorite TV show to dealing with spoiled food in refrigerators and freezers. For organizations without adequate power protection, outages can also spark much more serious consequences, including downtime, equipment damage and lost data.

But sometimes losing electricity can be downright dangerous, even deadly.

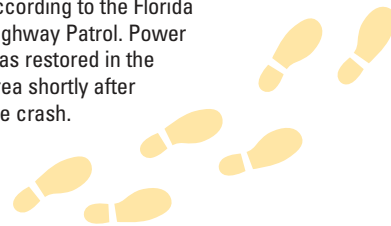
## Consider some of those types of incidents that occurred in 2018:

### A true tragedy.

There were conflicting theories about the death of a 57-year-old woman following a July 29 Brooklyn, N.Y., blackout. The outage—which struck a housing complex powered by a privately run electrical grid—plunged 46 buildings into darkness and trapped frightened residents in elevators. Although officials said it appeared the outage didn't cause the woman's death, her family insists that the two machines she relied on for breathing were powered by electricity, which in turn led to her passing. The victim, who suffered from chronic obstructive pulmonary disease, was alive when the family called 911, but had died by the time an ambulance arrived.

### Crosswalk catastrophe.

A 74-year-old pedestrian was killed during a Dec. 20 power outage in Southside, Fla., after he walked across an intersection without functioning traffic signals or light poles. The man was struck by a Nissan Titan, according to the Florida Highway Patrol. Power was restored in the area shortly after the crash.



### 911 emergency.

When a blackout strikes, some citizens mistakenly dial 911 for help. But residents of Thompson Falls, Mont., couldn't even attempt that, after a Dec. 30 outage knocked out 911 service for those who really needed it. The Sanders County Sheriff's Office reported that the outage not only took the 911 center's phone systems offline, but also killed texting capabilities. All services had to be temporarily rolled over to another county.



### If he couldn't have power, then nobody could.

A New Jersey man whose home was left without power for multiple days threatened to kidnap a utility company employee and blow up a substation. Vernon police said the 63-year-old was charged with making terroristic threats after he called Jersey Central Power & Light, became agitated while speaking with a utility staffer, then threatened to kidnap an employee. The man, who lost electricity in early March following a severe nor'easter, also made threats that he "knew how to make bombs" and would blow up a substation "so nobody could have power." Police arrested him a short time later at his home.

### No get-out-of-jail-free cards.

A Sept. 27 power outage at Al Cannon Detention Center in North Charleston, S.C., prompted deputies to surround the jail's perimeter. While emphasizing that the facility was still fully secure, deputies remained as an extra precautionary measure while crews worked on the power issue, according to the Charleston County Sheriff's Office.



### Be careful what you reach for during a blackout.

A woman who was looking to light a candle in her Bridgeport, Conn., home during a Sept. 6 power outage mistook a stick of dynamite for the candle. She suffered severe hand injuries when the stick went off in her hand and was taken to the hospital. Authorities said one of the home's windows was blown out and firefighters found another explosive device in the residence. As a precaution, neighbors on either side were evacuated and the police bomb squad was called in to remove it.



### And be careful what you drink.

A windstorm that struck Shoreline, Wash., Dec. 14 caused 130,000 gallons of sewage to overflow into Puget Sound after a blackout affected King County's Richmond Beach Pump Station. Power was out at the pump station for approximately two hours, but authorities said there were "no ill effects in water quality" found following the overflow.



### From Black Friday to Blackout Friday.

On Nov. 23, in Wilmington, N.C., an outage plunged shoppers into darkness at Independence Mall. Power was lost to the entire mall around 3:35 a.m., but only JC Penney was open at the time. Workers had to escort customers out and hold their items in carts for later purchase. The one-hour cut was attributed to a transformer issue.

Meanwhile, New Yorkers who planned to get to their Black Friday shopping destinations via the Long Island Rail Road had to make alternate plans after a Thanksgiving blackout interrupted service. The LIRR said its signal system suffered extensive damage at multiple locations due to a power line going down. As a result, service was disrupted and delayed on the Babylon, Long Beach, Far Rockaway and West Hempstead lines.

### Mylar mayhem.

Foil-coated balloons and power equipment don't play well together, but there remains no shortage of reports every year regarding contact between the two. Metallic balloon properties can cause a surge of electricity when touching equipment, often resulting in a blackout.

For example, Mylar balloons caused more than 20,000 Southern California Edison customers to lose electricity July 27 after tangling with a substation. And metallic streamers that landed on power lines during an annual Fourth of July parade in Kailua, Hawaii, were blamed for an outage affecting 1,935 customers, including local businesses. Officials also held balloons liable for a blackout that affected hundreds of Queens, N.Y., residents on Dec.

10. A Con Edison spokesperson said the helium inflatables hit an overhead power line, leaving 1,500 customers in the dark for two hours. The following day, balloons caused an outage for 200 residents in Key West, Fla. Keys Energy Services found pieces of scorched balloons, some still on fire.

# The impacts of 2018 blackouts by industry

The costs and consequences of power outages are often difficult to calculate and can vary dramatically depending on the industry.

**Losses generally represent a best-estimate of factors, including lost productivity, manufacturing disruptions, damaged inventory and lost sales, the majority of which are not recoverable. Potentially even more damaging is the impact of outages on customer confidence, which can also negatively impact an organization's future revenue.**

A 2016 Ponemon Institute study estimated the cost of a U.S. data center outage has grown to \$8,851 per minute. The toll can scale even higher for healthcare organizations, which face an average cost of \$690,000 per outage, according to Ponemon. That price tag doesn't even factor in how the loss of power at hospitals can be life threatening. Manufacturers and financial service companies also tend to suffer significantly from blackouts, as do industries that deal with perishable products, from food to pharmaceuticals.

Disturbingly, S&C's 2018 State of Commercial & Industrial Power Reliability report found 18 percent of companies experienced a loss of more than \$100,000 as a result of their worst outage, while half of customers endured outages lasting more than one hour over the past year. The same survey revealed that 25 percent of companies reported experiencing at least one outage per month.

**What follows is a snapshot of some of the most notable outages of the past year related to specific industries:**

## Data centers

Not even corporate giants are immune to power outages, a reality Amazon and Microsoft discovered firsthand in 2018. Amazon blamed human error for a March 2 outage that took down scores of large internet sites for several hours. The company said an employee who was debugging a billing system issue accidentally took more servers offline than intended. That misstep initiated a domino effect that knocked out other server subsystems, including those that are part of S3, Amazon's popular web hosting service. When the S3 servers went down, they disrupted web services for numerous Amazon clients, including Quora, Trello and IFTTT.

Another major fiasco occurred Sept. 4 when a Microsoft data center in Texas overheated, causing widespread outages that affected business users of the company's Azure services such as Office 365. Microsoft explained that after a lightning strike knocked out power at its data center complex, a cooling system malfunction led to a temperature spike, forcing the shutdown of equipment to prevent an even more catastrophic failure. One of 10 regions around the world that hosts Azure cloud services, the site's outages cascaded to some global customers due to cross-service dependencies. Full restoration of Azure services in the region took 21 hours.

## Healthcare

Sometimes access to continuous, clean power is literally a matter of life and death. Numerous medical facilities across the nation were forced to evacuate patients throughout 2018 due to power outages. Thankfully, Fort Lauderdale, Fla.-based Kindred Hospital was able to transfer eight critically ill patients on ventilators to nearby Broward Health Medical Center after a May 11 blackout left the facility without power. Similarly, some patients at Tennessee's Lauderdale Community Hospital were forced to relocate following a Dec. 31 outage. The only hospital for miles, the facility had to run on a generator for hours after the power shut off. Metroplex Health System in Killeen, Texas also had to transfer all patients to other nearby medical facilities on Sept. 22 after electricity was cut at the hospital. Nearly 14 hours later, crews were still working to restore power. And it was

an overnight departure for residents of a nursing home in Lauderdale Lakes, Fla., after an iguana climbing on a power pole cut electricity to the facility on Sept. 29.

While evacuations aren't always necessary, unexpected closures at medical facilities remain extremely inconvenient and costly, requiring patient appointments to be rescheduled and disrupting a variety of services. Pennsylvania's Meritus Urgent Care, Meritus Medical Laboratory, Meritus Family Medicine and Meritus Pediatric and Adult Medicine all temporarily closed the morning of Sept. 9 due to a power outage in the Sylvania Center building. Furthermore, a May 3 power outage at the central tower of St. David's South Austin Medical Center in Texas prompted authorities to reschedule all non-emergency surgical cases.

## Education

Affecting learning institutions from preschools through universities, the past year's blackouts made it clear the education sector lacks a lesson plan for escaping the impacts of power outages. Not even the nation's most prestigious campuses are immune from unexpected cuts, as Stanford University discovered on Oct. 24 when a cable failure knocked out power to about 50 buildings on the sprawling campus. The cut not only forced classes to be cancelled, but also posed an alarming safety risk. At the time, there were students working in labs with hazardous materials, all of whom were told to immediately stop their experiments and leave the building.

California State University, Sacramento was another higher ed victim, when aging infrastructure wreaked havoc with the power supply on Jan. 22. The unexpected campus-wide blackout—attributed to old switchgear failing—shut down buildings and prompted the cancellation of classes. And it was a curious squirrel that caused a Jan. 3 electrical outage at San Jose State University, leading officials to cancel classes, send all non-essential staff home, and close the student union and library.

Hundreds of K-12 institutions suffered similar consequences in 2018, as scores of power problems disrupted learning from coast to coast. In one instance, storm-induced blackouts led to closures across multiple districts in West Virginia on Sept. 28, including in Kanawha, Greenbrier, Wayne and Lincoln counties. Numerous other districts operated on delays.



Even the nation's Education Department was left in the dark on Sept. 25 after a construction accident cut power to part of the Washington D.C. headquarters' building. About 500 federal employees had to be sent home.

### Airports

Electric reliability in airports was thrust into the spotlight following the 11-hour power outage at Hartsfield-Jackson Atlanta International Airport in December 2017, which canceled flights and cost Delta Airlines an estimated \$40 million. The incident intensified interest in airport microgrids, which run continuously to provide backup power when needed. San Diego International Airport is among the sites already supported by an operational microgrid, which officials credit for improving reliability and reducing energy costs. Meanwhile, multiple other airports are currently in various stages of researching or developing microgrid projects. In the future, it's possible the backup source will significantly reduce—or prevent altogether—airport blackouts such as those that occurred in 2018.

Among them was an outage at LaGuardia Airport, which was completely blacked out on Dec. 27 after an electrical fire at a power plant in Queens caused a transmission dip in the area. Inbound flights had to be held at their outbound airports when a ground stop was issued by the FAA.

A 90-minute power outage at Reagan International Airport on August 17 occurred after redundancy built into the power system failed. Two utility feeds that power the airport both went down, according to a spokesman. Travelers began tweeting around 9:30 p.m. that the airport had been plunged into darkness.

Flight cancellations and delays also plagued Philadelphia International Airport on Nov. 5 when an outage struck the FAA Tower shortly before 7 p.m. Although power was out for about 40 minutes, the system had to be rebooted, leaving a ground stop in effect for about two hours.

Travelers at McCarran International Airport in Las Vegas endured similar delays when a June 13 outage lasting more than an hour impacted ticketing and gate operations.

### Government

Government shutdowns of a different kind halted services from coast to coast in 2018. At a polling site in Knoxville, Tenn., on Nov. 6, for instance, midterm election voters had to cast paper ballots when the location experienced a power outage. The site's generator failed, as well.

The city-county Government Center in Rochester, Minn., was another casualty when a Dec. 20 outage caused an early closure of the facility. A faulty circuit was responsible for cutting electricity to half the building, forcing its closure. As a result, the Olmsted County Adult Detention Center was also placed on lockdown.

And while Abraham Lincoln's likeness can be seen glowing from the end of Washington, D.C.'s National Mall on a nightly basis, on Dec. 16 the giant statue sat in blackness. A faulty underground cable was blamed for leaving the Lincoln Memorial—as well as Memorial Bridge, D.C. War Memorial and Korean War Veterans Memorial—in the dark.

### Sporting events

The Los Angeles Dodgers and Arizona Diamondbacks were among the major league baseball teams that endured power outages last year—and we aren't referring to their batting slumps. On July 30, blackouts plagued both teams' stadiums, with the loss of electricity at Dodger Stadium attributed to a Mylar balloon making contact with overhead equipment. The incident caused a 23-minute delay of a game with the Milwaukee Brewers. Although an automated switch rerouted power to the stadium in two seconds, all equipment had to be reset and powered back on by stadium personnel. One state to the east, it was a major storm moving through the Phoenix metro area at around the same time that left more than 100,000 residents without power and knocked out lights at Chase Field during the Diamondbacks' 9-5 loss to the Rangers. The blackout was prominently featured on Twitter after ESPN reporter Pedro Gomez accidentally tweeted that a baboon caused the outage: "@Rangers and @Dbacks delayed in downtown Phoenix because a baboon went through town and overloaded the grid, knocking some lights out." The reporter actually meant to type "haboob," which is a type of intense dust storm.

And baseball wasn't the only sport plagued by power anomalies; March Madness took on another meaning when the Intrust Bank Arena in Wichita saw electricity cut during a March 14 NCAA game. The loss of power caused a 10-minute stoppage of play.

### Entertainment venues

From halting rollercoasters in their tracks and freezing casino slot machines to postponing the concert of a popular country artist, power outages ripped the joy out of countless recreational attractions throughout 2018. Consider the August 11 blackout at Scottsdale's Talking Stick Resort and Casino. An estimated 200 people were playing on 844 slot machines when the venue had to be evacuated after a monsoon caused a major outage. Players who hadn't pulled their tickets from slot machines before the lights went out were forced to wait patiently for days until the casino and state's regulatory agency could verify claims.

Meanwhile, thrill seekers celebrating Memorial Day at Cedar Point amusement park in Sandusky, Ohio, got more than they bargained for when a car hit a utility pole near the park, cutting power to several rides. One of numerous theme park outages that occurred in 2018, the incident left riders stranded on rollercoasters and other rides for about two hours—including the 300-foot-tall Millennium Force rollercoaster. Park employees had to help passengers off.

Another high-altitude scare struck Colorado's Breckenridge Ski Resort on Dec. 29. When a power outage caused the Quicksilver SuperChair lift to stop moving, ski patrol had to use ropes to rescue skiers and snowboarders. There were no reports of injuries.

And Dierks Bentley fans had to walk the line in Cincinnati on May 31 after strong storms knocked out power to more than 45,000 residents, as well as the Riverbend Music Center. The blackout forced the cancellation of the country music star's concert.



# A state-by-state snapshot of blackouts

Ever wonder where your state ranks when it comes to the prevalence of power outages.

If you live in California, you may want to keep a flashlight handy at all times; after nearly 10 years of tracking blackouts across the U.S., Eaton is crowning the Golden State the official Blackout Queen. Between 2008 and 2017, California endured 4,297 power cuts—more than double the number of next runner-up Texas, which experienced 1,603. New York came in third with 1,528 outages, followed by Michigan (1,369), Ohio (1,349) and Pennsylvania (1,256).

Despite ranking low in the total number of outages, Montana, Vermont and Nebraska nonetheless left residents in the dark for the longest periods of time. Montana, which registered 337 power cuts over the 10-year period, averaged 212 minutes per outage. Vermont and Nebraska tied for second place with an average duration of 172 minutes.

And when it comes to affecting the greatest number of people, Florida edged out Queen California, leaving a collective 25.3 million customers without power over the 10-year span. California impacted a total of 22.2 million customers, followed by New York with 18.3 million and Michigan with 12.4 million.

Sometimes less is more—a creed welcomed by those living and working in states with the fewest number of total outages. Only one state managed to remain in the double digits over the decade of tracking: Wyoming endured just 94 blackouts. The next lowest overall were Rhode Island with 105, Vermont with 141 and North Dakota with 191.

State	Total number affected	Total duration	Total number of outages	Average number affected	Average duration
AK	503,113	20,365	225	3,225	138
AL	2,636,805	18,533	461	8,214	69
AR	1,883,787	22,612	296	7,752	122
AZ	2,036,543	45,961	530	4,860	138
CA	22,203,596	338,829	4,297	6,022	133
CO	2,329,892	38,518	594	4,895	99
CT	3,180,301	23,911	593	6,752	75
DC	2,532,401	4,225	179	19,041	49
DE	540,389	6,126	136	4,868	91
FL	25,348,824	51,226	848	38,819	105
GA	4,930,187	30,783	558	11,767	95
HI	2,055,710	16,340	273	10,542	93
IA	1,159,482	24,774	422	3,313	89
ID	1,157,012	21,811	373	3,582	85
IL	6,222,885	40,164	871	9,233	88
IN	2,500,043	42,882	686	4,546	100
KA	784,860	9,690	376	2,625	41
KY	2,004,924	26,500	326	7,537	126
LA	3,783,204	20,040	451	10,657	79
MA	4,355,364	34,019	823	7,039	68
MD	4,237,501	12,881	377	15,522	77
ME	4,371,598	17,350	309	16,435	93
MI	12,489,964	75,966	1,369	10,937	97
MN	2,254,450	26,875	458	6,369	90
MO	2,492,058	43,970	628	5,538	111
MS	844,023	13,795	259	4,117	77
MT	676,621	50,166	337	2,696	212
NC	6,033,038	58,624	982	7,570	96
ND	395,386	11,945	191	2,636	84
NE	919,030	38,456	319	3,508	172
NH	2,811,383	16,624	278	12,721	117
NJ	5,780,505	41,461	910	8,414	89
NM	917,411	9,138	195	5,881	68
NV	1,142,085	18,987	402	3,389	66
NY	18,359,431	88,657	1,528	14,606	103
OH	7,024,677	86,544	1,349	634	105
OK	2,220,750	13,625	498	5,093	42
OR	3,700,739	42,551	690	6,459	98
PA	7,095,095	74,134	1,256	7,131	103
RI	1,161,957	4,425	105	14,897	79
SC	2,479,440	19,774	439	6,984	71
SD	308,784	7,268	162	2,357	68
TN	2,520,456	37,821	584	5,651	102
TX	11,475,011	69,306	1,603	9,329	71
UT	1,802,762	22,986	346	6,303	103
VA	5,369,718	51,590	869	7,500	105
VT	607,749	14,647	141	5,194	172
WA	5,627,646	71,806	1,020	6,863	118
WI	2,965,277	46,175	774	4,633	100
WV	2,035,031	15,709	359	7,042	79
WY	222,374	9,925	94	2,965	153

# The top 10 most significant outages of 2018



**Mother Nature spared no section of the country in 2018. The year's biggest blackouts left customers not only in the dark, but often in extreme heat or bone-chilling cold. Below is a glimpse into some of the largest power outages of the year.**

## **Back-to-back nor'easters.**

Thousands of East Coast residents spent days — and some more than a week — in the dark after two back-to-back winter storms pummeled the region in early March, causing massive outages. New Jersey was among the hardest hit states, enduring 600 broken poles and 1,700 spans of wire that required replacement. The widespread system damage left utility companies unprepared for the second squall just days later, which struck while tens of thousands of residents remained in the dark from the previous “bomb cyclone.” More than 1 million customers in New Jersey, New York, Massachusetts and Connecticut were left without electricity after the second storm, with full restoration taking just over a week.

## **Hurricane Michael.**

Dubbed a “history-making monster” by a Florida newspaper, the Oct. 10 storm left approximately 2.5 million electricity customers across the Southeast without power. Making landfall as a Category 4 hurricane with winds blasting at over 150 mph, Michael also left behind outages in Alabama, Georgia, North Carolina, South Carolina and Virginia. More than 35,000 utility workers from at least 27 states and Canada rallied together to restore power as quickly as possible.

## **Hurricane Florence.**

Some 1.4 million customers across the Carolinas were left without power at one time or another after Flo made landfall in September. Despite arriving as a weakened Category 1 hurricane, she still packed enough wind speed to uproot trees and cause the widespread outages.

## **Nor'easter number three.**

No sooner had electricity been restored to thousands of Massachusetts customers who lost power during a pair of nor'easters that pounded the East Coast a week earlier, than a third powerful storm struck the region, blacking out more than 350,000 homes and businesses.

## **Severe summer storm.**

Tens of thousands of people in northern Lower Michigan had to wait up to four days to have their power restored after destructive storms knocked it out for more than 150,000 customers on August 29.

## **An icy reception.**

Ice and freezing rain on Nov. 15 were blamed for cutting power to nearly 134,000 Ohio customers, the majority in Hamilton County. Duke Energy officials said ice is the worst weather event for their system, causing downed trees, downed wires and other blackout-inducing conditions.

## **Worse than Superstorm Sandy.**

The spring storm that thrashed Connecticut May 15 caused more damage to the electrical system than 2012's Superstorm Sandy. Not only did it destroy more than 1,800 utility poles — compared to 1,700 from Sandy — it also tore down 288 miles of power lines, more than double the amount of Sandy. It took a week for crews to fully restore power to the 120,000 customers left in the dark.

## **Intentional outages.**

More than 60,000 customers in five Northern California counties were impacted on Oct. 14 when Pacific Gas and Electric Co. preemptively shut down electricity in anticipation of gusty winds, extremely dry weather and dangerous fire conditions. While the decision to cut power was unprecedented for the area, the utility said many factors played into the verdict, including a widespread red flag warning, on-the-ground reports from workers and humidity levels below 20 percent.

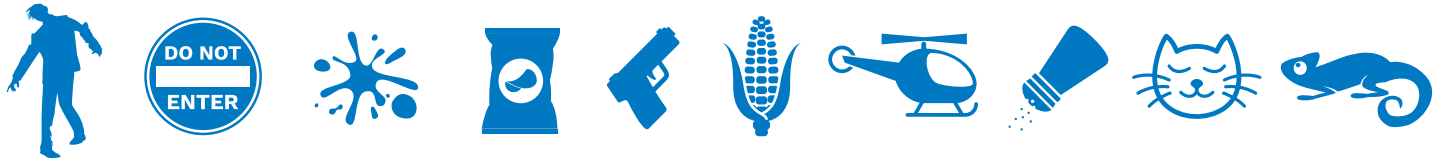
## **Tropical Storm Gordon.**

At least 30,000 customers were without electricity Sept. 5 after the powerful storm pummeled its way through Alabama, Florida and Mississippi. The largest outage was reported in Mobile, Ala., where almost 21,000 customers were blacked out.

## **Blizzard.**

On Nov. 25, Kansas City was hit by the city's first blizzard since 2011. The snow blitz caused a multitude of blackouts, leaving more than 23,000 customers without power across three separate utility territories

# The top 10 most unusual outages of 2018



## Zombie apocalypse.

Imagine the confusion when Lake Worth, Fla., residents received a text alert about a power outage caused by zombies. Yes, you read that right: zombies. The May 20 alert advised that 7,880 customers were left in the dark due to “extreme zombie activity.” After being flooded with inquiries, city officials went to work assuring concerned residents and apologizing for the bogus message. Although the true cause of the outage wasn’t disclosed, a spokesman later posted a Facebook message saying officials were investigating the fake alert and reiterated that no zombies had been encountered in Lake Worth.

## Man makes a wrong turn—under the sidewalk.

An undetermined number of Spokane residents endured a brief outage on Oct. 29 after a man apparently came into contact with high-voltage equipment situated beneath the sidewalk. Officials said someone saw the man crawl under the sidewalk near 2nd Avenue and Stevens Avenue and called police.

## Bird poop.

While bird activity ranks among the most common culprits of animal-related outages—typically sparked by their nesting on or flying into power lines—it was a different type of fowl action that instigated a May 4 blackout near Eugene, Ore. A bird pooped on a piece of equipment near a substation and cut power, taking radio station KLCC off the air for about 10 minutes. Normally, the natural bodily function wouldn’t have resulted in an outage, but the utility explained that a substation was down for maintenance at the same time, leading to a brief loss of power. The downtown area and the University of Oregon were affected.

## All that and a bag of chips.

Nearly 2,600 customers in Salisbury, Md., were left without power for almost two hours April 4 after a potato chip bag flew into a substation. Delmarva Power explained that the Mylar material in the bag caused an equipment failure, much like foil-coated balloons do when they make contact with power lines. The spokesperson acknowledges that while balloon-induced outages are not uncommon, this was the first he’d ever heard of an outage caused by a potato chip bag.

## A murderous mess.

A late-night murder was blamed for a power outage in Athens, Ga., on Jan. 30. After mortally gunning down a man, the suspect attempted to flee but lost control of his minivan, crashing into a utility pole. The broken pole knocked out power to the surrounding area for several hours.

## Corn on the cobblestone.

A collapsed corn silo took down power lines near New Carlisle, Ohio, on Jan. 22, spilling 10,000 tons of corn onto the road. Officials weren’t sure what caused the silo to crash, but when it did, it knocked out electricity to 300 people and forced the closure of State Route 571 for cleanup efforts.

## Helicopter havoc.

The FAA was investigating a Sept. 27 incident in which a helicopter inspecting power lines near Calistoga, Calif. struck the lines, sparking two grass fires and knocking out power to thousands. The local utility, PG&E, confirmed the helicopter was completing work for them. The helicopter did not crash and was able to land nearby, although the collision caused power lines to fall to the ground and ignited the pair of brush fires. Around the same time, PG&E reported several large power outages in this area affecting more than 8,500 customers.

## Salt or pepper?

They say too much salt is bad for your health, and apparently that’s true not just for the body but for the power supply, as well. Case in point: tens of thousands of people were left without power in Union County, N.J., on Jan. 12 after road salt wreaked havoc on electrical equipment. PSEG officials reported some 40,000 customers were impacted by the blackout, which was attributed to weather-related damage to circuits at switching stations. Officials said equipment was compromised by rain and condensation, mixed with residual salt on roadways and walkways.

## The cat’s meow.

A cat that made contact with a piece of substation equipment left 1,758 customers powerless for two-and-a-half hours on March 26 in Maui. Similarly, some 7,500 New Orleans customers woke up without electricity Sept. 17 after a feline was found inside a substation, leading many to question the resiliency of the city’s power grid. Dozens of businesses reported problems from the loss of electricity. Entergy acknowledged while precautions are taken to keep animals out of substations, they aren’t foolproof.

## So an iguana walked into a power station . . .

Before you attempt to guess the punchline, you can rest assured that no living creatures were harmed in this tale. Rather, one of Key West’s many iguanas sauntered away seemingly unscathed after it wandered into a substation on Dec. 17 and was zapped by 69,000 volts of power. The incident, which knocked out power to 7,600 customers for about 10 minutes, apparently resulted in no ill effects for the iguana, which employees witnessed departing the substation appearing no worse for the wear. Power was restored in about 10 minutes.



# How to protect your business

In today's business climate, there is a clear expectation for 100 percent uptime—an achievement that begins with the deployment of an appropriate uninterruptible power system (UPS).

**Increasingly, IT personnel are demanding the ability to monitor and control power, making software an essential component of a sound power protection strategy.**

Eaton understands that flexible intelligence gives IT pros the opportunity to identify and resolve potential issues before they escalate, an advantage that is accomplished through the Eaton Intelligence Platform. Our broad range of software solutions not only help you see what's coming today, but can adapt to ensure you're safeguarded well into the future. Whatever your application or monitoring need, Eaton has a solution to help you remotely and proactively address outages through a platform that includes IPM, VPM, VCOM and PredictPulse.

The Eaton Intelligence Platform works to monitor, automate, visualize and predict problems before they strike, addressing the unique challenges within your environment and empowering you to:

- **Make tasks simpler** via advance alerts and automated resolution
- **Make data actionable** through faster interpretation and analysis
- **See beyond power consumption** via 3D infrastructure visualizations
- **Monitor all infrastructure devices**—no matter the vendor—from one location

Unfortunately, Eaton can't protect you against the zombies blamed for the most unusual outage of 2018. But we can safeguard your equipment and organization against every type of power demon. From a small UPS deployment to a sophisticated data center housing thousands of servers and millions of datasets—and everything in between—our power protection platform is versatile enough to scale and change with you. For more information, visit [eaton.com](http://eaton.com).

To learn more, visit  
[Eaton.com/managesmarter](http://Eaton.com/managesmarter)

**Eaton**  
1000 Eaton Boulevard  
Cleveland, OH 44122  
United States  
[Eaton.com](http://Eaton.com)

© 2019 Eaton  
All Rights Reserved  
Printed in USA  
Publication No. MZ153043EN / GG  
February 2019

Eaton is a registered trademark.

All other trademarks are property of their respective owners.

Follow us on social media to get the latest product and support information.

