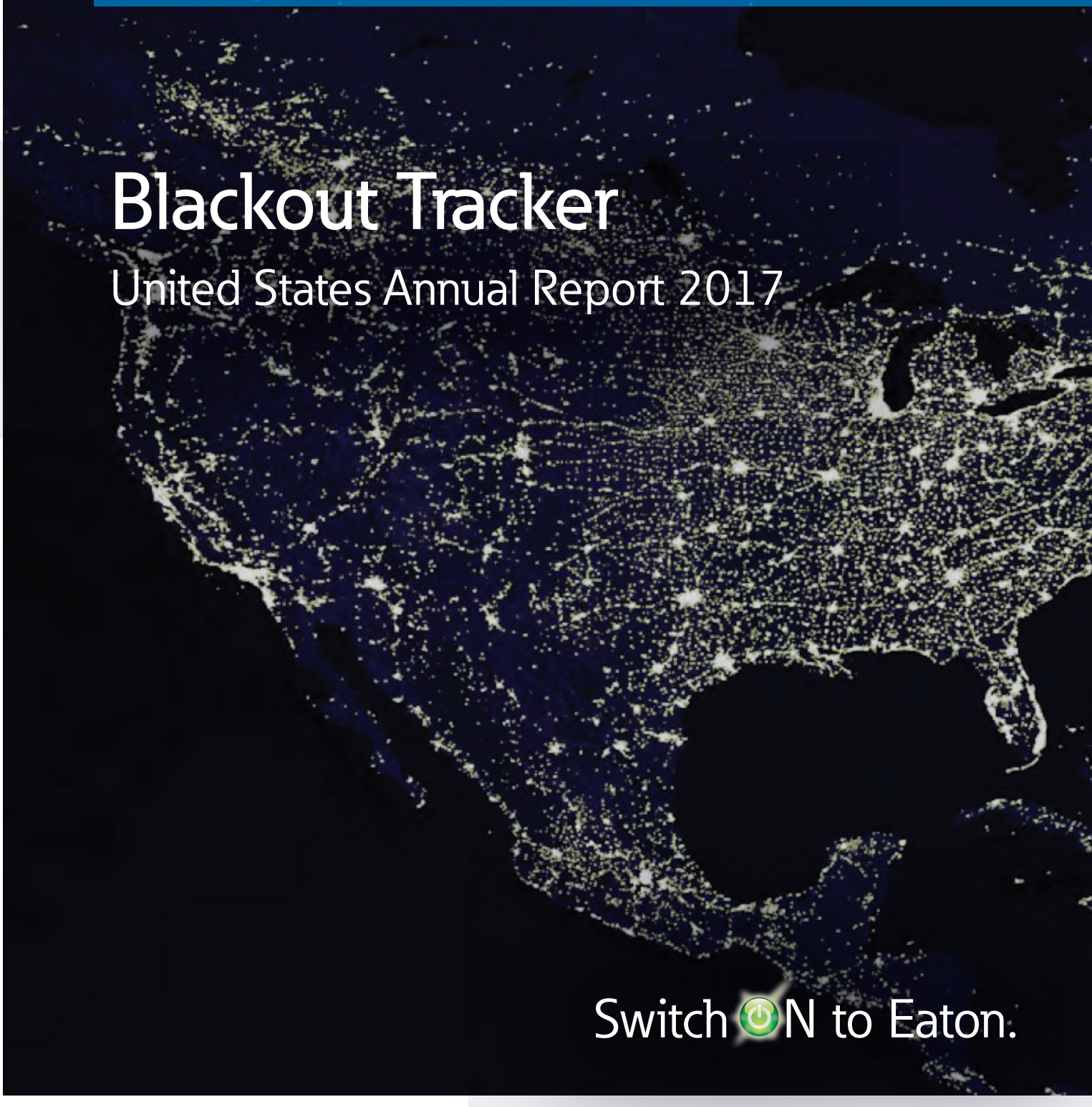
Power Outage Annual Report

Blackout Tracker

United States Annual Report 2017



Switch ON to Eaton.

EATON

Powering Business Worldwide

Table of contents

Introduction

Welcome to Eaton's Blackout Tracker Annual Report for 2017. This marks the 10th — and final — year that Eaton has been following the domino effect of power failures across the nation. From minor events that affected just a handful of homes or businesses to massive outages that left entire regions in the dark, we've tracked blackouts incited by human error, Mother Nature, bushy-tailed critters and a wide variety of other sources. This year alone, we have compiled data on more than 3,500 outages that left utility customers in the dark across all 50 states.

This annual report is based on reported power outages in the U.S., with sources of data including: news services, newspapers, websites (including those of newspapers and TV stations) and personal accounts. We at Eaton hope that you not only find this report insightful, but that it prompts you to take appropriate action to prepare for power outages that could affect you and your business.

The main body of the report follows this introduction and is organized into two sections:

1. Overview of national power outage data
2. Power outage data by state

In all, 3,526 outages were tabulated and used as the basis for the 2017 report, a reduction of nearly 9 percent compared to the 3,879 outages we tracked in 2016. However, the number of people affected by outages more than doubled — increasing by almost 19 million from 2016 to 2017. It is important to note that complete data is often unavailable on certain aspects of reported outages, including the number of people affected and the duration of the blackout.

The following chart outlines some overall data we have accumulated since 2008:

Year	Total number of outages	People affected
2008*	2,169	25.8 million
2009	2,840	13.5 million
2010	3,149	17.5 million
2011	3,071	41.8 million
2012	2,808	25.0 million
2013	3,236	14.0 million
2014	3,634	14.2 million
2015	3,571	13.2 million
2016	3,879	17.9 million
2017	3,526	36.7 million

**Partial-year data. Data collection began on February 16, 2008.*

Downtime figures not for the faint of heart

Can your organization afford to lose $100,000 per hour? That's now the staggering price tag associated with just 60 minutes of downtime, according to a recent ITIC study. Even more concerning, since the firm first started tracking data in 2008, the average cost of a single hour of downtime has skyrocketed more than 25 percent.

Keep in mind this is only an average. For many organizations, the costs are significantly higher. Delta, for instance, estimated that the December power outage at Hartsfield-Jackson Atlanta International cost the airline up to $50 million in revenue. As a result, Delta said it plans to seek

compensation from either Georgia Power and / or the airport, which is owned by the city of Atlanta, depending on the official determination of responsibility for the power failure.

It's important to remember that downtime isn't only about dollars. A negative experience can significantly damage your organization's reputation and cause customers to flee to your competitors. Data and monetary losses from unplanned outages can even cause a company to go out of business.

While the industry downtime average is dependent on many factors, and monetary losses vary based on a broad range of elements — including revenue, business type, outage duration, the number of people affected and the time of day an outage strikes — it's safe to say that downtime is a demon to be avoided at all costs.

Wildfires are a growing threat to power supply

There's a mounting concern, particularly on the west coast, over inferno-induced outages. And in 2017, multiple fires fanned the flames of this growing anxiety. On Dec. 7, Santa Ana winds whipped through parts of San Diego County at 88 mph, fueling a wildfire that burned 4,100 acres, torched 157 homes, and led to the deaths of dozens of elite Thoroughbred racehorses.

Dangerously dry and windy conditions prompted San Diego Gas & Electric to preemptively cut electricity to 12,000 customers, some for more than three days — indicative of lessons learned from previous wildfire disasters. Similarly, a raging wildfire in Sonoma County Oct. 11 led Cal Fire to ask the utility to shut off electricity to 279,000 customers so firefighters wouldn't have to worry about live lines overhead.

Meanwhile, about three hours north, some 88,500 Southern California Edison customers in southern Santa Barbara County experienced intermittent outages and power surges due to the Thomas Fire, the third worst fire in the state's history. SCE said the issues were with the transmission lines.

As communities attempt to recover from some of the deadliest wildfires in California's history, questions are arising about the role of utility equipment as a repeat offender in starting or spreading at least some of the blazes. The explosive failure of power lines and other electrical equipment has ranked among the top three sources of California wildfires for the last several years. In 2015, the last year of reported data, electrical power problems were blamed for burning 149,241 acres — more than twice the amount from any other cause.

Regulators have struck back against utility companies, imposing tens of millions of dollars in fines related to wildfires, including $37 million for the 2007 Malibu fire (SCE); $14.4 million for the Witch, Rice and Guejito fires the same year (SDG&E); and $8.3 million for the 2015 Butte Fire (Pacific Gas & Electric). SDG&E said it has made significant investments in fire preparedness over the last several years and has modernized infrastructure throughout its service area, including replacing thousands of wooden poles with fire-resistant steel poles to reduce the risk of damage to power lines in fire-prone areas. The utility also developed and operates the nation's largest utility-owned weather network, with models that provide a fire potential rating, giving a team of meteorologists and local fire agencies valuable information to help develop response strategies in advance of an emergency.

A growing movement is calling for regulators and government leaders to do more to ensure public safety, such as requiring utility companies to properly manage trees and brush around electrical equipment and reinforcing equipment against hazardous conditions. SCE said it works with state, county and local fire agencies to identify areas with high fire risk, and has also sought to better manage vegetation. The utility reports it has also established design and construction standards

appropriate for high wind and high fire areas, and identified operational practices to reduce fire risk. To that end, when red flag warnings are in place and circuits in high fire areas trip, Edison requires a patrol to inspect lines before they are re-energized.

Airport outages are just plane disastrous

One of the most devastating aspects of power outages is their propensity to cause ripple effects, and few industries endure this as painfully as the airlines. Unexpected power losses left dozens of the nation's airports in disarray in 2017, impacting vital operations ranging from runway lighting to security checkpoints.

Not even the world's busiest airport was immune, as a fire in an underground electrical facility was responsible for a Dec. 17 blackout that caused mayhem at Hartsfield-Jackson Atlanta International. The incident, occurring just before the start of the Christmas travel rush, grounded more than 1,400 flights in a chain of events that was felt for days. International flights were diverted, arriving planes were held on the ground at their point of departure, and all outgoing flights were halted at the airport, which serves an average of 275,000 passengers daily on nearly 2,500 planes.

Hartsfield-Jackson wasn't the only International airport to be left in the dark. Northern California's San Jose International Airport saw power cut on Jan. 7 and again on Feb 17. Meanwhile, a short distance north at San Francisco International, an airport-wide outage Jan. 3 caused some arriving flights to be delayed by more than three hours.

Airport functions were also impacted in Los Angeles, Phoenix, Tucson, Jacksonville, Orlando (twice!), Lexington and Duluth, among other cities.

And then there are times when the outage isn't responsible for the airplane delays, it's the other way around! Take a Dec. 17 incident in Colorado, where a small plane crashed into an electrical transmission line, causing a massive power outage. The pilot then attempted to put the damaged plane on the ground at the Limon Airport, but instead safely crash-landed nearby.

Blackouts spark conspiracy theories

Were three seemingly-simultaneous blackouts that occurred in major U.S. cities on April 21 the work of Russian hackers — or an even greater terror plot? While the widespread electrical outages in New York and San Francisco (and erroneous reports of a third in Los Angeles) prompted some to speculate about nefarious schemes, the power losses were ultimately attributed to something far less sinister: equipment failures.

San Francisco's outage, which began just after 9 a.m. local time and affected 88,000 customers, was traced to an overloaded circuit breaker at a substation, which then sparked a fire. The blackout in New York — which stranded morning subway commuters around 7:30 a.m. local time, several hours before San Francisco's — was caused by a service line failure.

The third outage, affecting 500 customers in Los Angeles' Century City area, actually occurred the previous day and was the result of a construction accident where workers struck equipment.

All customers affected by outages in the three cities were back online the same day after repair crews worked for hours to restore electricity. Although two of the three blackouts did occur on the same morning, there was no evidence that there was any connection between them.

Hurricanes pack powerful punch to grid

Back-to-back historic hurricanes wreaked havoc on the power grid in 2017. First Hurricane Harvey — which struck the greater Houston area on August 25 as a Category 4 hurricane with wind speeds of up to 130 mph — left nearly 300,000 homes and businesses in the dark. The first major hurricane to make landfall in the United States since Wilma in 2005, Harvey also left at least 70 dead, caused unprecedented flooding, and destroyed power lines along its destructive path.

The shattering squall, which was deemed the largest storm to hit the Texas service territory in 44 years, felled approximately 5,000 distribution poles and 300 transmission lines, as well as damaged an additional 200 utility structures. In the week following the storm, crews making repairs used materials equivalent to the amount necessary to build a 200-mile power line from Corpus Christi to San Antonio — and estimated that it would require *double* that amount of supplies to fix additional infrastructure in the weeks to come. Utility representatives warned it would take weeks to bring all customers back online, in part due to the inability to access hard-hit areas until floodwaters receded and electric infrastructure dried out.

Arriving right on the heels of Harvey, Hurricane Irma pounded the southeast as it made landfall on Sept. 11, walloping power lines and other utility infrastructure. The storm knocked out power to 16 million people, the most of any hurricane on record. Florida bore the brunt of the storm — deemed the most intense Atlantic hurricane to strike the U.S. since Katrina in 2005 — with more than 15 million people left in the dark, representing three-quarters of the state's population. In addition, some 800,000 people in Georgia and 270,000 in South Carolina were without electricity in the wake of the squall.

A week and a half later, crews were still hard at work on the restoration process, but had managed to reconnect 99 percent of customers. Officials deemed the effort the largest power-restoration process in U.S. history, with power companies having to reestablish entire service areas instead of just specific portions. Preliminary estimates suggest that damages from Hurricane Irma could cost the U.S. upwards of $50 billion.

Although more than $2 billion has been invested over the past decade in strengthening the nationwide grid, hurricanes pose a number of challenges when it comes to safeguarding against their destruction. One issue is that the grid has so many poles and wires that are vulnerable to falling trees and flying debris. In addition, if one transmission line is knocked out of service, it can potentially affect tens of thousands of customers. Another problem is that many ground-level electric substations were built very close to sea level, making them extremely susceptible to flooding during major storms.

From cause to cure — drones lend a much-needed hand in resolving outages

For the past several years, drones have been blamed for inadvertently causing numerous power outages. But now the flying technology is being credited for helping to resolve them! Utility

providers across the nation have begun to rely on drones to assess power grid damage and speed up the recovery process. Proving especially beneficial following extreme weather events, drones can be deployed faster than helicopters and are useful for conducting visual inspections, with the ability to transmit video of downed power lines and other equipment.

Alleviating both time and manpower requirements for utilities, especially in rural and remote areas, drones eliminate the need for crews to spend countless hours driving roads or walking power lines searching for damage. From tornadoes to flooding to natural disasters such as wildfires and earthquakes, the ability to call in the drones enables utility companies to assess and identify problems and reestablish electricity more quickly.

The Edison Electric Institute even credited drones with helping to protect the power grid in three key manners. First, drones improve resiliency by helping to quickly assess damage from disasters and speed power restoration. They also enhance reliability through the ability to inspect remote infrastructure and identify issues before they become problems. And finally, the airborne devices bolster grid security through routine flights.

Oklahoma Gas & Electric is among a growing number of utilities now flying the friendly skies with drones. Estimating that it has shaved off approximately a half day of assessment time by using drones, OG&E now plans to use the devices to aid storm recovery efforts. Further possibilities include deploying drones to inspect power distribution lines, wind farm turbines, and the inside of power plant equipment such as boilers and stacks.

Fuel cell generators get nod from utilities

When it comes to helping reduce power disruptions, drones aren't the only solution looking to take credit — the GenCell G5rx hydrogen fuel cell generator is also making a play in the same arena.

With a profile that looks similar to a storage refrigerator, the hydrogen fuel cell generator is part of a compact system that relies on cutting-edge technology to help utilities diminish outage time. Although the platform boasts a small footprint — occupying about 8 feet by 9 feet — it can produce 5 kilowatts of auxiliary power. Even more, it emits no CO2 and runs 10 times longer than existing backup power sources.

San Diego Gas & Electric was so impressed with the technology that the company ordered 30 systems in 2017, becoming the first utility in the U.S. to partner with GenCell. When the grid goes off, the generator automatically switches on. In the past, during prolonged outages SDG&E typically rolled out a generator to a substation, but the new solution will recharge batteries until the grid comes back online.

"Previously we only had the capacity to first restore our critical customers — our hospitals, police stations, fire stations," said an SDG&E spokesperson. "Now with the GenCell fuel cell, we have extended capacity, which means we could be able to restore every customer served by that substation earlier."

Fueled by standard cylinders of industrial-grade hydrogen, the G5rx also enables SDG&E to analyze and monitor substations from remote locations while providing quick start-up once the outage ends. Furthermore, unlike diesel backup systems, the G5 technology emits only water, a significant value to SDG&E as California utilities are striving to meet the state's ambitious climate directives.

While fuel cells have been used by NASA for the Apollo and Space Shuttle missions, commercial applications have been slower to develop in large part due to the cells' expensive materials such

as platinum. But by relying instead on a graphite construction, the new systems can be manufactured at a dramatically reduced cost.

SDG&E planned to deploy its first three G5rx units in 2017, with the remaining 27 to be installed over the next three years.

Law & Order: Blackout Edition

North Carolina's Hatteras and Ocracoke islands experienced one of the longest outages of 2017 — and the drama didn't end when the lights came back on. Instead, the lawsuits began stacking up against the construction company charged with the bridge-building blunder that resulted in the eight-day-long outage. While working on the new Bonner Bridge July 27, a crew from PCL Constructors drove a steel casing into the underground transmission cables powering the islands. The subsequent failure prompted a state of emergency declaration and mandatory evacuation order, keeping visitors off the islands during what was supposed to be one of the Outer Banks' busiest tourist weeks.

Multiple federal class action suits were filed in North Carolina against the contractor by a variety of plaintiffs, including hotels, rental properties, restaurants, charter boat companies and even a riding stable. Although power was restored Aug. 3, the lawsuits allege that the damage was catastrophic for the businesses that rely on seasonal tourism. In addition to claims such as "financial loss by way of un-reimbursed rental payments and travel expenses," at least one of the class action suits sought to also "punish those responsible for the power outage, and to deter this from happening again."

Amusement park outages are no laughing matter

It's a small world after all — for power outages, that is! In 2017, not even Mickey Mouse could escape their wrath, with an unexpected blackout stopping the magic at Disneyland shortly before 11 a.m. on Dec. 27. A transformer issue was blamed for leaving Disneyland wishing for some pixie dust, as the outage knocked out power in portions of the Toontown and Fantasyland areas during the busy holiday season. About a dozen attractions were affected at the Anaheim, Calif., park, with guests having to be escorted from rides. One park-goer revealed that halfway through the "It's A Small World" boat ride, everything suddenly went dark. After sitting for about 25 minutes, stranded passengers were eventually helped off. Although all power was restored by 4 p.m. and rides had resumed operation, Disneyland said on its Twitter feed that it was "only accepting guests for re-entry."

More than a dozen other theme parks were also impacted by power outages throughout the year, including Disneyland's sister park, Epcott Center in Florida, where a Jan. 31 cut affected all of the rides. And guests at Six Flags Fiesta in San Antonio, Texas, got a lot more than they bargained for when an outage struck the park April 15. Riders were stuck on attractions — including Superman: Krypton Coaster and the Sky Screamer — for up to 25 minutes. Similarly, a power loss at Universal's Islands of Adventure in Orlando on August 5 forced several rides such as Harry Potter and the Forbidden Journey to be evacuated. Ohio's Kings Island and Cedar Point, Carowinds in Charlotte, N.C., and Pennsylvania's Kennywood Park were among the other amusement parks that endured outages in 2017.

Power outages strand skiers throughout 2017

Almost as frightening as dangling atop a stalled roller coaster during a blackout is having to wait it out atop a halted chair lift. Skiers and snowboarders across the nation can attest to this firsthand, as hundreds — from California to Maine — were left stranded above the snow in 2017.

About three dozen were stuck on a chairlift for more than an hour during a power outage at Southern California's Mountain High resort Feb. 21. Several hundred more were left hanging during a Jan. 22 outage at New Mexico's Sandia Peak Ski Area, where the power loss occurred while both lifts were at full capacity and some riders had to be evacuated using ropes. Similarly, an April 16 blackout at Colorado's Loveland Ski Area forced ski patrol to evacuate people from lifts. And after a squirrel made contact with energized equipment in Juneau March 26, the resulting surge left 200 skiers temporarily dangling at Eaglecrest Ski Area.

Idaho suffered a one-two power outage punch in early January, when a fault on an underground power line caused a blackout on a bitterly cold day at the Grand Targhee Resort. Five days later, Bogus Basin officials announced that the recreational area north of Boise would close for the remainder of the day due to an outage, with guests who had purchased a day lift ticket offered a "weather check" to ski on another day. And a post-Christmas outage on Dec. 26 that affected thousands of customers in Franklin County, Maine, briefly stranded Sugarloaf skiers on the resort's lifts during chilly temperatures.

Outage forces community to hold its breath (literally)

Power outages can be hazardous to your health! Air quality in Commerce City, Colo. was compromised after a power outage caused malfunctions at a local oil refinery. The March 11 blackout triggered belches of hydrogen sulfide and sulfur dioxide gas that exceeded state air quality limits. While Xcel Energy officials said electricity was out for 6 minutes, a Suncor spokeswoman said power was cut for more than 13 hours. The unexpected issue triggered automatic and manual safety shut downs, causing the refinery to emit more than 100 pounds of hydrogen sulfide and more than 500 pounds of sulfur dioxide gas into the air. Suncor officials responded to the problem by closing nearby streets and sending air-monitoring trucks into surrounding neighborhoods.

Power failure proves to be a real lemon for sales

Yoga shoppers seeking a little Chi were left without any Namaste after Lululemon Athletica Inc.'s website suffered a lengthy outage on May 22. The company's North American site crashed after a reported power failure and other problems at a server farm, dealing a blow to the yoga brand's efforts to draw more online shoppers.

For hours, the website of the Vancouver-based company ─ No. 83 in the Internet Retailer 2017 Top 500 ─ displayed an error message that said, "We are usually awesome at this. Please don't refresh your browser. You'll be back in the flow shortly." The power failure, which lasted just shy of 24 hours, represented a setback for the company, which had been working on its online performance and actively striving to improve the site. While an exact price tag for missed sales was not immediately available, one analyst cautioned that a brief shutdown such as this could have dire effects on sales for a retailer like Lululemon, estimating that three days of an outage would likely have cost the company nearly $425,000 in lost sales.

Blackouts make for a night to remember

The generosity and quick-thinking of community members prevented a homecoming disaster for not one but two high schools. The Greenfield, Wis., Fire Department came to the rescue of

Whitnall High School on Saturday, Sept. 23 when the power went out at the school's homecoming dance. After hearing about the blackout, firefighters showed up to the dance with all the equipment needed to save the day. They hung up portable lights in the hallways, and relied on generators to bring back the power and music. As a result, students were able to stay and enjoy the last hour of the homecoming dance.

On the same evening, administrators at Cincinnati's Lakota East High School also refused to let a little power outage spoil their homecoming dance. Instead, they improvised and held the event on the football field. The principal reported that the dance was one the students will always remember. "They were pumped," she revealed. "They said, 'This was awesome, and there will never be another homecoming like this.'"

Power loss leads to full bellies for those in need

While there's no shortage of damaging and devastating news surrounding blackouts, occasionally a power outage presents the opportunity for a real feel-good story, too. Such was the case in Salem, Ore., after a windstorm knocked out electricity at Trader Joe's April 7.

Although the 31-hour outage was an obvious inconvenience to utility customers, there were many in the community that actually benefitted from the blackout after Trader Joe's donated thousands of dollars' worth of food to the hungry in the area, including Marion-Polk Food Share, St. Vincent de Paul Food Bank, Keizer Food Pantry, Union Gospel Mission and the women's shelter Grace House. Each community organization received refrigerated and frozen products from the store that couldn't be preserved. Locally and nationally, Trader Joe's has a long-running policy to donate products that are not fit for sale but are safe for consumption. In January, the company announced that it had donated more than $341 million worth of product to food banks in 2016, up from $321 million the previous year.

Power (outage) corrupts

There are times when a power outage goes way beyond inconvenience — and can even become a matter of life and death. Consider a storm-induced March blackout in Bloomfield Township, Mich. A man who was staying with relatives got into an argument over the use of a generator during the outage. The altercation escalated to the point where he threatened to stab the homeowners with a knife, prompting police to be dispatched.

The relative was arrested and was unable to post the $50,000 cash bond, leaving him locked up until his trial date.

The top 10 most significant U.S. blackouts of 2017

Mother Nature spared no corner of the country in 2017. From raging wildfires in the west to horrific hurricanes in the south and east, the year's events had a dramatic impact on millions of electricity customers. Here, we round up some of the most significant:

1. **Hurricane havoc.** Making landfall on Sept. 11, the devastating storm deemed Hurricane Irma caused widespread and catastrophic damage, including cutting power to more than 15 million customers throughout Florida, Georgia, North Carolina and South Carolina. Across Florida, the Category 5 hurricane spared most houses and lives, but had less mercy on the power grid. A week and a half later, electricity had been restored to 99 percent of customers.

2. **Halloween trick.** A powerful storm that pounded the Northeast on Oct. 29 left more than 1.5 million customers in the dark throughout Maine, New Hampshire and Massachusetts — some for up to 3 days! The lengthy blackout prompted many communities to cancel trick-or-treating activities, as utility companies brought in crews from other East Coast states to help restore electricity faster.

3. **One for the record books.** Deemed the largest weather event in the history of Michigan's DTE utility, gusts topping 60 mph hammered the southeast portion of the state March 8, cutting power to more than 1 million customers. The high winds pulled down more than 4,000 power lines in the record-breaking outage.

4. **Horrific Harvey.** Nearly 300,000 people were left without power August 26 after Hurricane Harvey smashed into Texas, bringing prolonged rainfall that caused catastrophic flooding. The storm made landfall near Corpus Christi as a Category 4 event, with maximum sustained winds of 130 mph.

5. **Adding — make that subtracting — fuel to the fire.** A raging wildfire in Sonoma County, Calif., led Cal Fire to ask the utility to shut off electricity to 279,000 customers Oct. 11. Firefighters requested that power lines be de-energized so they wouldn't have to worry about live lines overhead. The blackouts impacted the Sonoma, Santa Rosa and Napa areas.

6. **Bridging the (power) gap.** A bridge-building mishap on July 27 resulted in an 8-day-long outage on North Carolina's Hatteras and Ocracoke islands. While working on the new Bonner Bridge, a construction crew drove a steel casing into an electric transmission cable, inadvertently cutting off power to 9,000 homes and businesses. The major blackout completely shut down the tourist haven, prompting the governor to declare a state of emergency.

7. **Snowed under.** The Atlanta area was left to dig out of more than a foot of snow after a massive storm plowed through the area Dec. 8, resulting in 365,000 utility customers losing power.

8. **Walking in (a darkened) Memphis**. Memphis Light, Gas & Water predicted it would take more than a week to restore service to the 10,080 customers who lost power May 27 when severe storms pounded the region. It was the third largest outage in the city's history, surpassed only by a 1994 ice storm and Hurricane Elvis in 2003.

9. **Wicked windstorm.** More than 200,000 Portland, Ore., area residents were left in the dark after a windstorm — the strongest on record for the month of April since 1957 — pummeled power lines. With gusts up to 73 mph, the storm was responsible for at least two deaths in the region.

10. **Taken by storm.** Some 76,000 customers in the Omaha area were left in the dark June 16 when severe weather cut power. Utility crews had to work 16-hour shifts around the clock to restore electricity, with some customers having to wait a full week to get power back!

The top 10 most unusual U.S. blackouts of 2017

Like years past, 2017 didn't disappoint when it came to unusual outages. From bees to bears, quarrels to coughs, we've rounded up 10 of the most peculiar:

1. **Statue of darkness.** Not even Lady Liberty is invulnerable to power outages. The nation's most famous statue was left without its hallmark illuminating lights for several hours March 7. Although there was some online speculation that it was a deliberate move to show solidarity with the Day Without A Woman inequality protests scheduled for the following day, the National Parks Service said the New York City blackout was probably due to construction work.

2. **Beeware.** Crews in Bradford, Ill., were busy as bees June 11 after a tree branch, rotted from beehives and honeycombs inside, broke off and landed on power lines. The subsequent outage was prolonged when crews had to find a way to remove the state-protected insects without harming them, and were forced to wait for the arrival of state agency employees.

3. **Why did the chicken cross the road?** There was a whole lot of squawking over a blackout in Felton, Del., on Dec. 12. Sixty customers were left without electricity for two hours following a crash involving a tractor-trailer truck carrying a load of chickens. The collision not only cut electricity to area residents, but snarled traffic after the flock escaped.

4. **A cross to bear.** A utility crew summoned to a Mountain View, Ala., power outage on June 8 got a bit of a shock when they discovered the source of the problem. After tracing the outage to a transformer on a utility pole, workers arrived on scene to find a 150-pound black bear dead on the ground. It is believed that the animal climbed the pole, touched the live transformer and was electrocuted. The outage was confined to about 20 customers, with electricity restored in about an hour.

5. **Fight ends in knock-out – of power.** An entire neighborhood in Hileah, Fla., paid the price for a young couple's quarrel on April 28 when an 18-year-old caused an outage during a fight with his 17-year-old girlfriend. Investigators reported that the teen allegedly grabbed his girlfriend's purse, lit it on fire and threw it over the gate where he lives. The burning purse then hit a palm tree, with flames spreading to a nearby electric box and knocking out electric services. It was unclear if the couple remains together.

6. **The naked truth.** A 25-year-old naked man jumped off a train on May 15 in Topock, Ariz., then allegedly broke water pipes near an electrical box, resulting in a blackout. Sheriff's officials found the man stumbling on a road and covered in blood. Apparently a 72-year-old woman saw the naked man walking up to her home after her electricity went out and screamed at him to leave. Her 86-year-old boyfriend fired a shot after the man ignored commands to get off the property, wounding him in the face. County prosecutors were reviewing the case.

7. **Don't blame it on the squirrel (even if he was there).** While often the protagonist behind power outages, a Hampton, Va., squirrel actually played a secondhand role in a blackout. Fire officials discovered a singed squirrel clutched in the talons of a hawk that flew into power lines. They believe the bird caught the squirrel then attempted to land on top of the pole to enjoy its meal but instead touched a live power line, electrocuting both bird and squirrel while setting the woods on fire below.

8. **Cough it up.** Excessive coughing was the excuse a man gave authorities for crashing his vehicle into a Michigan utility pole and knocking out power to more than 1,300 DP&L customers on Feb. 19.

9. **Trash talk.** It really stinks when the power goes out — and residents in Atlanta, Ga., can attest to this quite literally. On Nov. 6, more than 5,000 customers were left in the dark after a large garbage dumpster was dropped by a crane. The dumpster, filled with heavy

items, knocked down power lines as it fell, which led to a chaos-causing rush hour outage.

10. **Power supply goes out to sea.** On Sept. 19 a sailboat — yes, a sailboat! — was blamed for knocking out power to 2,575 customers in Michigan's Grand Haven Township. The boat's mast hit an overhead wire in a swampy area on the Lost Channel, resulting in the 75-minute blackout. The boat caught fire and its sole passenger reportedly attempted to put out the fire himself before jumping off the sailboat and swimming to shore.

Price tag for data center outages continues to soar

The costs associated with data center power outages continue to rise, a fact confirmed by the Ponemon Institute in The 2016 Cost of Data Center Outages report. The group, which polled 63 data center organizations in the U.S. that had experienced an outage in the past 12 months, found the average cost of a data center outage in 2015 was a staggering $740,357. The price tag was up 38 percent from 2010, while the increase in the maximum downtime cost ($2,409,991) was even greater, climbing 81 percent over that same time period.

The most expensive cost was found to be business disruption, followed by lost revenue and end-user productivity, IT productivity, detection, recovery, ex-post activities and equipment.

Among the publication's other key findings:

- The average total cost per minute of an unplanned outage increased from $5,617 in 2010 to $7,908 in 2013 to a current price tag of $8,851
- The average cost of a data center outage rose from $505,502 in 2010 to $690,204 in 2013 to $740,357 in the latest study, representing a 38 percent increase in the cost of downtime
- Maximum downtime costs are rising faster than average, increasing 81 percent since 2010 to a current high of $2,409,991
- UPS failure, including UPS and batteries, is the No. 1 cause of unplanned data center outages, accounting for one-quarter of all such events
- Cybercrime represents the fastest growing cause of data center outages, accounting for 2 percent of outages in 2010, 18 percent in 2013 and now 22 percent of those polled in the latest downtime study

What you can do to protect your business

In today's business climate, there is a clear expectation for 100% uptime, making business continuity a chief concern. Yet when an unplanned outage occurs, the focus of IT personnel must be shifted to resolving the issue and reducing data loss. But what if there were a way to monitor and control power so potential issues could be identified and resolved before they escalate?

Eaton's PredictPulse™ remote monitoring service and Intelligent Power Manager (IPM) software help to accomplish that, plus so much more. When used together, they deliver the support of Eaton's technical alarm experts — who keep tabs on an organization's power devices 24x7 and alert key personnel to any anomalies — along with the ability to remotely monitor, manage and control power devices. If there's an extended power event, IPM also helps maximize the runtime of critical equipment and ensure data integrity. The solution not only keeps downtime to a minimum, but contributes to business continuity and helps IT professionals rest easier.

Overview of 2017 national power outage data

This section provides aggregate data for the U.S. and includes all of the data found in the subsequent state section.

Outage summary

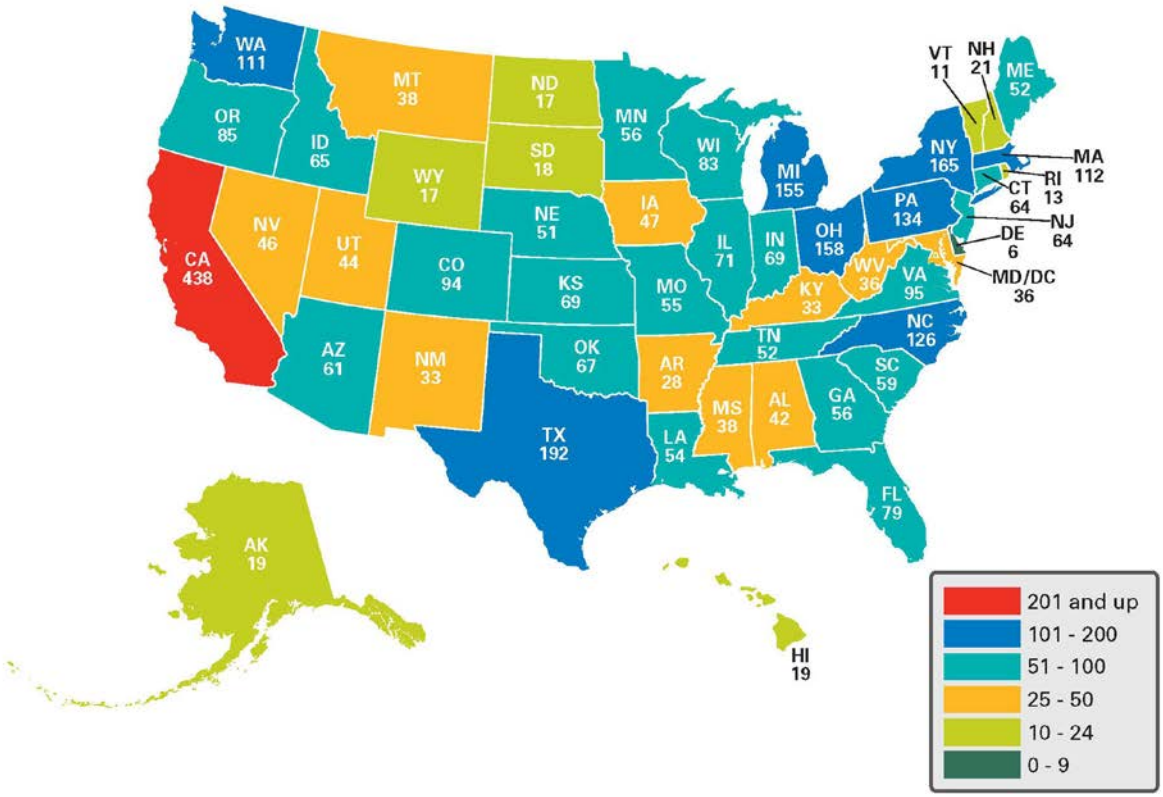
Total number of people affected by outages *(This is the sum of the number of people affected by reported power outages in the USA for 2017.)*	36,179,833
Total duration of outages *(This is the sum of the durations of the reported power outages.)*	284,086 minutes (approximately 4,735 hours or 197 days)
Total number of outages *(The sum of the number of reported power outages.)*	3,526
Average number of people affected per outage *(This number is determined by dividing the "Total number of people affected by outages" by the number of outages that reported the number of people affected. Not all reports of outages included number of people affected. The number of outages used for this calculation can be found in the note following this table.)*	10,261
Average duration of outage *(This number is determined by dividing the "Total duration of outages" by the number of outages that reported durations. Not all reports of outages included the duration. The number of outages used for this calculation can be found in the note following this table.)*	81 minutes

Notes: Total number of people affected (and average) is based on 2,310 (66%) of the total reported outages. Total duration of outages (and average) is based on 765 (22%) of the total reported outages. These are the number of outages that had reports that included data for number of people affected and duration, respectively.

Top states with most reported outages

2017	2016	2015
1. California (438)	1. California (470)	1. California (417)
2. Texas (192)	2. Texas (197)	2. Texas (201)
3. New York (165)	3. New York (197)	3. New York (173)
4. Ohio (158)	4. Michigan (192)	4. Ohio (155)
5. Michigan (155)	5. Ohio (184)	5. Michigan (152)
6. Pennsylvania (134)	6. North Carolina (152)	6. Pennsylvania (144)
7. North Carolina (126)	7. Pennsylvania (146)	7. North Carolina (121)
8. Massachusetts (112)	8. Virginia (118)	8. Virginia (106)
9. Washington (111)	9. Florida (107)	9. Washington (104)
10. Virginia (95)	10. Massachusetts (106)	10. Indiana (100)

Number of reported power outages by state



Top states for outages caused by weather/falling trees

2017 (1,159 total outages)	2016 (1,279 total outages)	2015 (1,069 total outages)	2014 (1,081 total outages)
1. California (124)	1. California (116)	1. California (96)	1. California (81)
2. Texas (65)	2. Texas (72)	2. Texas (72)	2. Texas (57)
3. New York (64)	3. Michigan (72)	3. Michigan (43)	3. Pennsylvania (52)
4. Michigan (56)	4. North Carolina (67)	4. Ohio (42)	4. Michigan (49)
5. Pennsylvania (47)	3. Ohio (67)	5. North Carolina (41)	5. Ohio (47)
6. Ohio (42)	5. New York (60)	6. Washington (35)	6. New York (44)
7. Massachusetts (38)	6. Pennsylvania (48)	7. New York (35)	7. North Carolina (41)
8. North Carolina (35)	7. Florida (46)	8. Pennsylvania (34)	8. Georgia (35)
9. Colorado (32)	8. Massachusetts (41)	9. Oklahoma (33)	9. Virginia (32)
9. Virginia (32)	9. Virginia (38)	10. Connecticut (33)	9. Wisconsin (32)

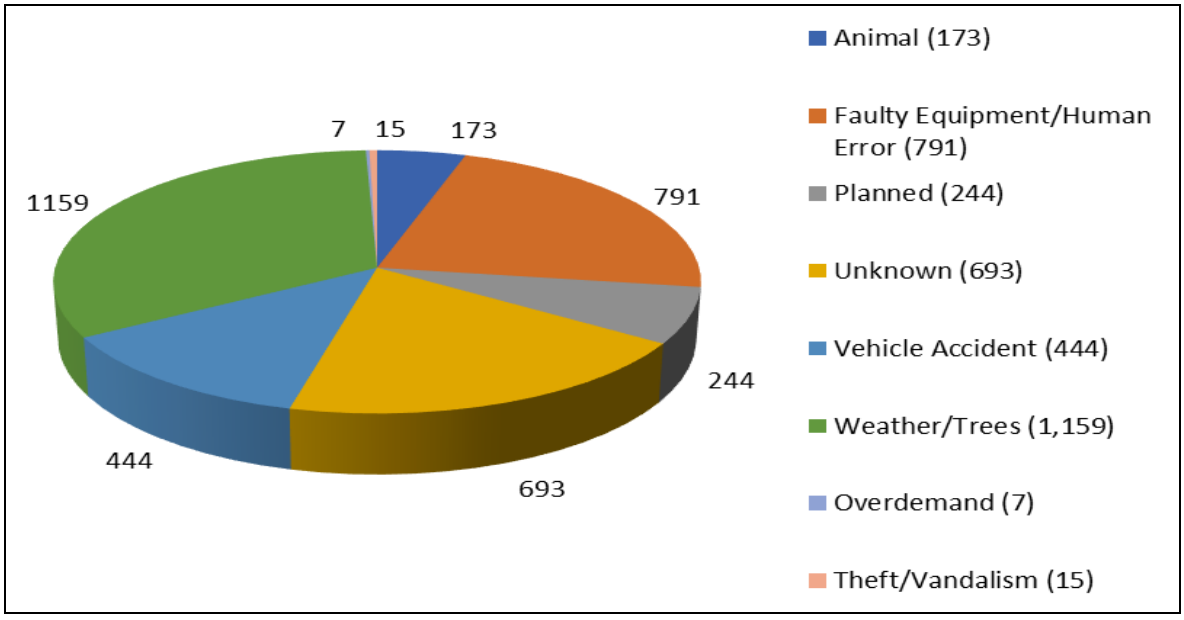
Top states for outages by vehicle accident

2017 (444 total outages)	2016 (483 total outages)	2015 (419 total outages)	2014 (356 total outages)
1. California (34)	1. California (59)	1. California (55)	1. California (55)
2. North Carolina (30)	2. Texas (29)	2. North Carolina (29)	2. Texas (20)
3. Ohio (28)	3. Ohio (26)	3. Texas (28)	3. Virginia (17)
4. New York (21)	4. Pennsylvania (24)	4. Pennsylvania (23)	4. Pennsylvania (14)
4. Massachusetts (21)	5. North Carolina (22)	5. Ohio (18)	5. Michigan (14)
5. Texas (19)	6. Florida (21)	6. New Jersey (15)	6. Ohio (13)
6. Pennsylvania (17)	6. New York (21)	7. Florida (13)	7. Florida (12)
6. Virginia (17)	7. Oregon (16)	7. Michigan (13)	8. Oregon (11)
6. Wisconsin (17)	8. New Jersey (16)	8. New York (12) Tennessee (12)	9. Oklahoma (11) New Jersey (11) Indiana (11) New York (11)

Top states for outages caused by faulty equipment/human error

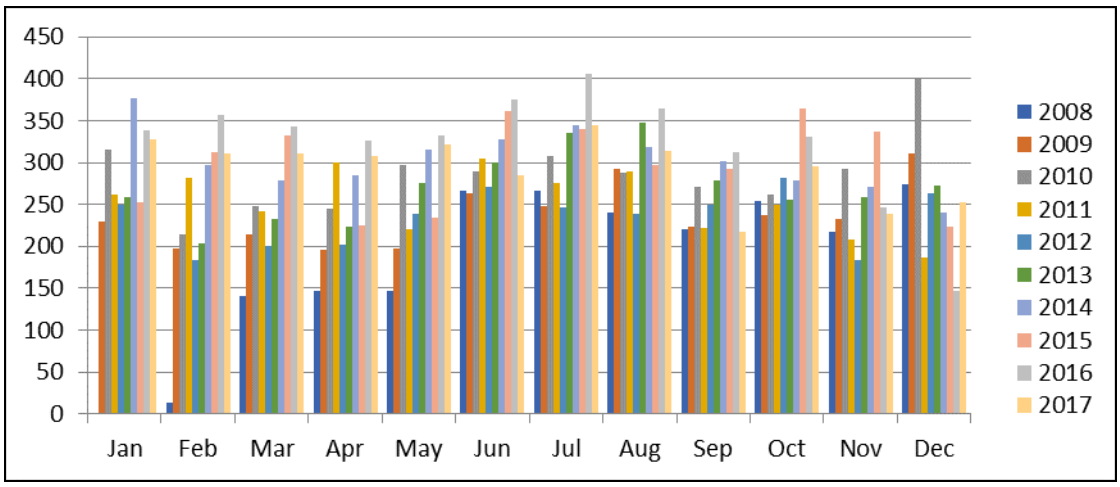
2017 (791 total outages)	2016 (925 total outages)	2015 (942 total outages)	2014 (1,026 total outages)
1. California (103)	1. California (119)	1. California (133)	1. California (202)
2. Texas (45)	2. New York (52)	2. New York (55)	2. Michigan (51)
3. New York (42)	3. Michigan (47)	3. Ohio (52)	3. New York (45)
4. Ohio (39)	4. Texas (39)	4. Texas (49)	4. Pennsylvania (42)
5. Michigan (36)	5. Pennsylvania (35)	5. Michigan (43)	5. Texas (39)
6. Pennsylvania (32)	6. Ohio (34)	6. Pennsylvania (42)	6. Ohio (38)
7. Massachusetts (25)	6. Virginia (34)	7. Virginia (38)	7. New Jersey (33)
8. Virginia (24)	7. Nevada (33)	8. New Jersey (31)	8. Washington (32)
9. Washington (20)	8. North Carolina (32)	9. North Carolina (26)	9. Massachusetts (28)
9. Wisconsin (20)	9. New Jersey (27)	10. Oregon (21) Colorado (21)	10. Illinois (26)

Reported power outages by cause

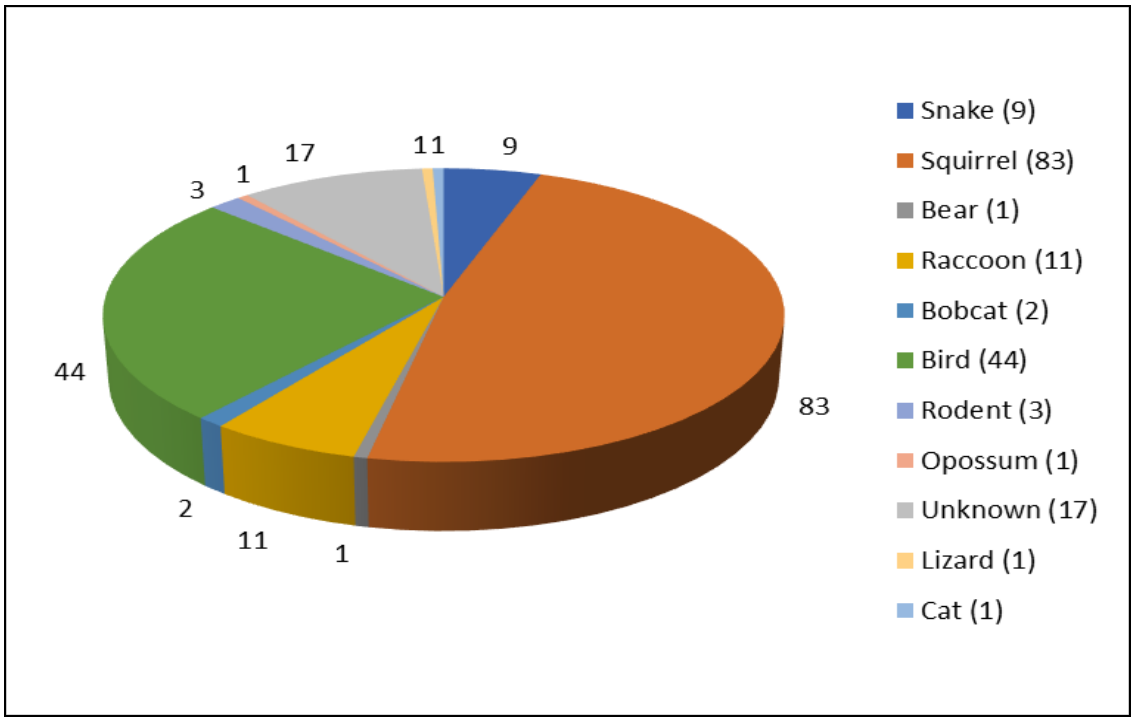


Note: Each power outage was grouped into one of eight possible causes. The number adjacent to the pie piece is the number of outages attributable to that cause.

Reported power outages by month



Reported power outages by animal type



Notes: Number following animal type in the legend indicates number of reported outages caused by that animal. The bird category includes the following types: Crow, eagle, goose, hawk, dove, seagull, owl and buzzard.

Top states for outages caused by animals

2017 (173 total outages)	**2016** (169 total outages)	**2015** (179 total outages)	**2014** (150 total outages)
1. California (10)	1. Colorado (10)	1. Indiana (10)	1. California (13)
1. Oregon (10)	1. Michigan (10)	2. California (9)	2. Texas (11)
2. Texas (9)	2. New York (9)	3. Washington (8)	3. Ohio (9)
2. Michigan (9)	2. Washington (9)	3. Michigan (8)	3. Oregon (9)
3. Ohio (8)	3. Montana (8)	4. Florida (7)	4. Michigan (9)
3. Washington (8)	4. Massachusetts (7)	4. Massachusetts (7)	5. Alaska (6)
4. Kansas (7)	4. Ohio (7)	4. Texas (7)	6. Missouri (5)
5. Florida (6)	4. Pennsylvania (7)	5. Iowa, New York, South Carolina, Tennessee, Virginia (6)	7. Wisconsin (5)
5. Nebraska (6)	5. California Oklahoma (6)		

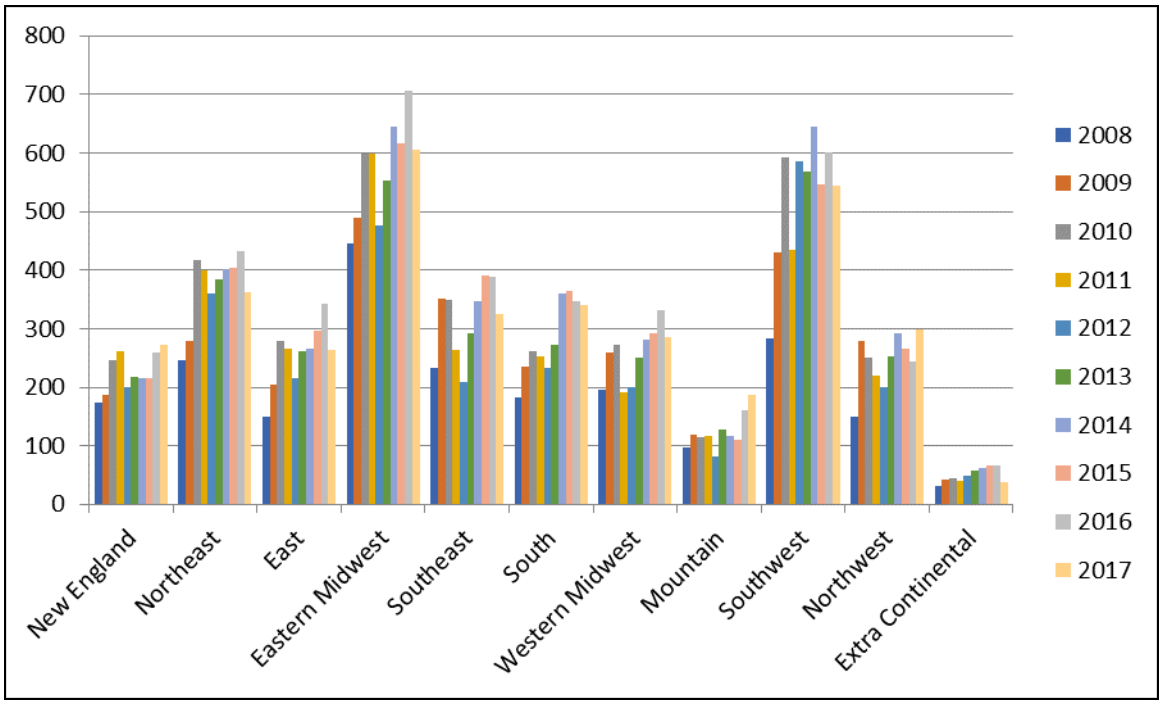
Animals still busy as beavers instigating outages

The offenders may be bright eyed and bushy tailed, but there's nothing cute about the fact that they cause hundreds of power outages each year. Undeniably, animals are responsible for a lot of monkey business when it comes to the grid. In 2017, squirrels led the pack of culprits, accounting for nearly half (83) of the 173 animal-related blackouts tracked by Eaton. Other perpetrators included numerous species of birds, snakes, raccoons, bobcats, an opossum, a lizard, and a bear.

Why do animals shoulder the blame for causing so many outages? When their bodies come in contact with a piece of energized equipment, it creates a short circuit. This diverts the path of electricity as it travels through the animal's body in search of a ground source. When the path is interrupted, special utility equipment senses this change and stops the flow of electricity, causing the blackout.

Power outage data by state

Reported power outages by region



Regions:
New England: Connecticut, Massachusetts, Rhode Island, Vermont, New Hampshire, Maine
Northeast: New York, Pennsylvania, New Jersey
East: Virginia, North Carolina, Maryland (includes Washington DC), Delaware
Eastern Midwest: Wisconsin, Illinois, West Virginia, Ohio, Michigan, Kentucky, Indiana
Southeast: Tennessee, Georgia, Alabama, Mississippi, South Carolina, Florida
South: Texas, Louisiana, Arkansas, Oklahoma
Western Midwest: South Dakota, North Dakota, Nebraska, Minnesota, Missouri, Kansas, Iowa
Mountain: Colorado, Wyoming, Utah, New Mexico
Southwest: Nevada, California, Arizona
Northwest: Washington, Oregon, Idaho, Montana
Extra Continental: Alaska, Hawaii

State data overview

This section of the report provides an analysis of the power outages by state. There are four parts to each analysis.

1. The first part is an outage summary. The results are computed in the same manner as those in the outage summary found in the national power outage data in the previous part of this report. Only data pertaining to the particular state is used.
2. The second part of the analysis on each state is the outage fact. This is simply an interesting fact concerning a particular outage (or outages) in a state.
3. The third part of the analysis is a chart of the power outages by cause. This is the same type of chart that can be found in the national power outage data in the previous part of this report. Only data pertaining to the particular state is used.
4. The last part of each state section is the number of power outages by month. This is the same type of chart that can be found in the national power outage data in the previous part of this report. Only data pertaining to the particular state is used. From this chart it may be possible to determine particular times of the year when power outages are more common.
5. Data collection began February 16, 2008.

Alabama

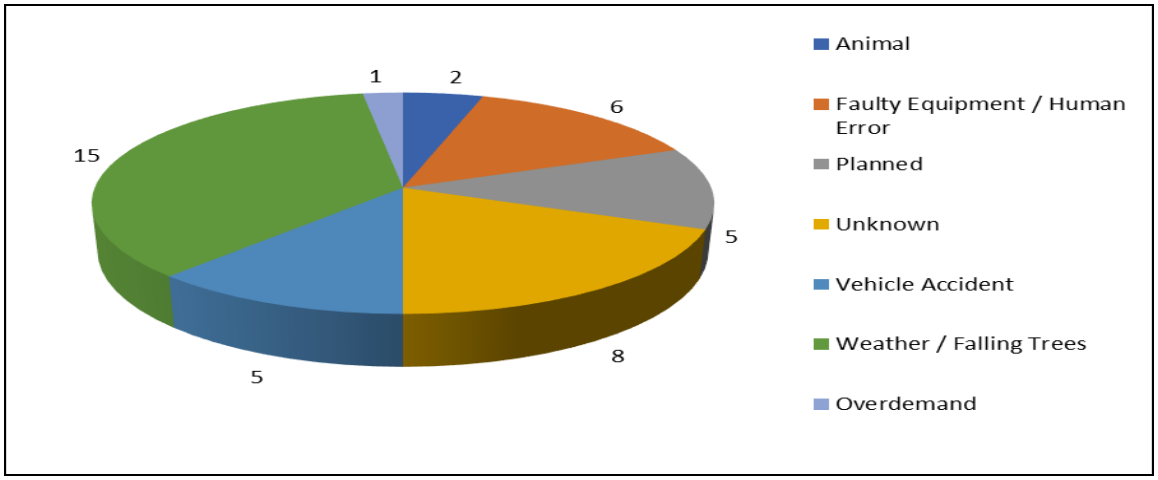
Outage summary

Total number of people affected by outages	138,925
Total duration of outages	3,555 minutes (nearly 60 hours)
Total number of outages	42
State ranking (number of outages)	30
Average number of people affected per outage	3,308
Average duration of outage	85 minutes

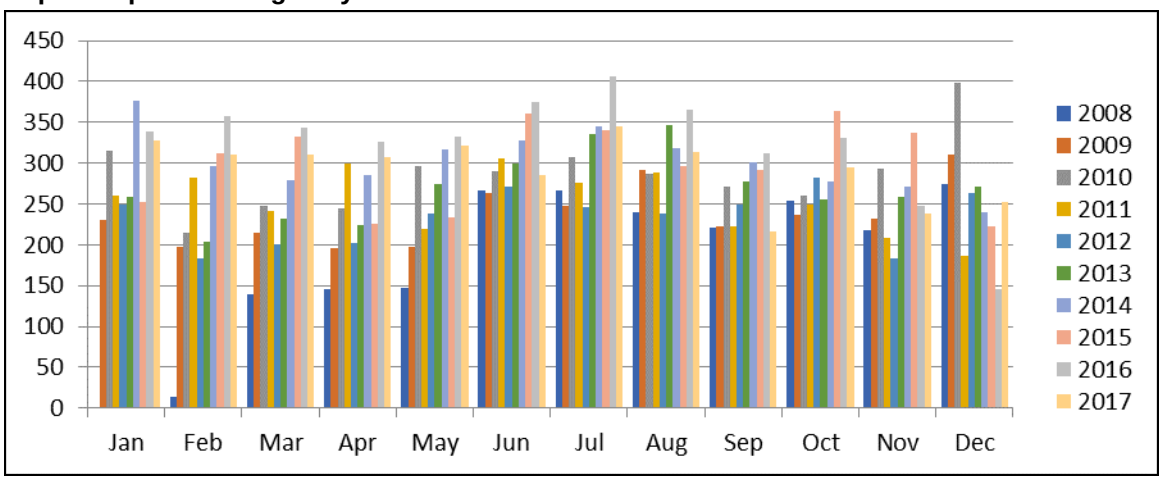
Note: Total number of people affected (and average) based on 18 (43%) of the total reported outages. Total duration of outages (and average) based on 7 (17%) of the total reported outages.

Outage fact: Ashford residents got spooked on Oct. 31 when a squirrel shorted out a transformer, causing some power lines to burn out and knocking out power.

Reported power outages by cause



Reported power outages by month



Alaska

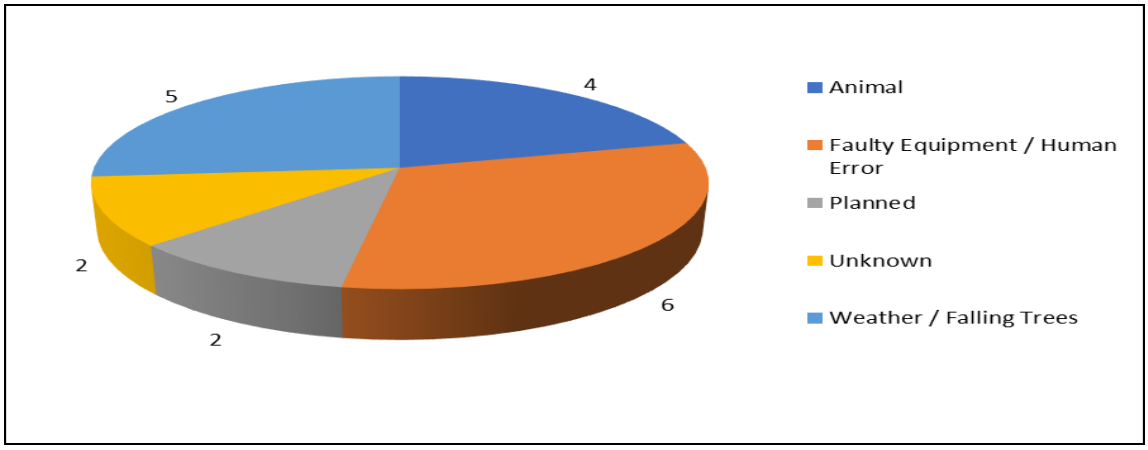
Outage summary

Total number of people affected by outages	19,908
Total duration of outages	5,245 minutes (more than 87 hours)
Total number of outages	19
State ranking (number of outages)	37 (tie)
Average number of people affected per outage	1,048
Average duration of outage	276 minutes (4.6 hours)

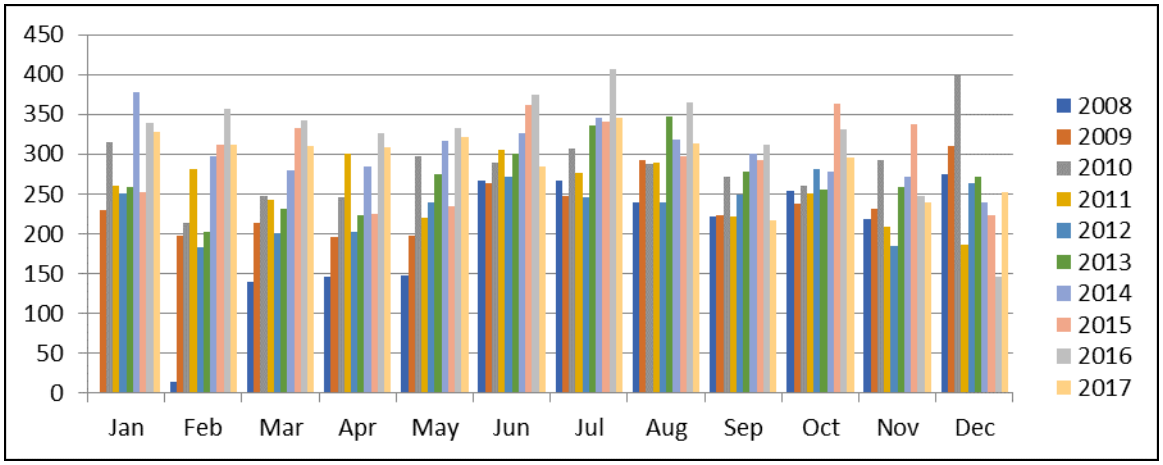
Note: Total number of people affected (and average) based on 8 (42%) of the total reported outages. Total duration of outages (and average) based on 13 (68%) of the total reported outages.

Outage fact: A Sept. 5 storm blew in to Houston with enough force to knock down trees, dismantle roofs and cut power to 11,000 customers. Flooding at the Seward Airport deposited spawning salmon along the main runway.

Reported power outages by cause



Reported power outages by month



Arizona

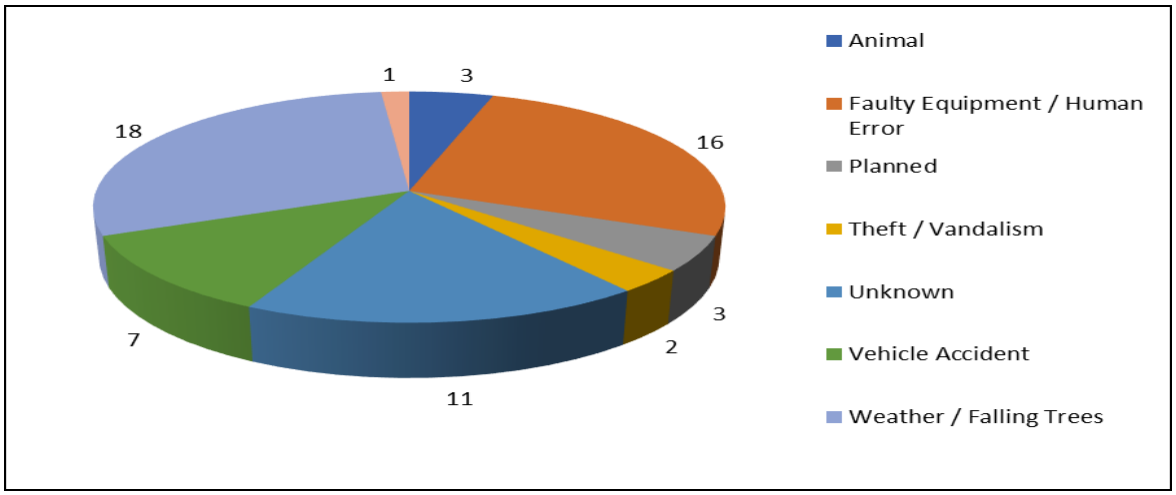
Outage summary

Total number of people affected by outages	142,922
Total duration of outages	11,315 minutes (nearly 8 days)
Total number of outages	61
State ranking (number of outages)	20
Average number of people affected per outage	2,343
Average duration of outage	185 minutes

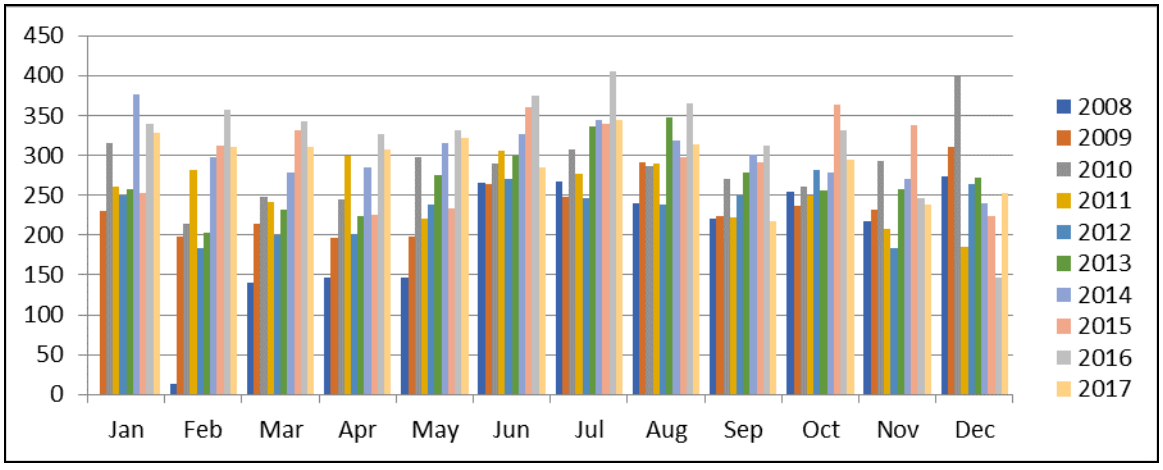
Note: Total number of people affected (and average) based on 43 (70%) of the total reported outages. Total duration of outages (and average) based on 11 (18%) of the total reported outages.

Outage fact: On Nov. 13, a semi truck caught an overhead power line in Phoenix, snapping it and causing low- and high-voltage lines to spark as electricity was cut to 4,000 customers.

Reported power outages by cause



Reported power outages by month



Arkansas

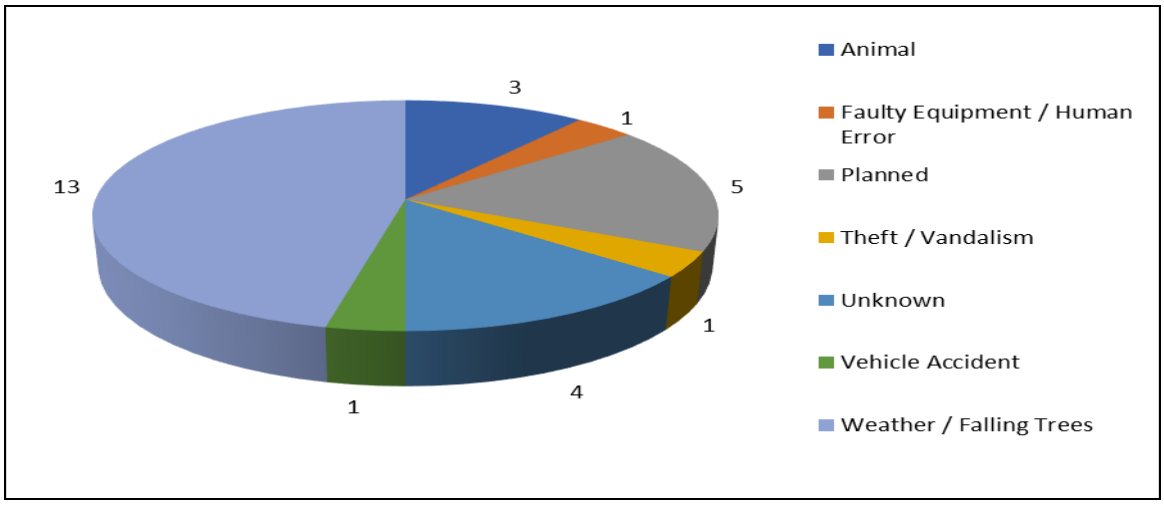
Outage summary

Total number of people affected by outages	110,989
Total duration of outages	7,095 minutes (nearly 5 days)
Total number of outages	28
State ranking (number of outages)	35
Average number of people affected per outage	3,964
Average duration of outage	253 minutes (over 4 hours)

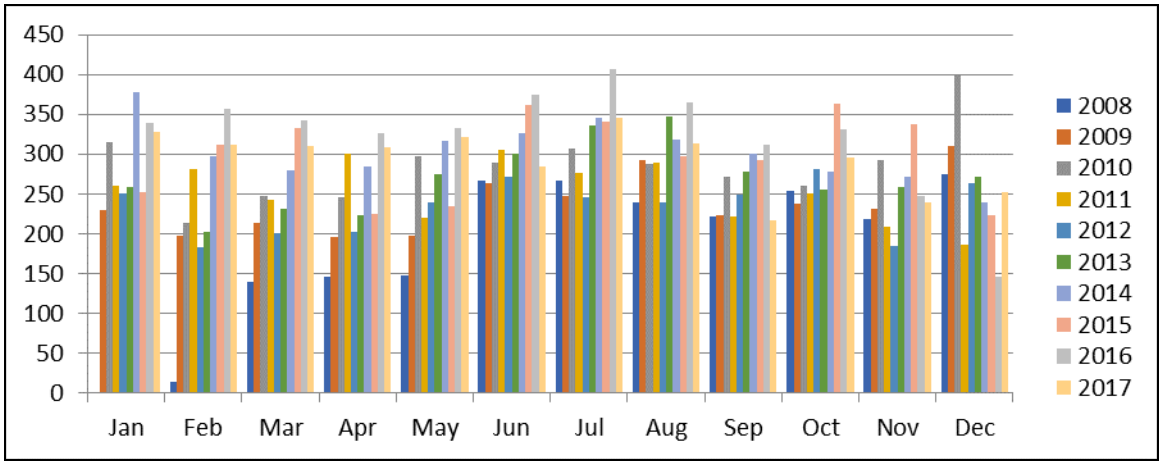
Note: Total number of people affected (and average) based on 19 (68%) of the total reported outages. Total duration of outages (and average) based on 9 (32%) of the total reported outages.

Outage fact: On April 30, powerful thunderstorms were blamed for several deaths as heavy rain caused flash flooding and strong winds brought down trees and utility lines, leaving 71,000 customers without power statewide.

Reported power outages by cause



Reported power outages by month



California

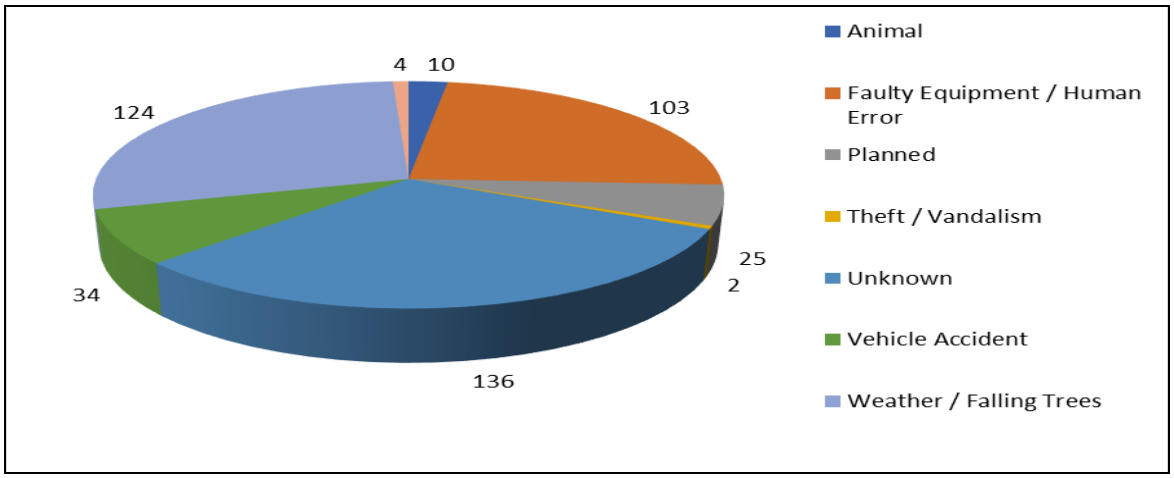
Outage summary

Total number of people affected by outages	2,709,740
Total duration of outages	25,868 minutes (nearly 18 days)
Total number of outages	438
State ranking (number of outages)	1
Average number of people affected per outage	6,187
Average duration of outage	59 minutes

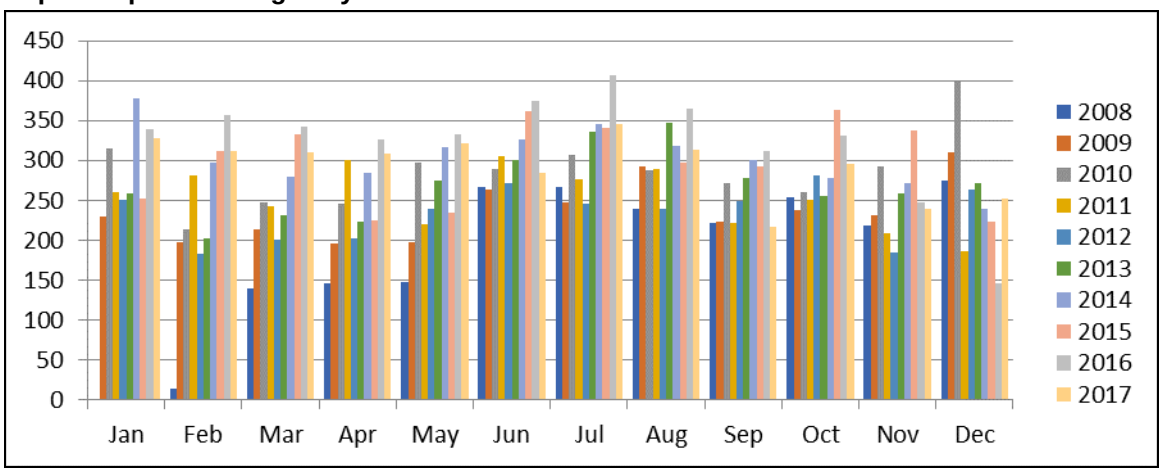
Note: Total number of people affected (and average) based on 336 (77%) of the total reported outages. Total duration of outages (and average) based on 86 (20%) of the total reported outages.

Outage fact: A bobcat climbed to the top of a power pole in Cambria August 6, shorting out the circuit at the end of his ascent and cutting power to 3,530 customers. The animal did not survive.

Reported power outages by cause



Reported power outages by month



Colorado

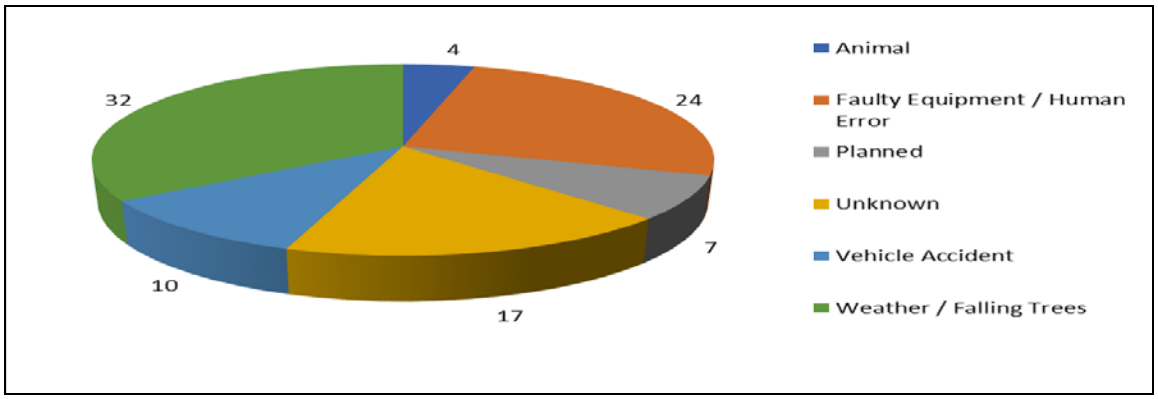
Outage summary

Total number of people affected by outages	415,852
Total duration of outages	10,391 minutes (more than 7 days)
Total number of outages	94
State ranking (number of outages)	11
Average number of people affected per outage	1,145
Average duration of outage	16 minutes

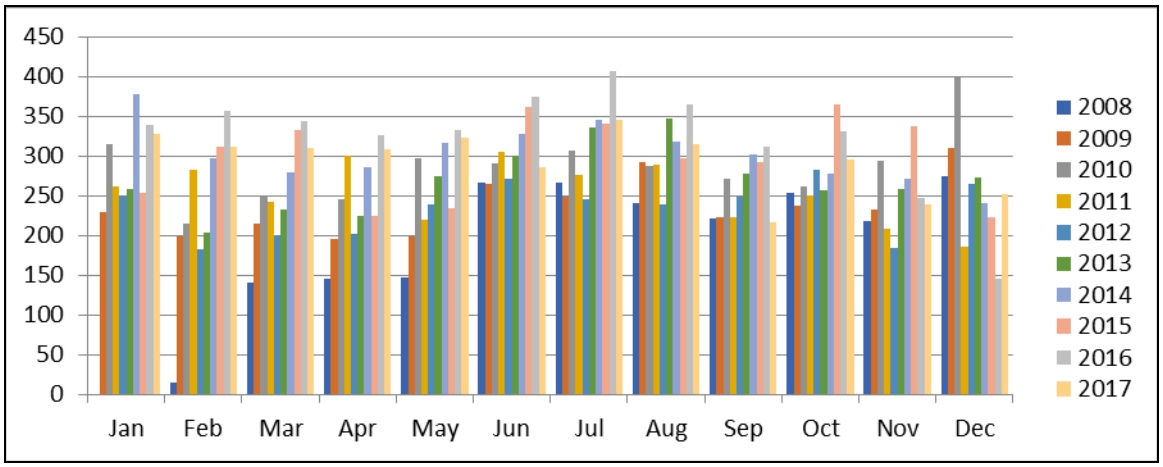
Note: Total number of people affected (and average) based on 64 (68%) of the total reported outages.
Total duration of outages (and average) based on 25 (27%) of the total reported outages.

Outage fact: On July 18, a snake slithered 12 feet off the ground and into some equipment in a Loveland substation, causing a small fire that cut power to 6,500 customers for two hours.

Reported power outages by cause



Reported power outages by month



Connecticut

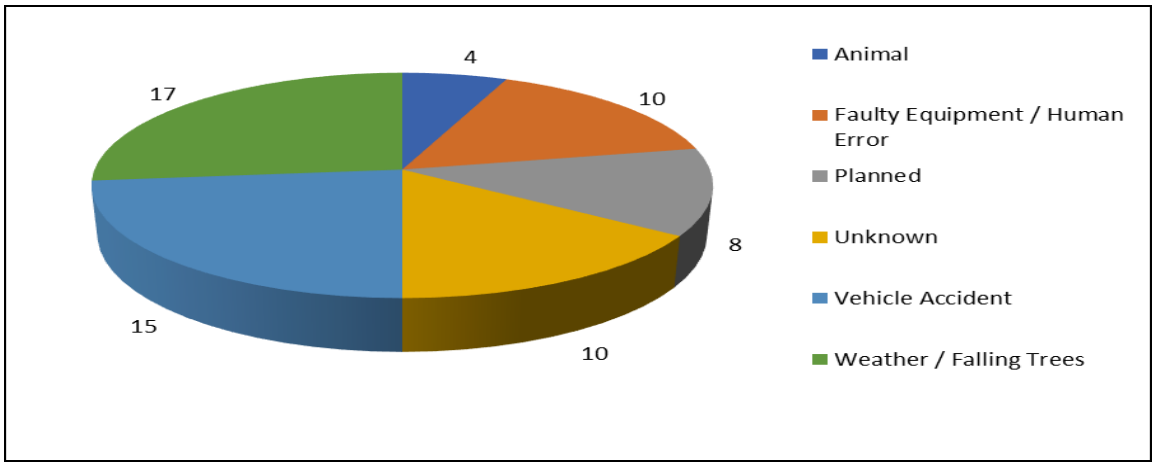
Outage summary

Total number of people affected by outages	73,268
Total duration of outages	1,005 minutes (nearly 17 hours)
Total number of outages	64
State ranking (number of outages)	19 (tie)
Average number of people affected per outage	1,145
Average duration of outage	16 minutes

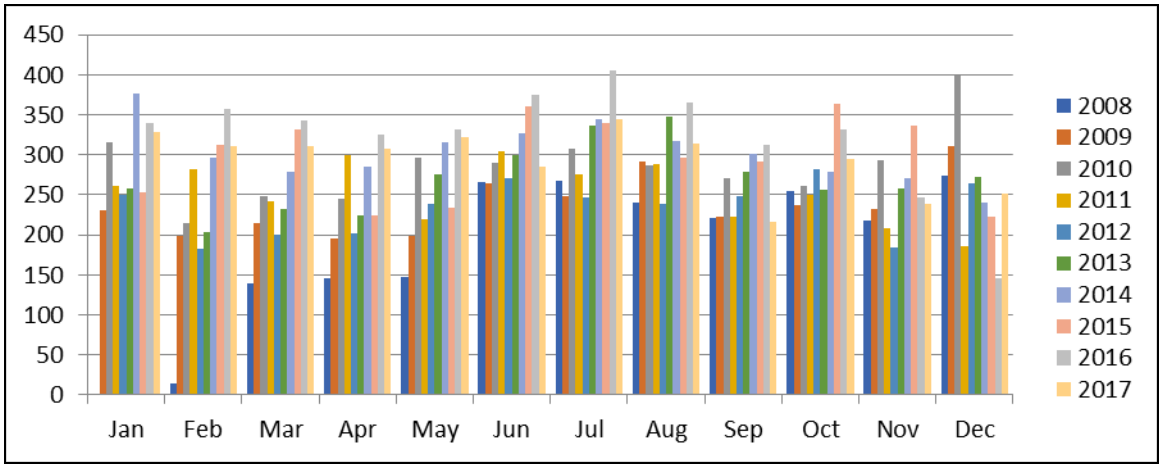
Note: Total number of people affected (and average) based on 31 (48%) of the total reported outages. Total duration of outages (and average) based on 11 (17%) of the total reported outages.

Outage fact: An equipment breakdown at a Milford substation on March 23 left 10,000 customers in the dark for almost an hour and a half.

Reported power outages by cause



Reported power outages by month



Delaware

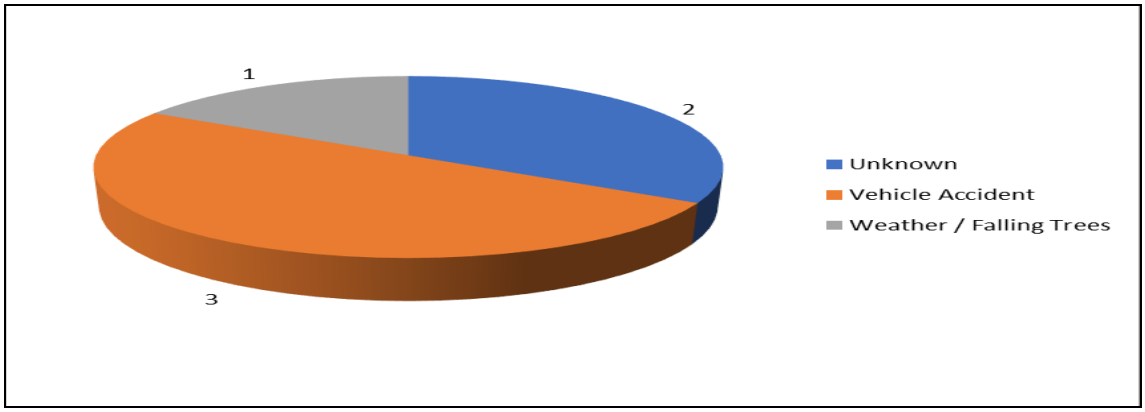
Outage summary

Total number of people affected by outages	51,060
Total duration of outages	190 minutes
Total number of outages	6
State ranking (number of outages)	42
Average number of people affected per outage	8,510
Average duration of outage	32 minutes

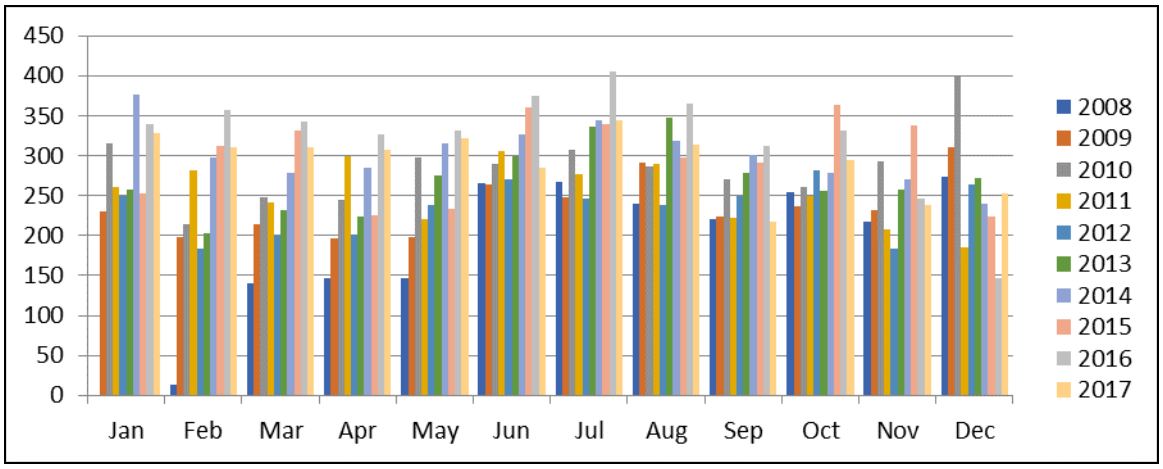
N*ote: Total number of people affected (and average) based on 4 (67%) of the total reported outages. Total duration of outages (and average) based on 2 (33%) of the total reported outages.*

Outage fact: A crash involving a tractor-trailer knocked out power to 60 Felton residents for two hours Dec. 12 and also snarled traffic after the vehicle lost its load of chickens.

Reported power outages by cause



Reported power outages by month



Florida

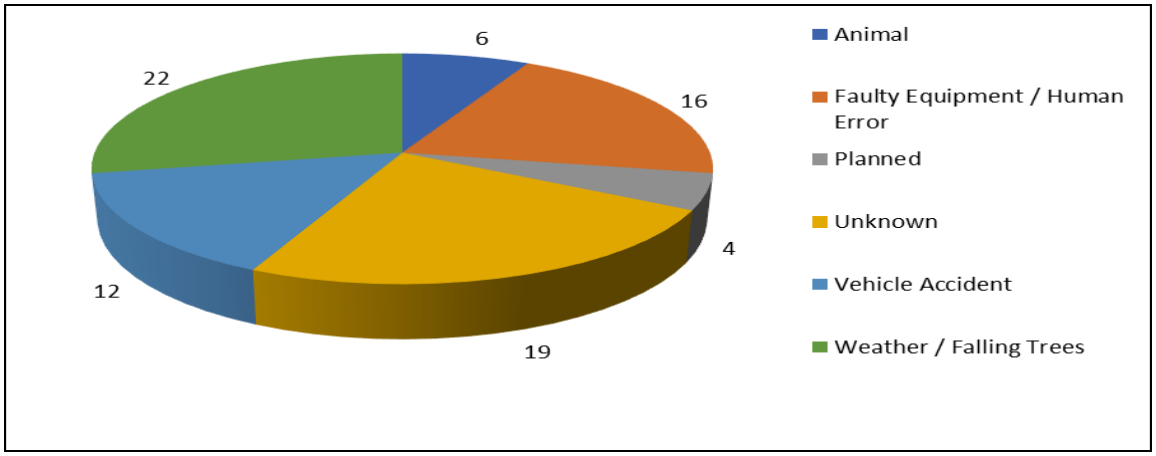
Outage summary

Total number of people affected by outages	15,236,136
Total duration of outages	20,479 minutes (more than 14 days)
Total number of outages	79
State ranking (number of outages)	14
Average number of people affected per outage	192,862
Average duration of outage	259 minutes (4+ hours)

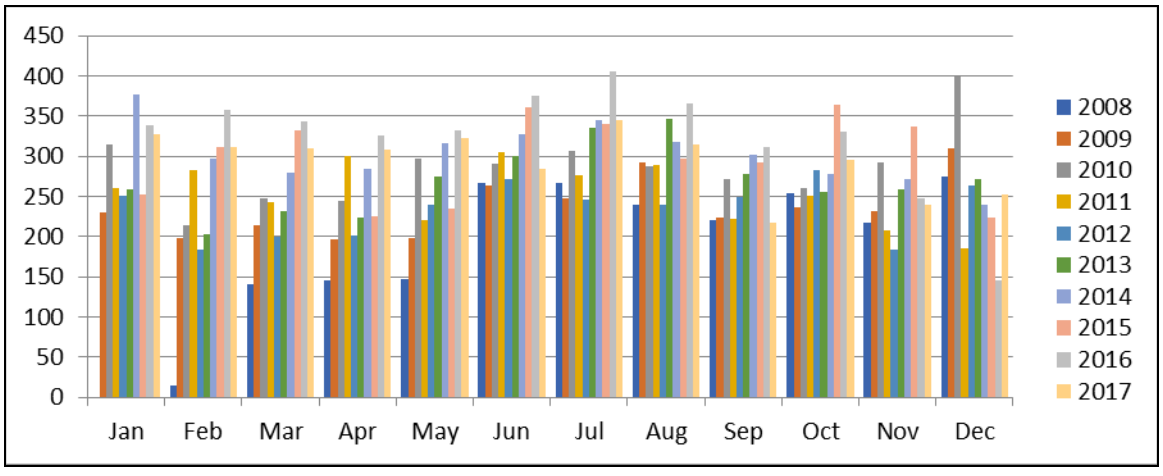
Note: Total number of people affected (and average) based on 44 (56%) of the total reported outages. Total duration of outages (and average) based on 20 (25%) of the total reported outages.

Outage fact: On March 14, a semi truck carrying crushed vehicles left 1,862 in the dark for two hours after one of the car's hoods popped up and tore down feeder lines in two locations, causing separate outages.

Reported power outages by cause



Reported power outages by month



Georgia

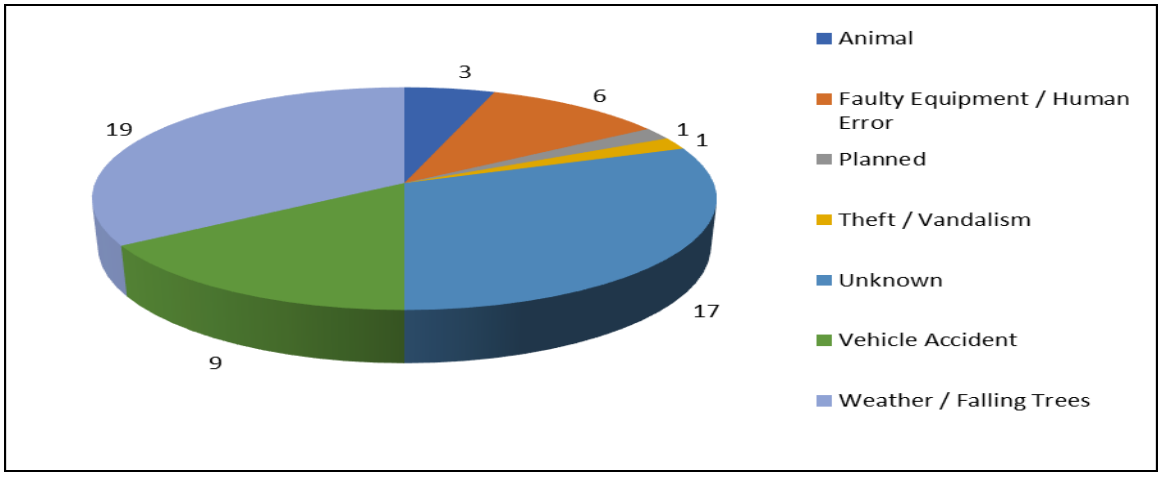
Outage summary

Total number of people affected by outages	2,040,663
Total duration of outages	5,505 minutes (nearly 92 hours)
Total number of outages	56
State ranking (number of outages)	22 (tie)
Average number of people affected per outage	36,440
Average duration of outage	98 minutes

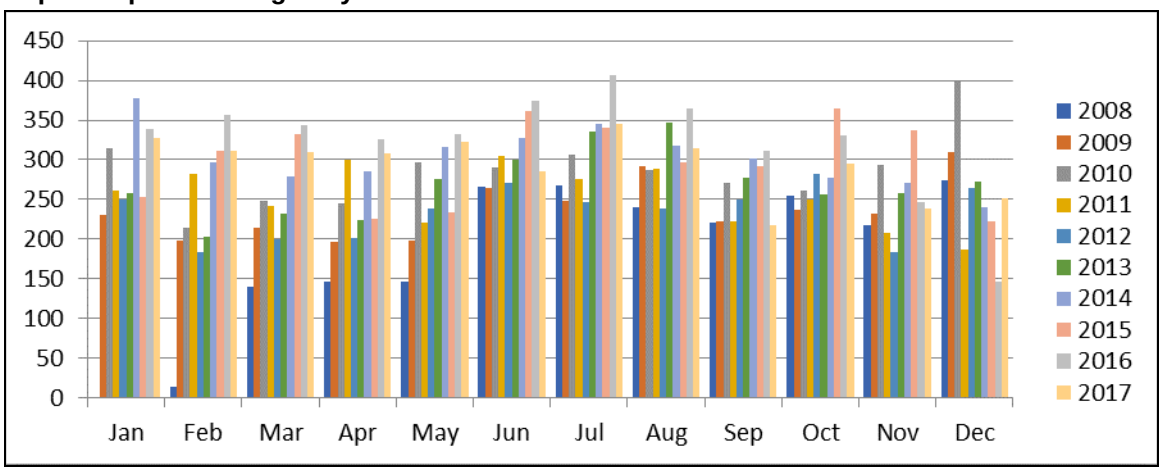
Note: Total number of people affected (and average) based on 32 (57%) of the total reported outages. Total duration of outages (and average) based on 6 (11%) of the total reported outages.

Outage fact: More than 100,000 Atlanta area customers lost power in a March 21 storm that dropped large hail and downed trees and power lines. The following day, nearly 40,000 customers were still without power.

Reported power outages by cause



Reported power outages by month



Hawaii

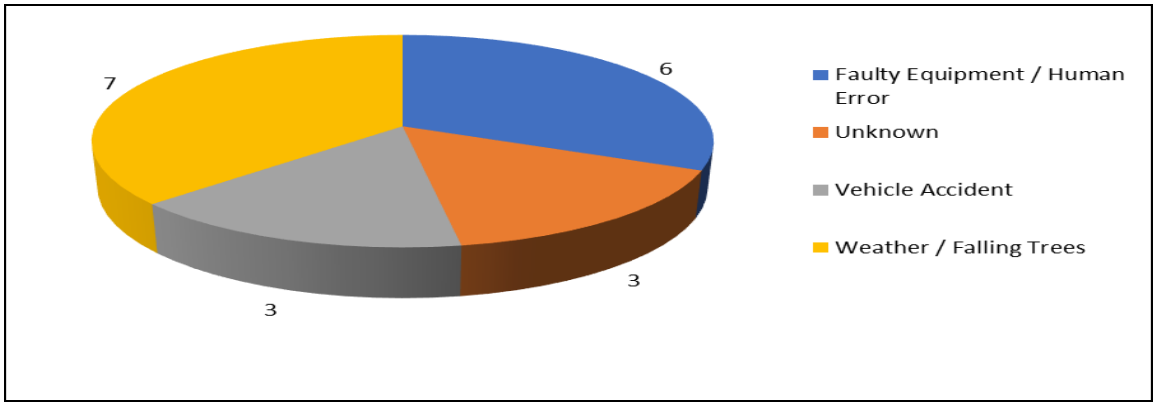
Outage summary

Total number of people affected by outages	284,405
Total duration of outages	1,455 minutes (just over 1 day)
Total number of outages	19
State ranking (number of outages)	37 (tie)
Average number of people affected per outage	14,969
Average duration of outage	77 minutes

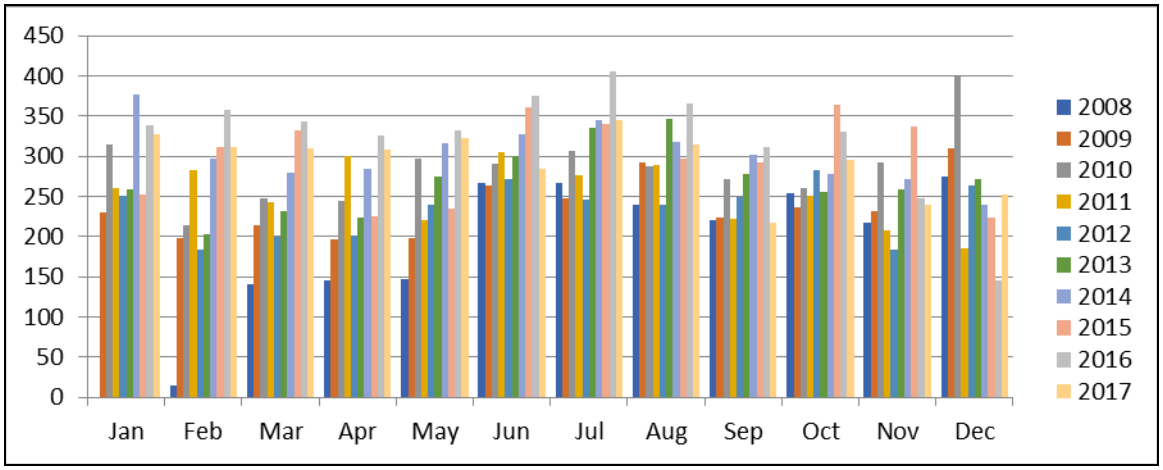
Note: Total number of people affected (and average) based on 15 (79%) of the total reported outages. Total duration of outages (and average) based on 6 (32%) of the total reported outages.

Outage fact: Across the state, downed trees and winds caused 100 separate outages, resulting in a loss of power to 100,000 customers. Strong winds created a mess across the islands with wind gusts reaching up to 60 mph. Firefighters had to respond to 72 weather-related incidents: including power line issues and one report of arcing wires.

Reported power outages by cause



Reported power outages by month



Idaho

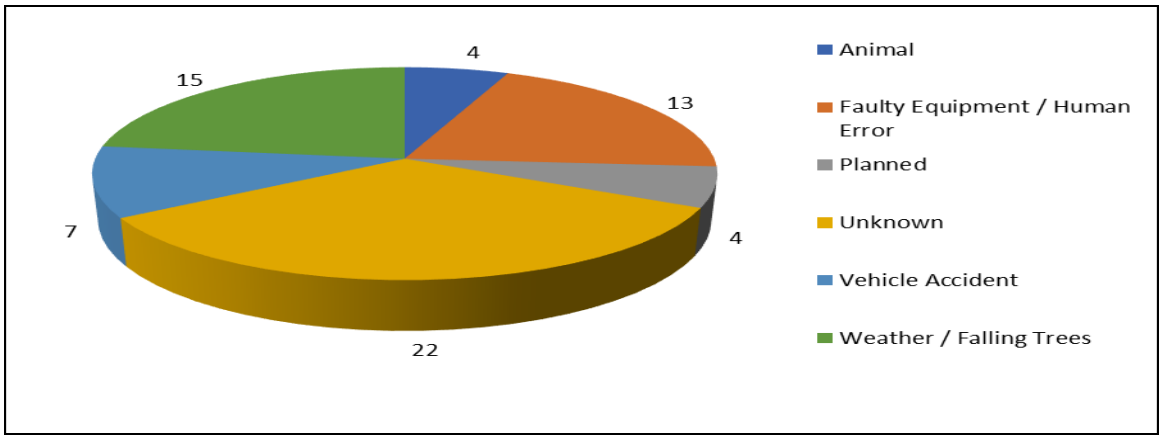
Outage summary

Total number of people affected by outages	168,466
Total duration of outages	2,655 minutes (more than 44 hours)
Total number of outages	65
State ranking (number of outages)	18
Average number of people affected per outage	2,592
Average duration of outage	41 minutes

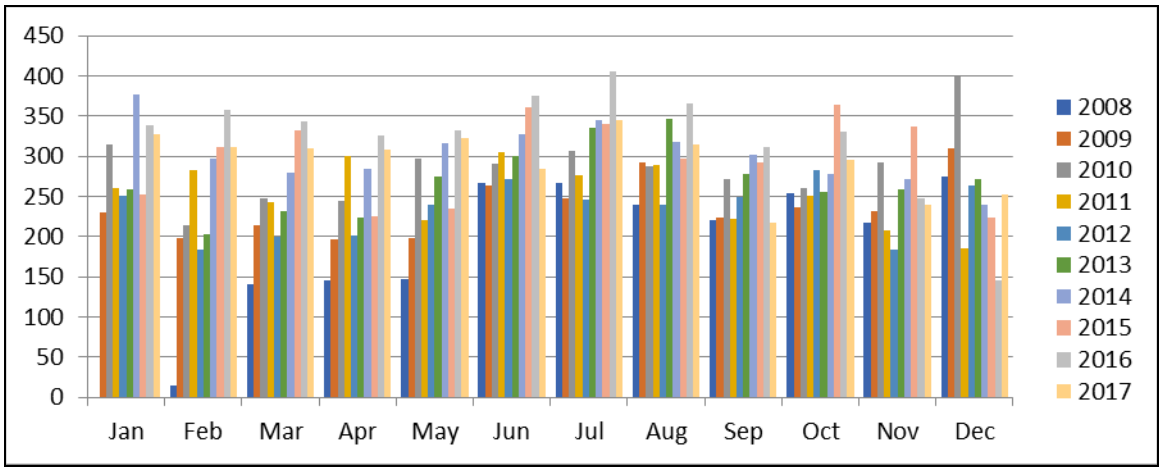
Note: Total number of people affected (and average) based on 48 (74%) of the total reported outages. Total duration of outages (and average) based on 14 (22%) of the total reported outages.

Outage fact: A goose flew into a Pocatello power line April 8, causing an hour-long outage for 1,000 customers.

Reported power outages by cause



Reported power outages by month



Illinois

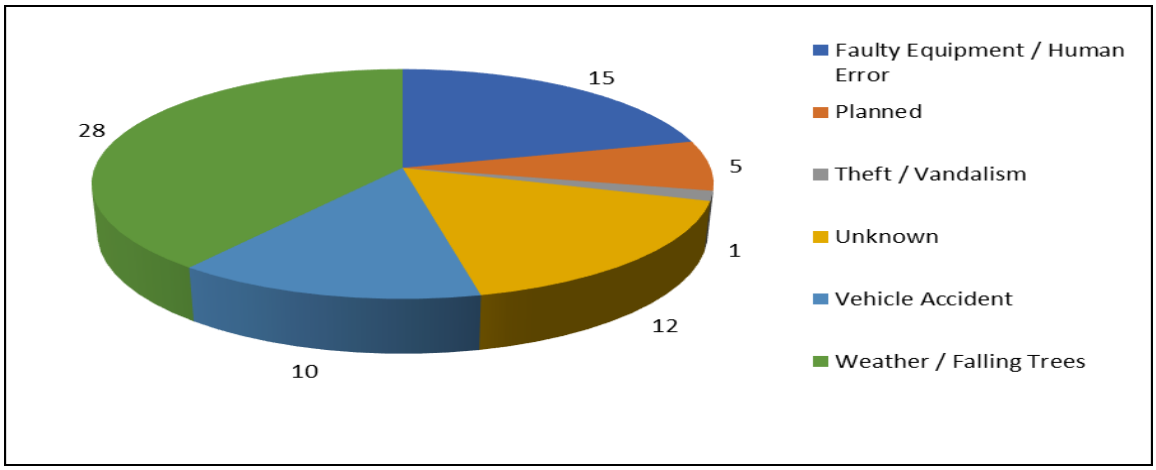
Outage summary

Total number of people affected by outages	186,588
Total duration of outages	1,140 minutes (19 hours)
Total number of outages	71
State ranking (number of outages)	15
Average number of people affected per outage	2,628
Average duration of outage	16 minutes

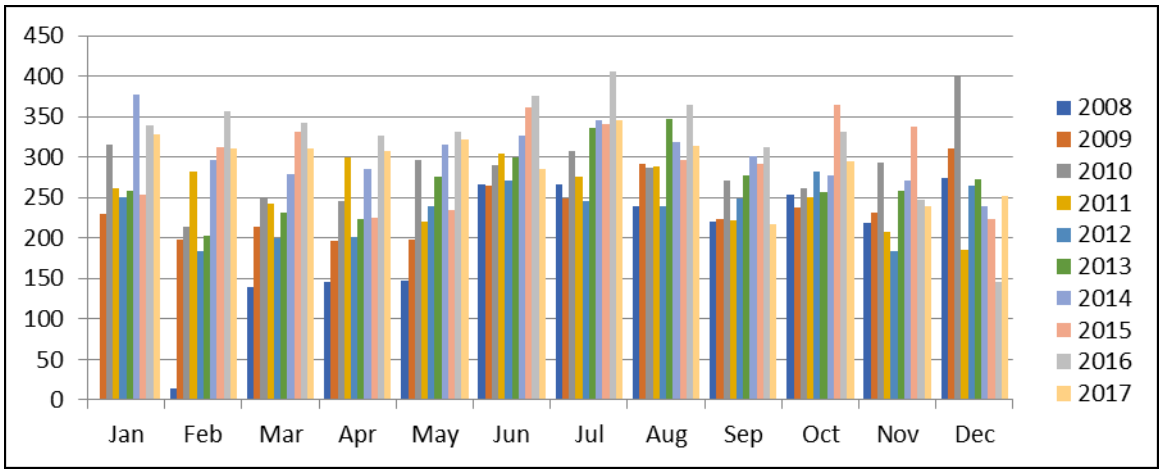
Note: Total number of people affected (and average) based on 40 (56%) of the total reported outages. Total duration of outages (and average) based on 9 (13%) of the total reported outages.

Outage fact: On July 22, Edwardsville was among the hardest-hit areas by storms that blew through the metro, knocking down trees and power lines and leaving 40,000 without power.

Reported power outages by cause



Reported power outages by month



Indiana

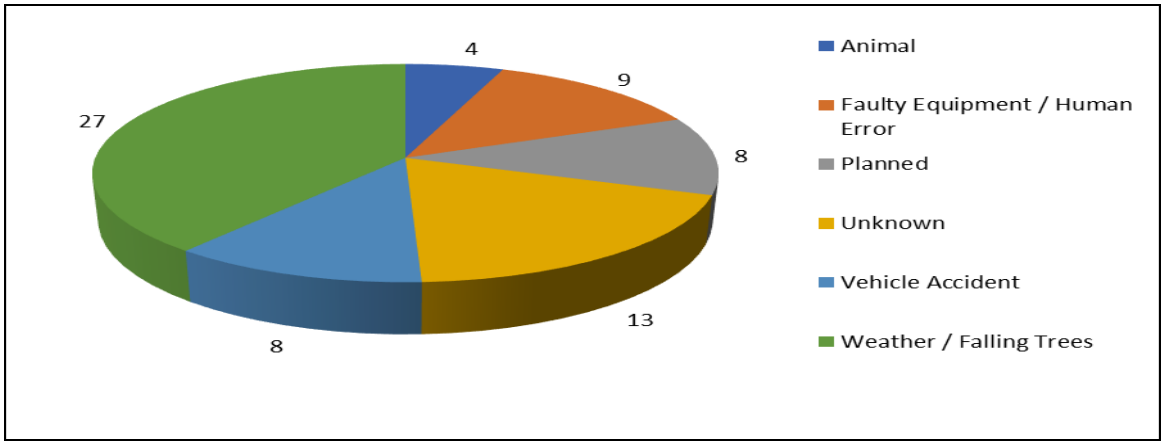
Outage summary

Total number of people affected by outages	176,901
Total duration of outages	2,690 minutes (nearly 45 hours)
Total number of outages	69
State ranking (number of outages)	16
Average number of people affected per outage	2,564
Average duration of outage	39 minutes

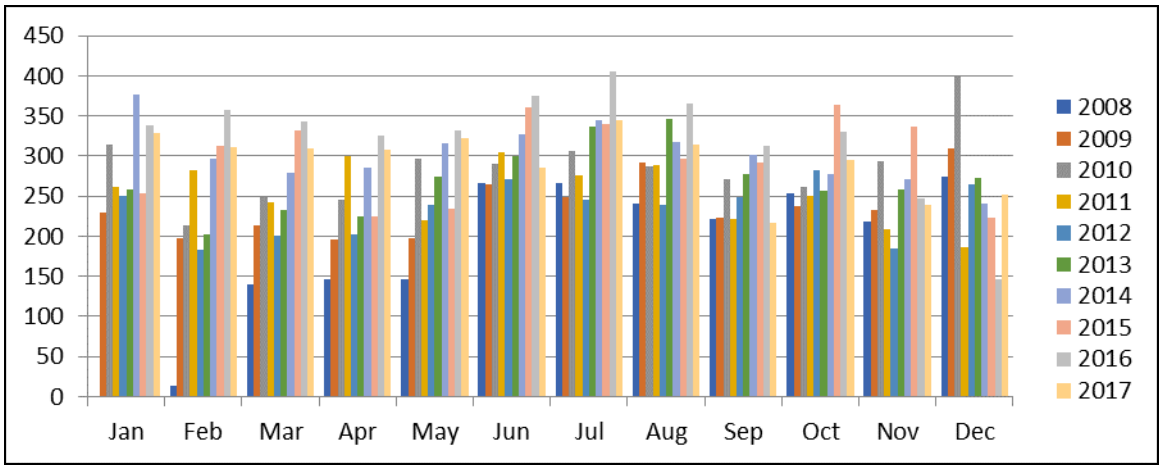
Note: Total number of people affected (and average) based on 42 (61%) of the total reported outages. Total duration of outages (and average) based on 17 (25%) of the total reported outages.

Outage fact: An excavator snagged a power line and caused an outage in Lafayette Sept. 18. In addition to cutting power, the line fell onto the highway, bringing traffic to a halt until it could be safely removed.

Reported power outages by cause



Reported power outages by month



Iowa

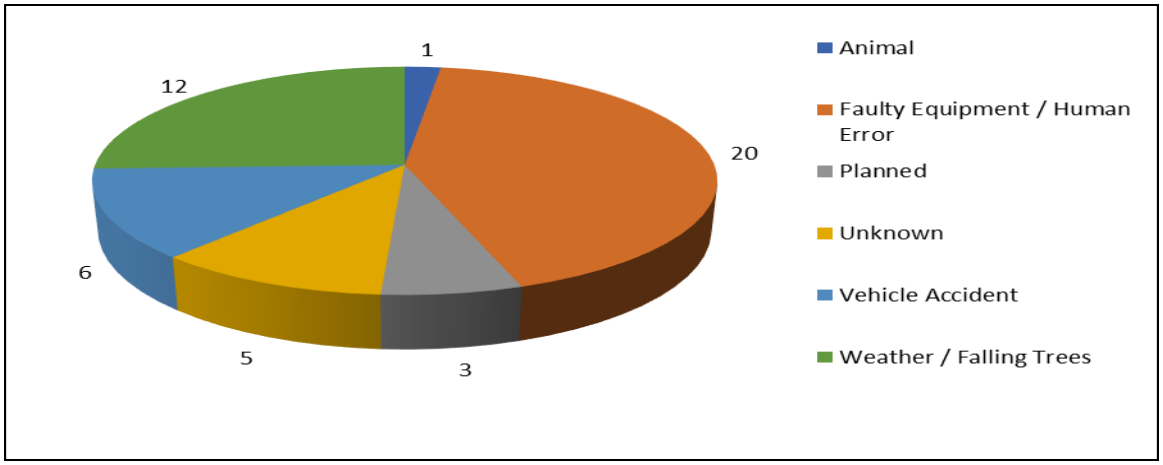
Outage summary

Total number of people affected by outages	132,564
Total duration of outages	2,495 minutes (more than 41 hours)
Total number of outages	47
State ranking (number of outages)	27
Average number of people affected per outage	2,821
Average duration of outage	53 minutes

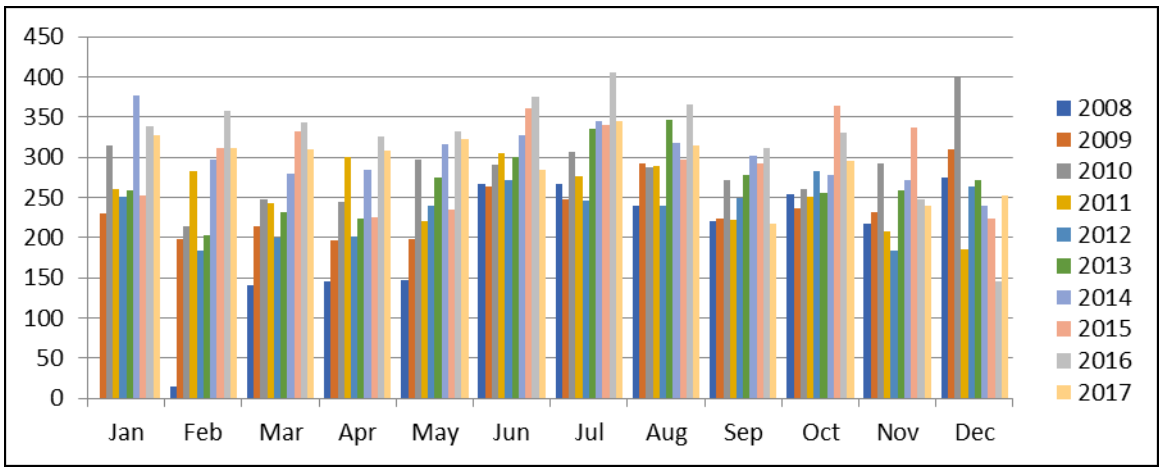
Note: Total number of people affected (and average) based on 34 (72%) of the total reported outages. Total duration of outages (and average) based on 14 (30%) of the total reported outages.

Outage fact: A flying roof led to a power outage in Waterloo on March 6, forcing more than 12,000 people to spend the night in the dark. Winds ripped the roof off of a building, with debris from the roof landing on an electrical substation.

Reported power outages by cause



Reported power outages by month



Kansas

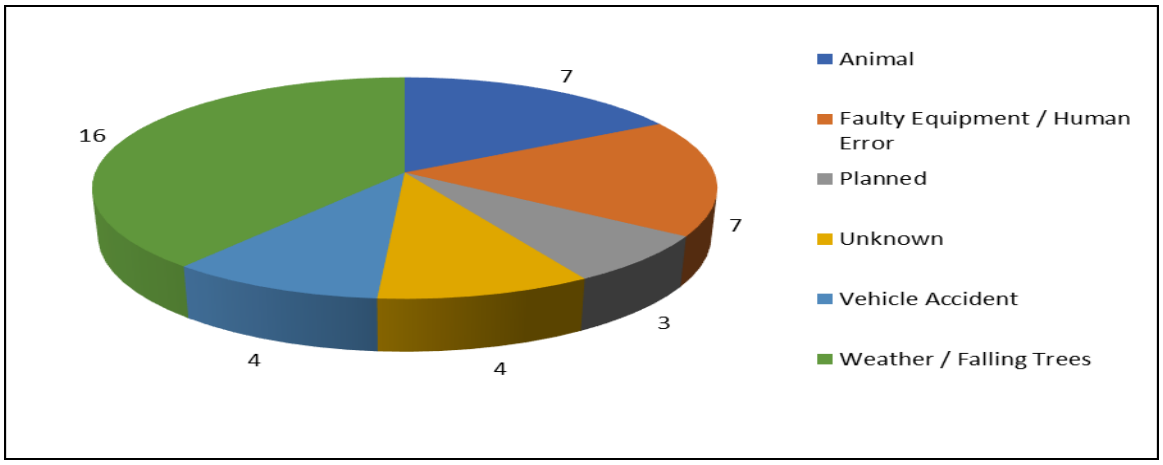
Outage summary

Total number of people affected by outages	44,449
Total duration of outages	1,735 minutes (29 hours)
Total number of outages	69
State ranking (number of outages)	31
Average number of people affected per outage	2,564
Average duration of outage	39 minutes

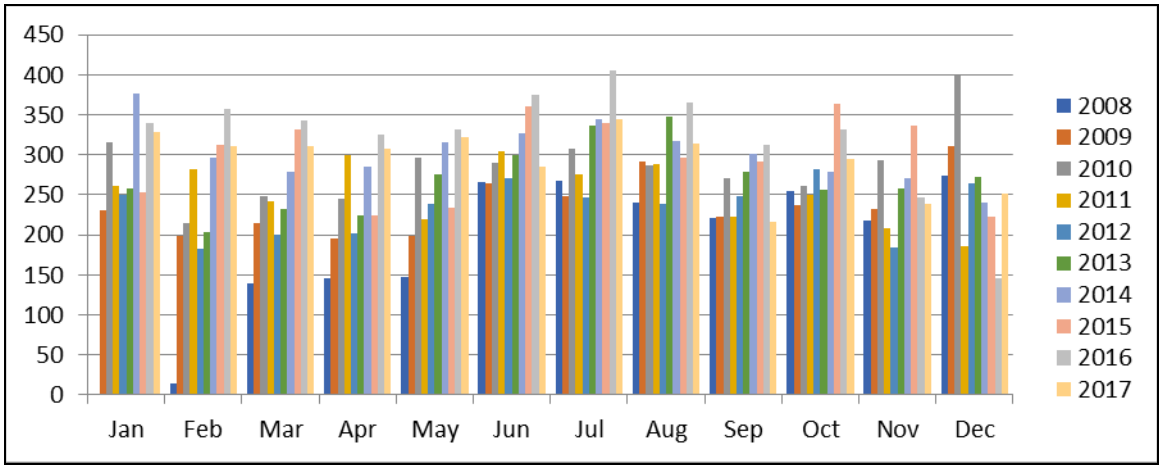
Note: Total number of people affected (and average) based on 22 (32%) of the total reported outages. Total duration of outages (and average) based on 12 (17%) of the total reported outages.

Outage fact: An owl that entered a Topeka substation knocked out power to 4,000 people for an hour on Aug. 27, also causing a small fire.

Reported power outages by cause



Reported power outages by month



Kentucky

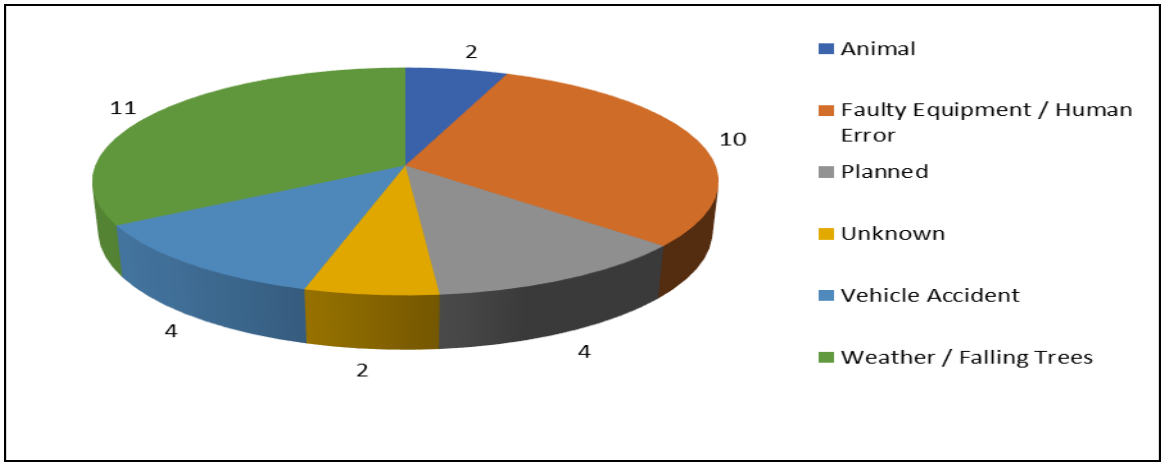
Outage summary

Total number of people affected by outages	90,046
Total duration of outages	1,263 minutes (21 hours)
Total number of outages	33
State ranking (number of outages)	34 (tie)
Average number of people affected per outage	2,729
Average duration of outage	38 minutes

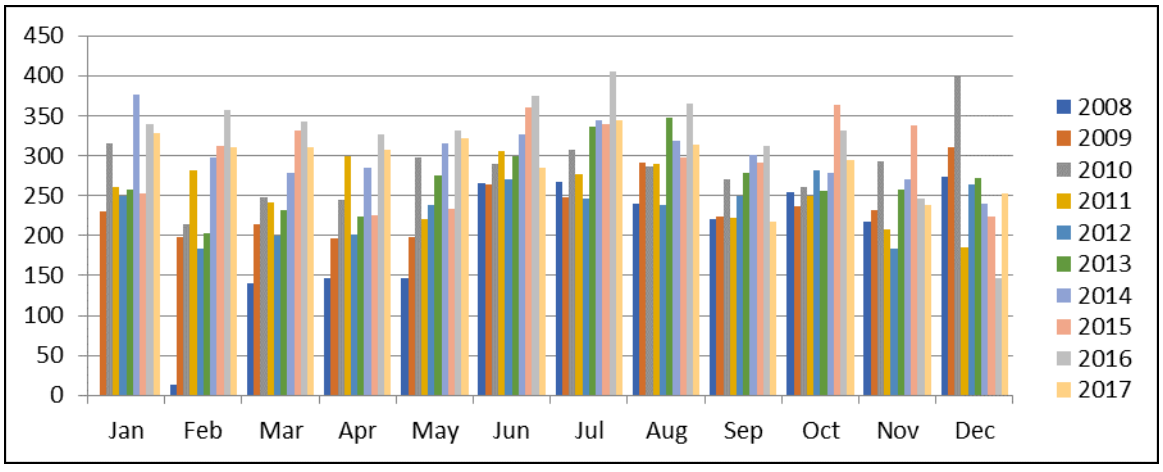
Note: Total number of people affected (and average) based on 33 (62%) of the total reported outages. Total duration of outages (and average) based on 9 (17%) of the total reported outages.

Outage fact: Wind gusts of up to 68 miles per hour left more than 31,000 customers across the state without electricity on March 1. Four days later, some 5,000 homes and businesses were still waiting for power to be restored.

Reported power outages by cause



Reported power outages by month



Louisiana

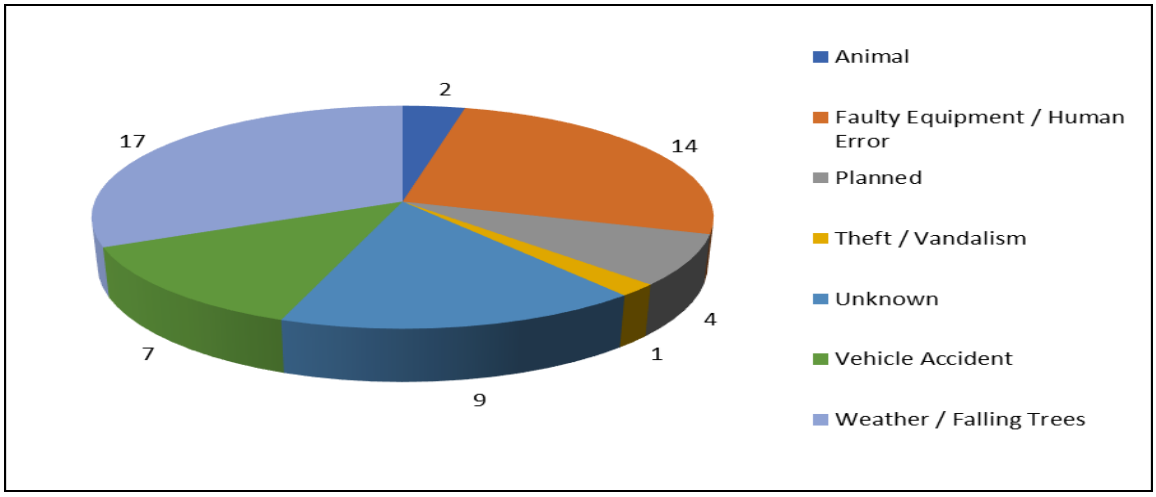
Outage summary

Total number of people affected by outages	329,836
Total duration of outages	7,660 minutes (more than 5 days)
Total number of outages	54
State ranking (number of outages)	24
Average number of people affected per outage	6,108
Average duration of outage	142 minutes

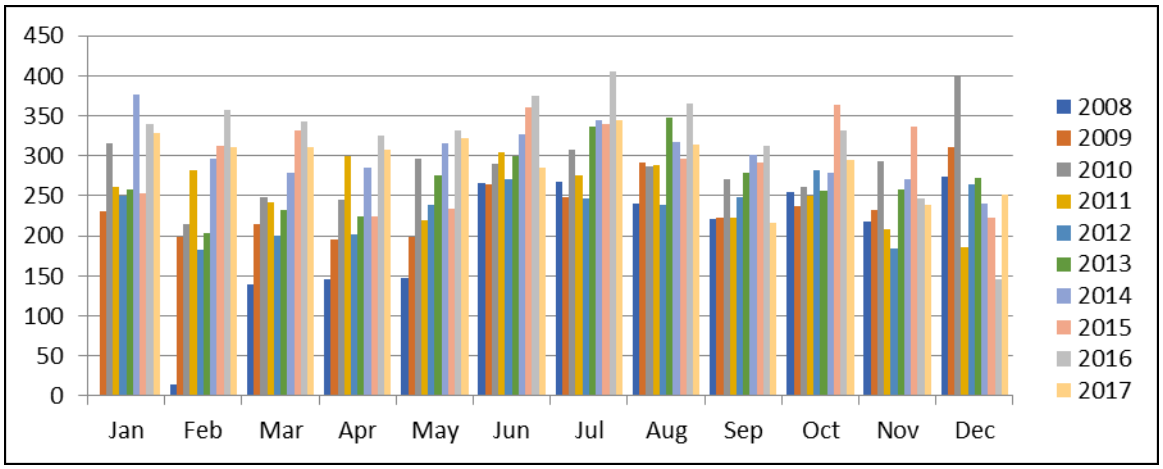
Note: Total number of people affected (and average) based on 29 (54%) of the total reported outages. Total duration of outages (and average) based on 6 (11%) of the total reported outages.

Outage fact: The man responsible for a copper wiring theft that caused a widespread outage in New Orleans June 29 was arrested in September after being found living in a tent directly behind the Entergy facility he vandalized.

Reported power outages by cause



Reported power outages by month



Maine

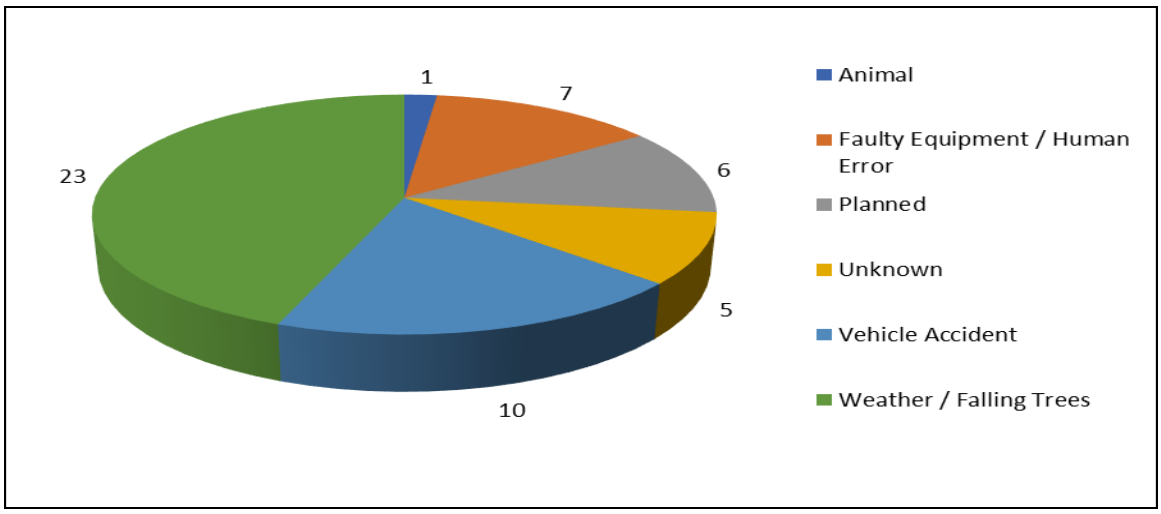
Outage summary

Total number of people affected by outages	1,729,950
Total duration of outages	6,565 minutes (4 ½ days)
Total number of outages	52
State ranking (number of outages)	25 (tie)
Average number of people affected per outage	33,268
Average duration of outage	126 minutes

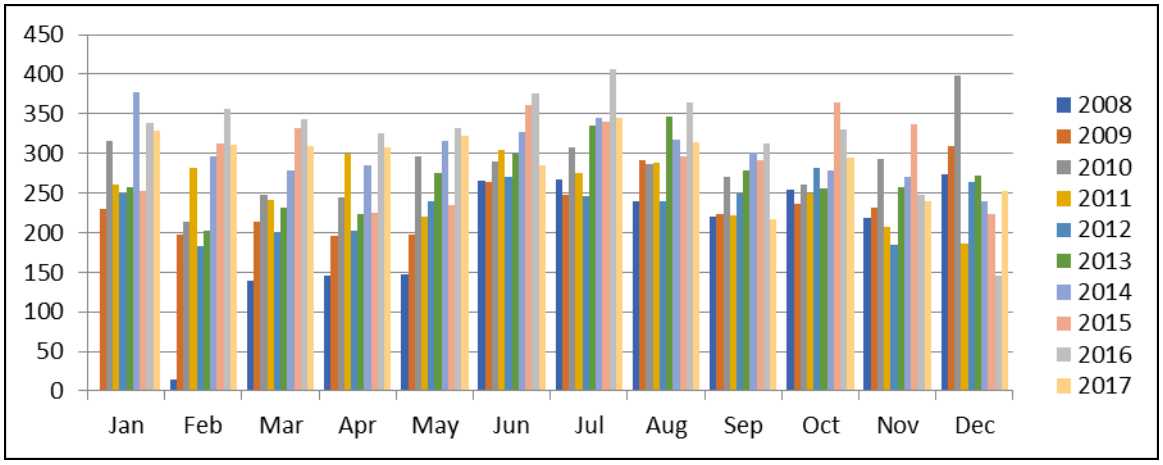
Note: Total number of people affected (and average) based on 39 (75%) of the total reported outages. Total duration of outages (and average) based on 14 (27%) of the total reported outages.

Outage fact: A powerful nor'easter on March 14 raked the region with gusting winds and blowing snow that sent cars off roads and left more than 30,000 homes and businesses without power.

Reported power outages by cause



Reported power outages by month



Maryland / Washington, DC

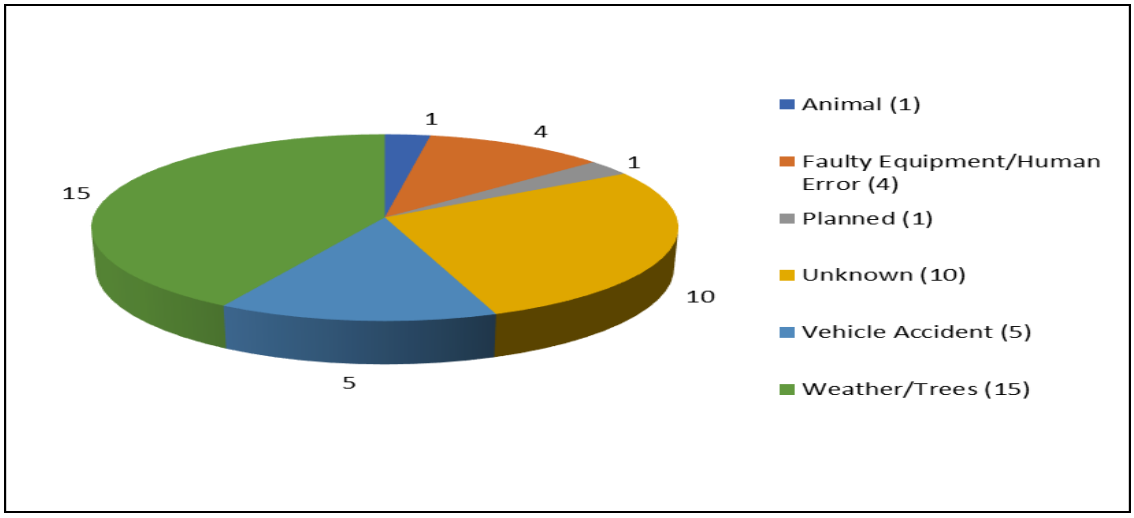
Outage summary

Total number of people affected by outages	88,042
Total duration of outages	974 minutes (more than 16 hours)
Total number of outages	36
State ranking (number of outages)	33 (tie)
Average number of people affected per outage	2,446
Average duration of outage	27 minutes

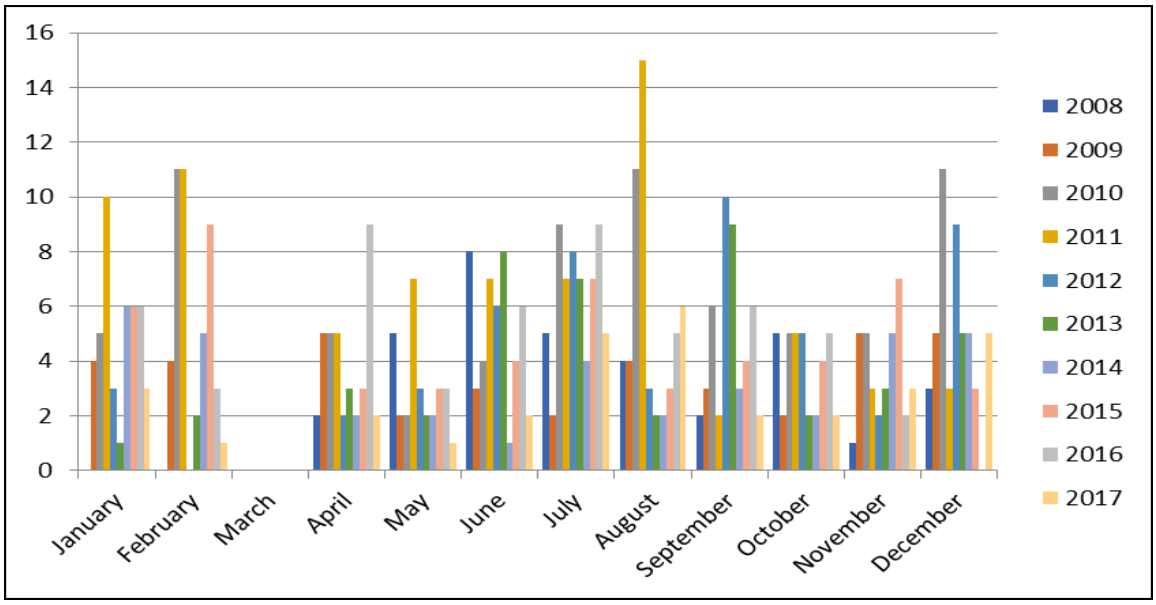
Note: Total number of people affected (and average) based on 22 (61%) of the total reported outages. Total duration of outages (and average) based on 4 (11%) of the total reported outages.

Outage fact: A tornado with wind speeds of up to 125 miles per hour touched down in Queen Anne's County, leaving 3,000 customers in the dark.

Reported power outages by cause



Reported power outages by month



Massachusetts

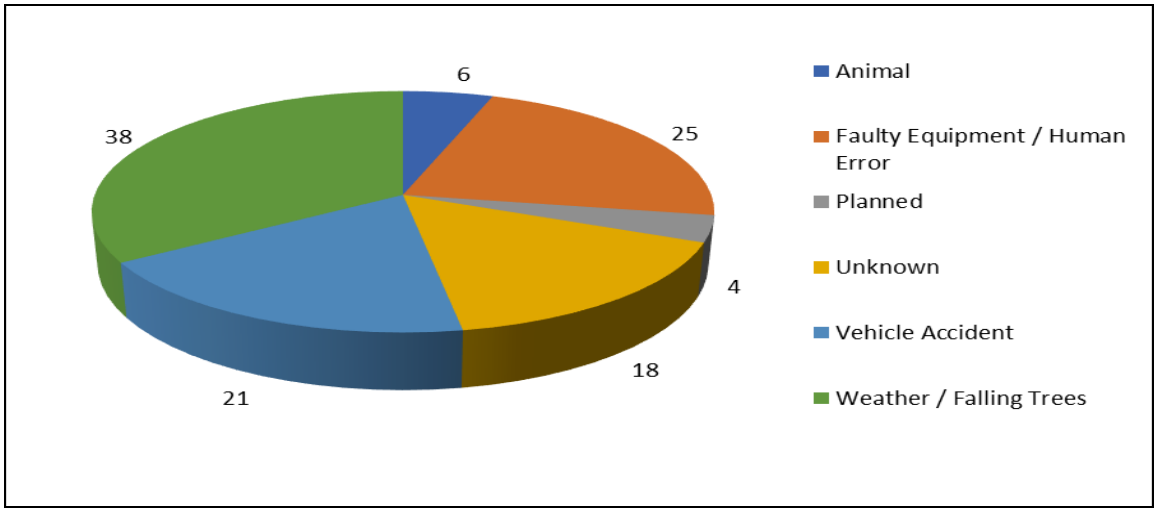
Outage summary

Total number of people affected by outages	631,811
Total duration of outages	3,302 minutes (55 hours)
Total number of outages	112
State ranking (number of outages)	8
Average number of people affected per outage	5,641
Average duration of outage	29 minutes

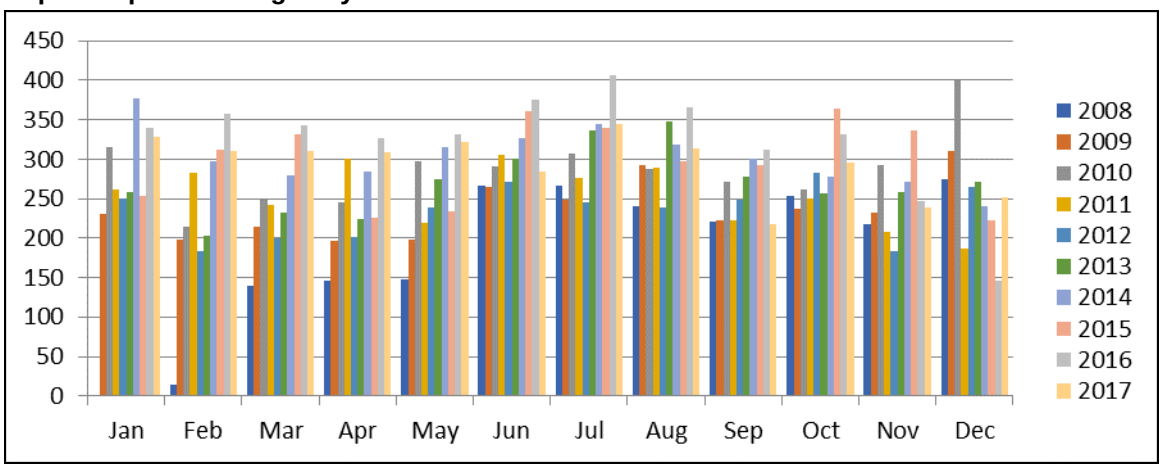
Note: Total number of people affected (and average) based on 71 (63%) of the total reported outages. Total duration of outages (and average) based on 20 (18%) of the total reported outages.

Outage fact: Police said a distracted box truck driver was to blame for an outage in Whately June 26. The driver admitted that he became distracted by his cell phone and drifted off the road, crashing into a tree and a utility pole.

Reported power outages by cause



Reported power outages by month



Michigan

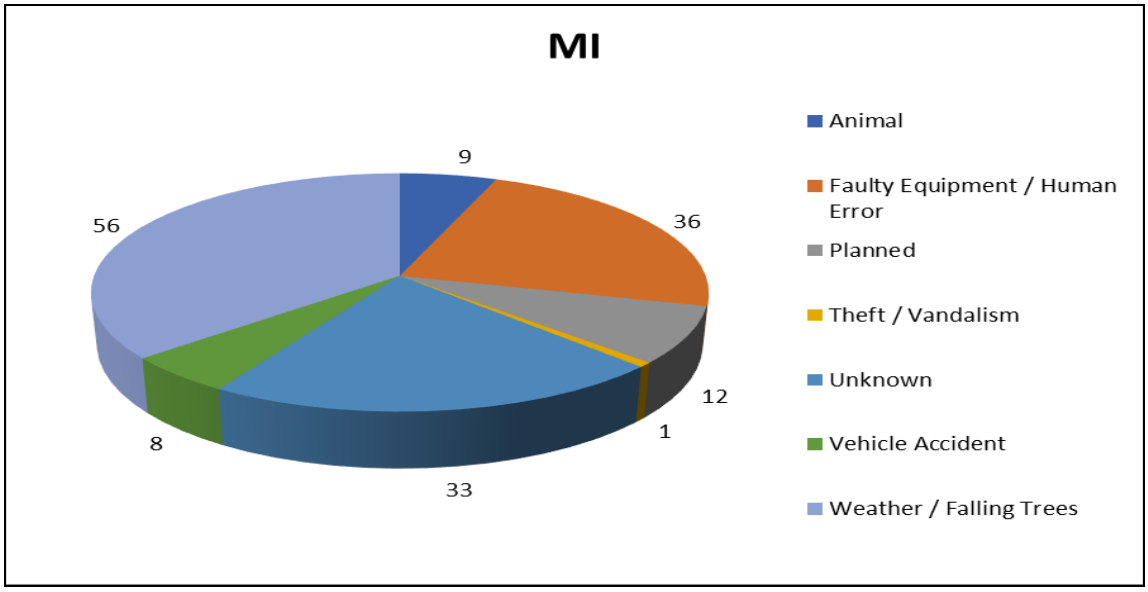
Outage summary

Total number of people affected by outages	2,020,635
Total duration of outages	14,052 minutes (nearly 10 days)
Total number of outages	155
State ranking (number of outages)	5
Average number of people affected per outage	13,036
Average duration of outage	76 minutes

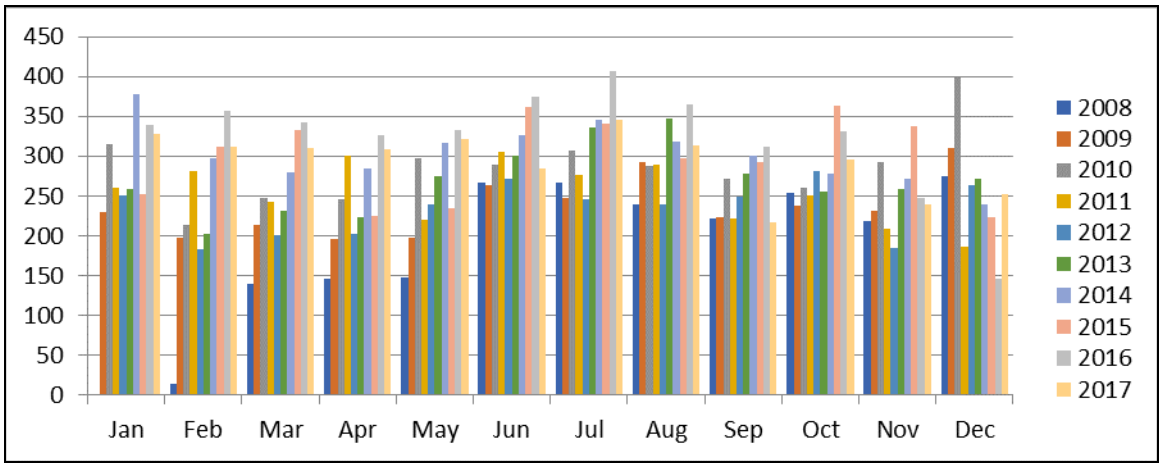
Note: Total number of people affected (and average) based on 109 (70%) of the total reported outages. Total duration of outages (and average) based on 34 (22%) of the total reported outages.

Outage fact: On May 7, a dashboard camera revealed the cause of an outage that affected 4,500 Muskegon customers for five hours: a bright flash of light above the road was followed by a goose falling lifelessly to the ground. The bird apparently collided with a 7,200-volt line, which tripped a nearby transformer.

Reported power outages by cause



Reported power outages by month



Minnesota

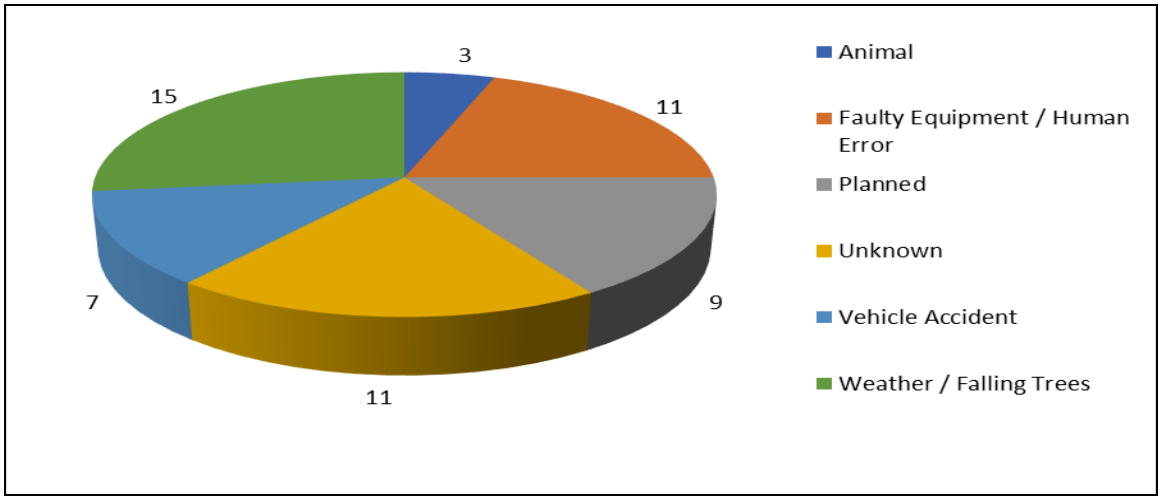
Outage summary

Total number of people affected by outages	77,159
Total duration of outages	4,271 minutes (more than 71 hours)
Total number of outages	56
State ranking (number of outages)	22 (tie)
Average number of people affected per outage	1,378
Average duration of outage	76 minutes

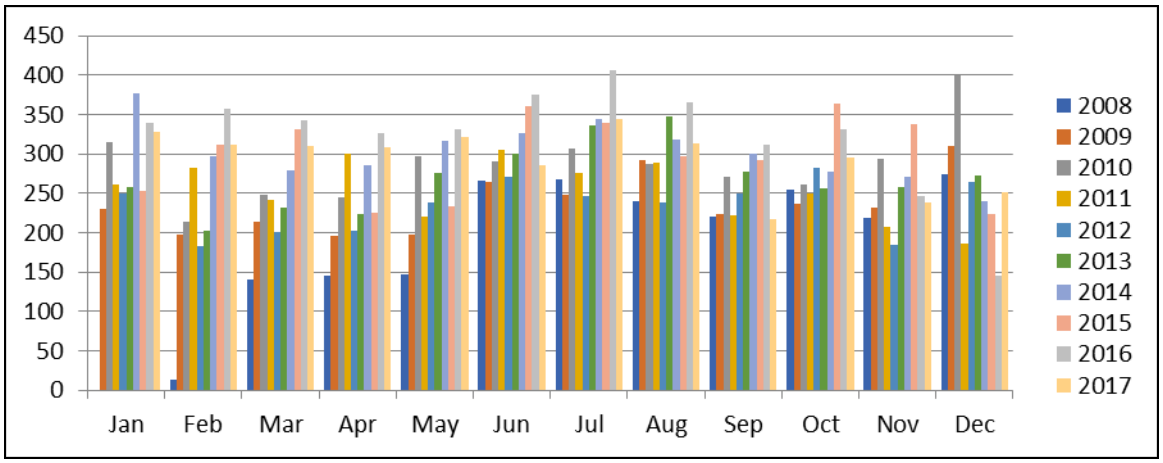
Note: Total number of people affected (and average) based on 29 (52%) of the total reported outages. Total duration of outages (and average) based on 20 (36%) of the total reported outages.

Outage fact: Some Fergus Falls residents lost power May 4 after a driver in a commercial dump truck mistakenly drove down the highway with the dump box still elevated. Deputies arrived to find felled power poles on either side of the highway and the power line between them severed.

Reported power outages by cause



Reported power outages by month



Mississippi

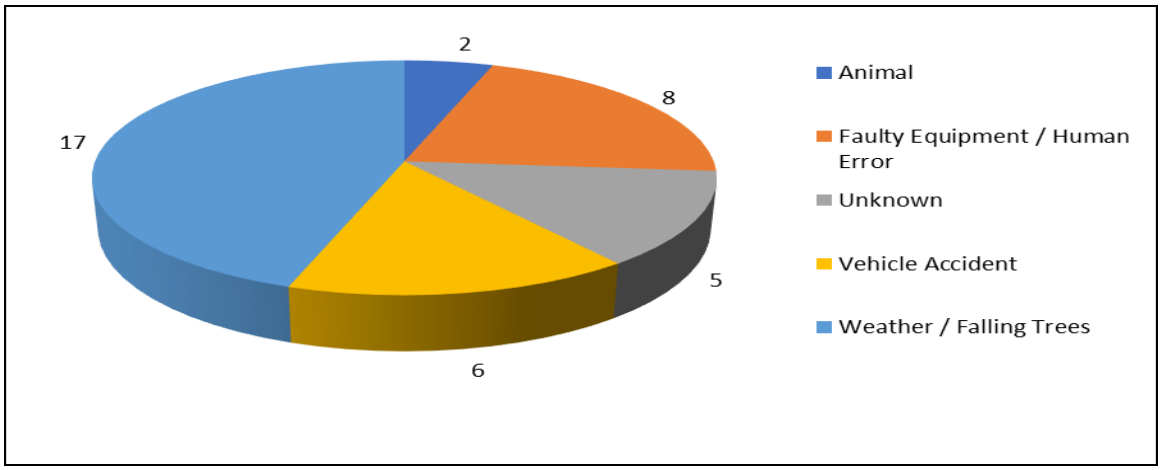
Outage summary

Total number of people affected by outages	177,797
Total duration of outages	669 minutes (more than 11 hours)
Total number of outages	38
State ranking (number of outages)	32 (tie)
Average number of people affected per outage	4,679
Average duration of outage	18 minutes

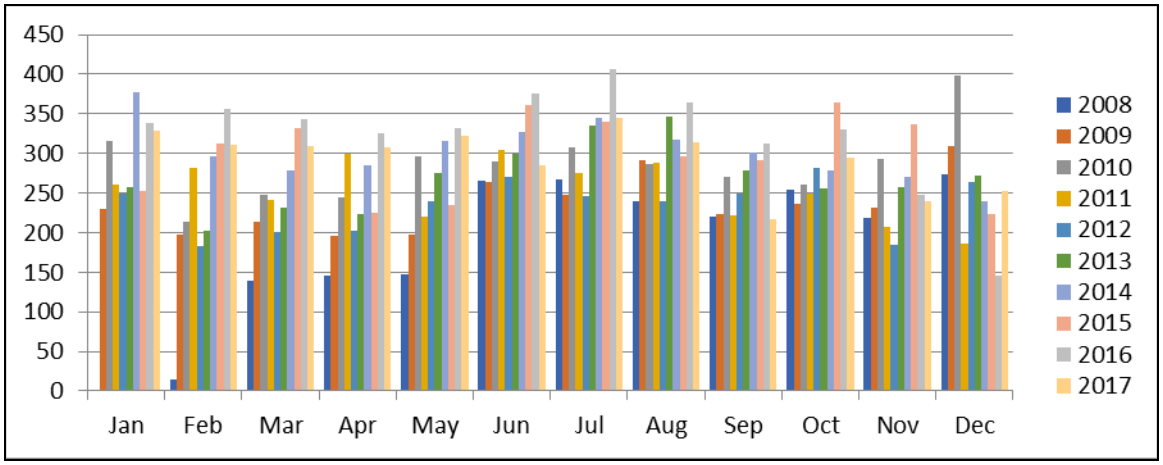
Note: Total number of people affected (and average) based on 21 (55%) of the total reported outages. Total duration of outages (and average) based on 6 (16%) of the total reported outages.

Outage fact: Hurricane Nate caused massive outages when the storm made landfall on Oct. 8, leaving 100,000 powerless customers in its wake.

Reported power outages by cause



Reported power outages by month



Missouri

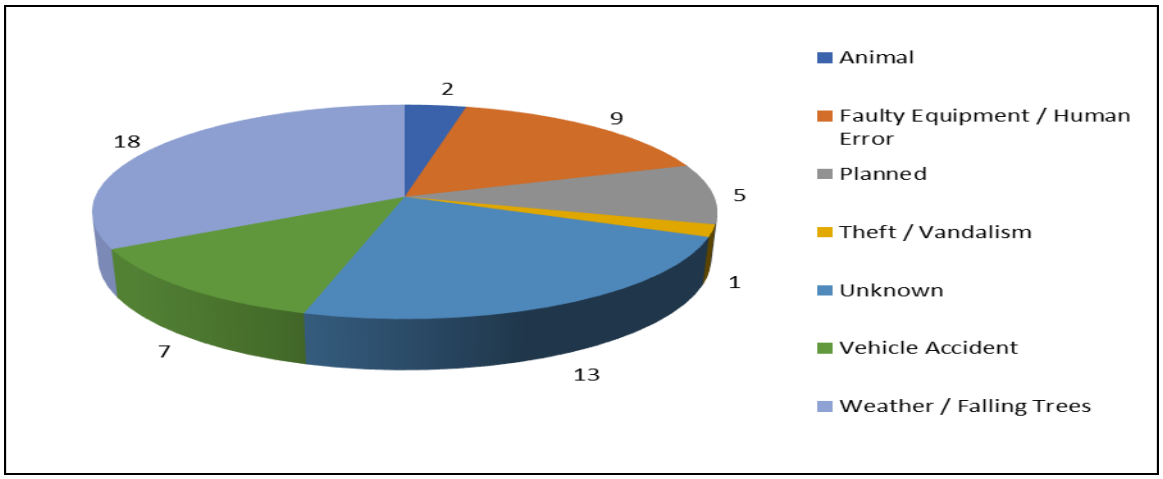
Outage summary

Total number of people affected by outages	399,617
Total duration of outages	8,959 minutes (more than 6 days)
Total number of outages	55
State ranking (number of outages)	23
Average number of people affected per outage	7,266
Average duration of outage	163 minutes (almost 3 hours)

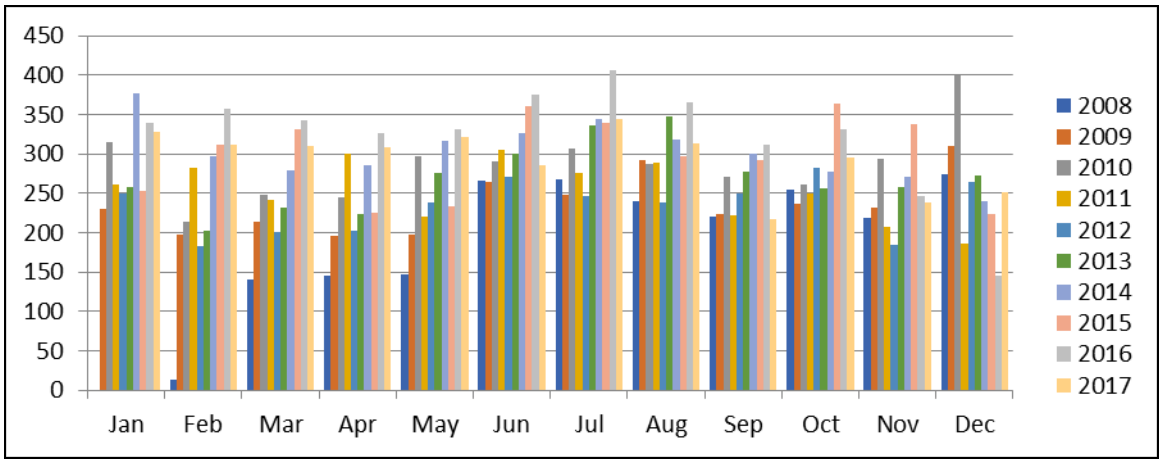
Note: Total number of people affected (and average) based on 46 (64%) of the total reported outages. Total duration of outages (and average) based on 16 (22%) of the total reported outages.

Outage fact: A 70-minute outage resulted from a bird flying into wires in Washington on June 6 after the contact caused a transformer to malfunction.

Reported power outages by cause



Reported power outages by month



Montana

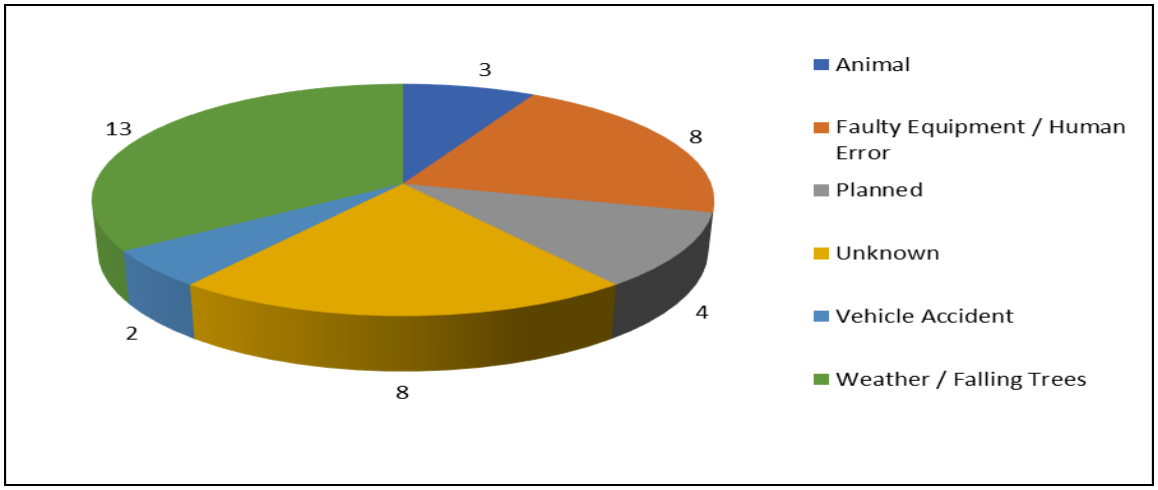
Outage summary

Total number of people affected by outages	170,076
Total duration of outages	1,240 minutes (more than 28 hours)
Total number of outages	38
State ranking (number of outages)	32 (tie)
Average number of people affected per outage	4,476
Average duration of outage	33 minutes

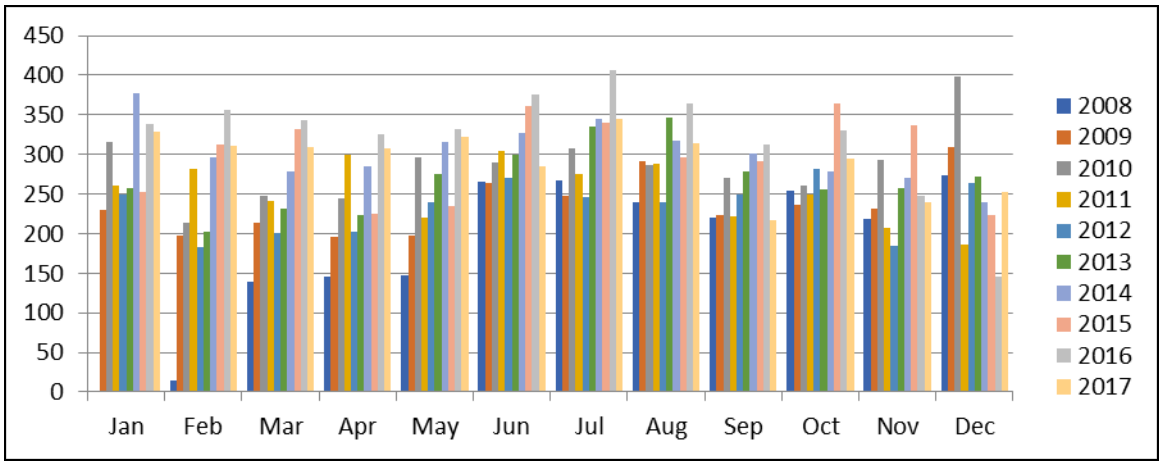
Note: Total number of people affected (and average) based on 23 (61%) of the total reported outages. Total duration of outages (and average) based on 8 (21%) of the total reported outages.

Outage fact: A lightning strike was suspected of causing a five-hour outage in Sidney August 31. The entire city was left in the dark after the cross arm of the pole, which holds a double circuit, caught fire.

Reported power outages by cause



Reported power outages by month



Nebraska

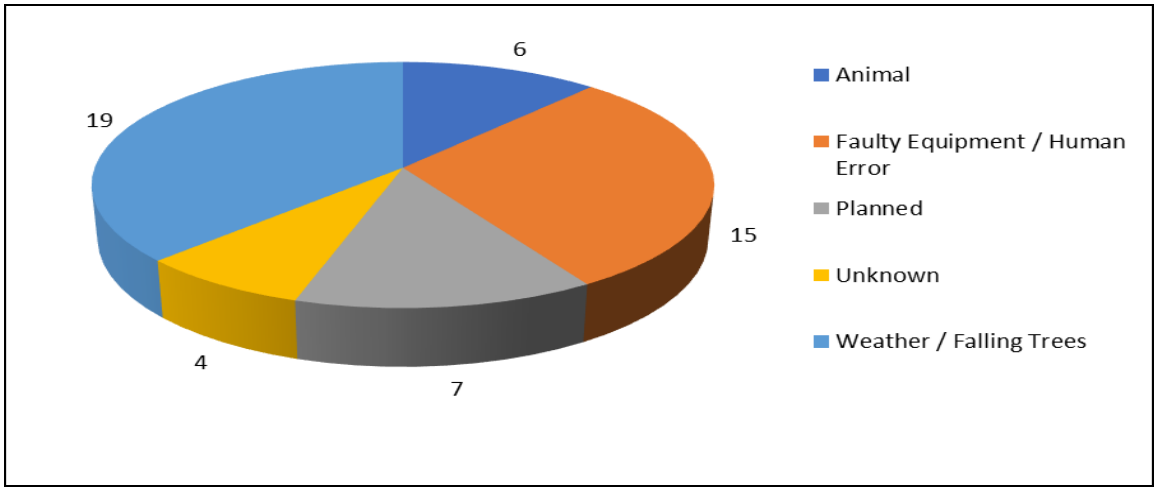
Outage summary

Total number of people affected by outages	193,434
Total duration of outages	11,929 minutes (more than 8 days)
Total number of outages	51
State ranking (number of outages)	26
Average number of people affected per outage	3,793
Average duration of outage	234 minutes

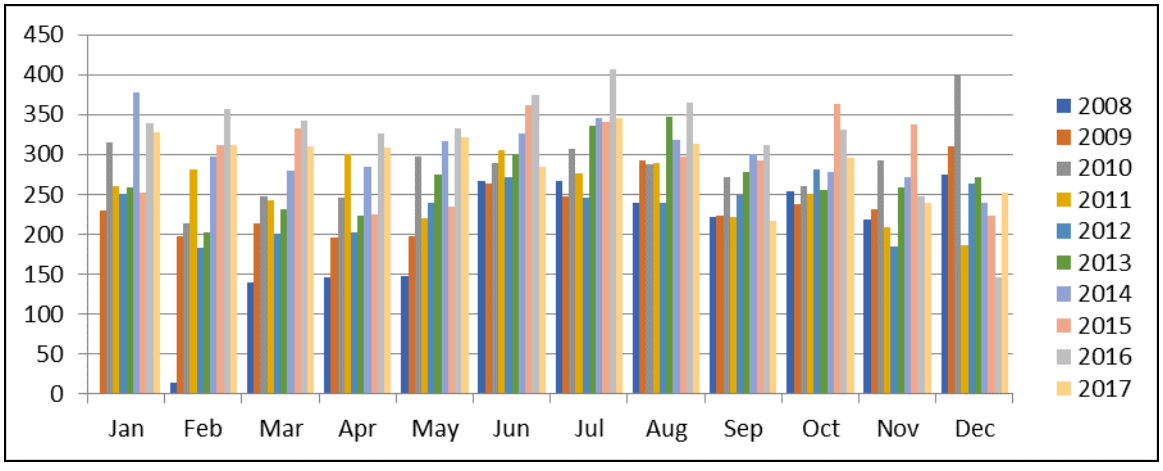
Note: Total number of people affected (and average) based on 31 (61%) of the total reported outages. Total duration of outages (and average) based on 19 (37%) of the total reported outages.

Outage fact: There were a lot of unhappy shoppers and chefs in Omaha Thanksgiving morning — 2,736, to be exact —after a large bird flew into a substation, causing some damage and a power outage on two circuits.

Reported power outages by cause



Reported power outages by month



Nevada

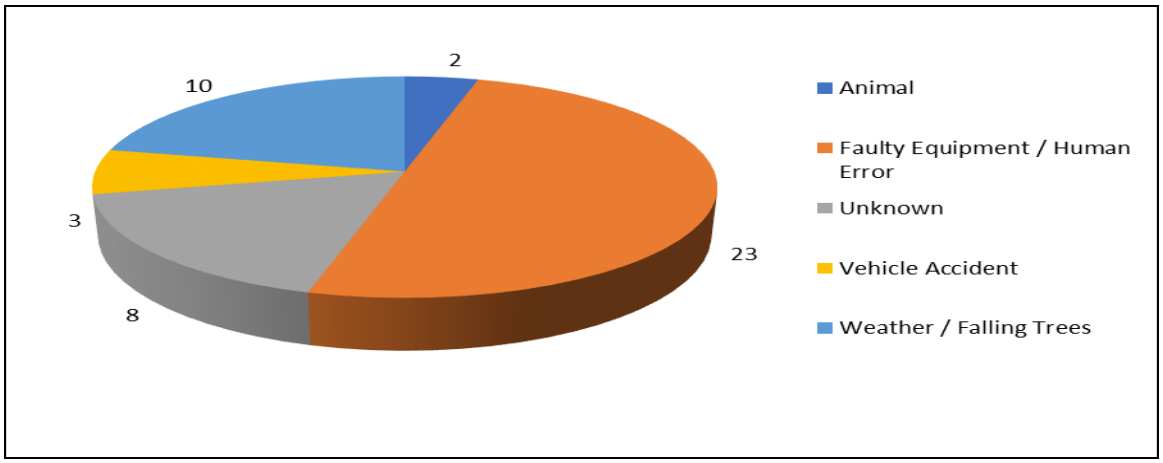
Outage summary

Total number of people affected by outages	163,928
Total duration of outages	1,760 minutes (more than 29 hours)
Total number of outages	46
State ranking (number of outages)	28
Average number of people affected per outage	3,564
Average duration of outage	38 minutes

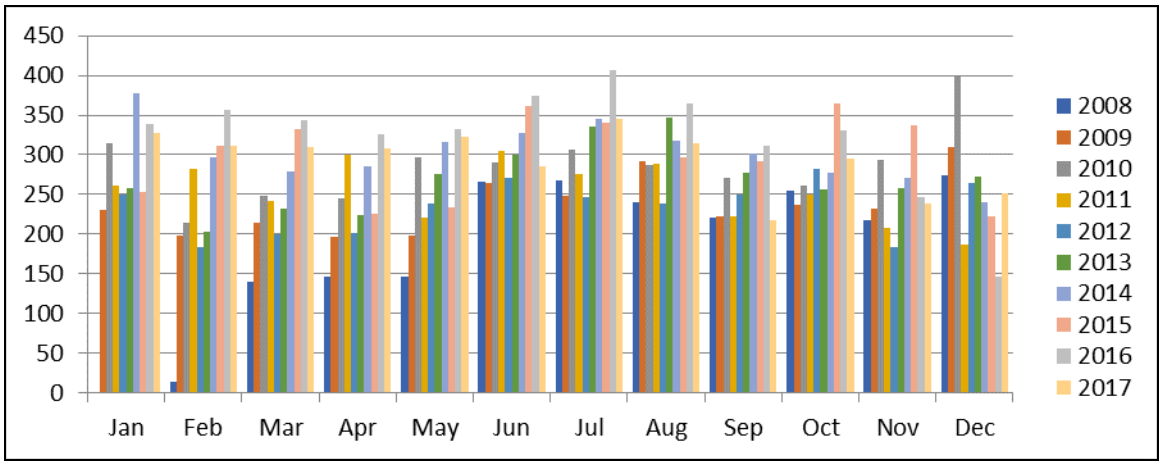
Note: Total number of people affected (and average) based on 33 (72%) of the total reported outages. Total duration of outages (and average) based on 7 (15%) of the total reported outages.

Outage fact: A Mylar balloon hit power lines and cut electricity in Las Vegas April 19, causing some traffic signals to go dark near the Las Vegas Strip.

Reported power outages by cause



Reported power outages by month



New Hampshire

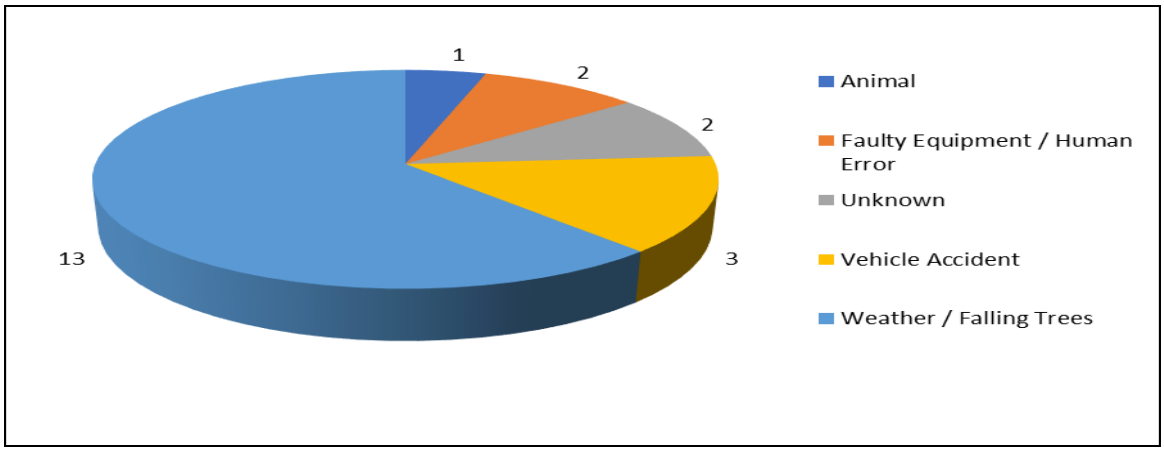
Outage summary

Total number of people affected by outages	457,644
Total duration of outages	7,855 minutes (almost 5 ½ days)
Total number of outages	21
State ranking (number of outages)	36
Average number of people affected per outage	21,793
Average duration of outage	374 minutes (more than 6 hours)

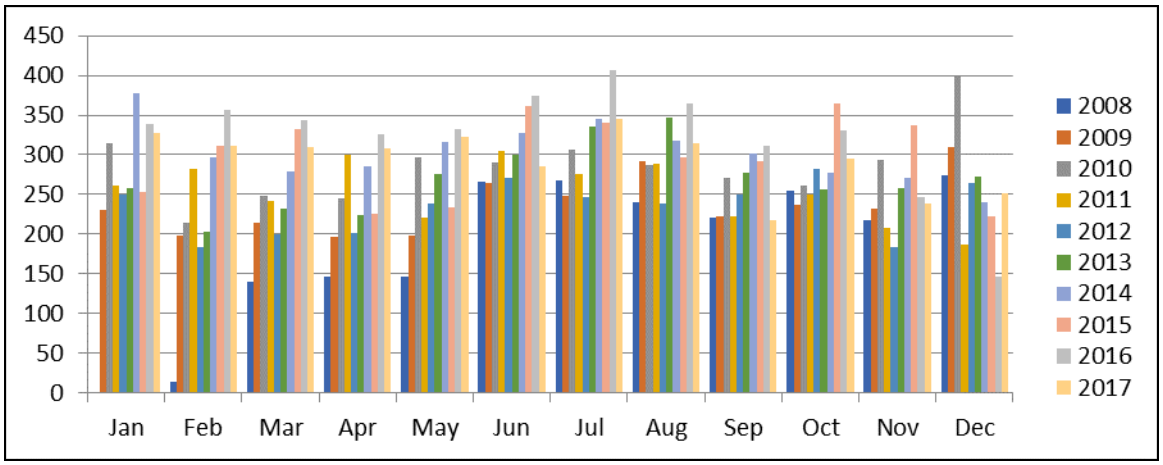
Note: Total number of people affected (and average) based on 18 (86%) of the total reported outages. Total duration of outages (and average) based on 6 (29%) of the total reported outages.

Outage fact: On Jan. 4, a squirrel triggered a fire in a substation, cutting power to 5,000 Concord residents. The tree-dwelling rodent tripped a breaker.

Reported power outages by cause



Reported power outages by month



New Jersey

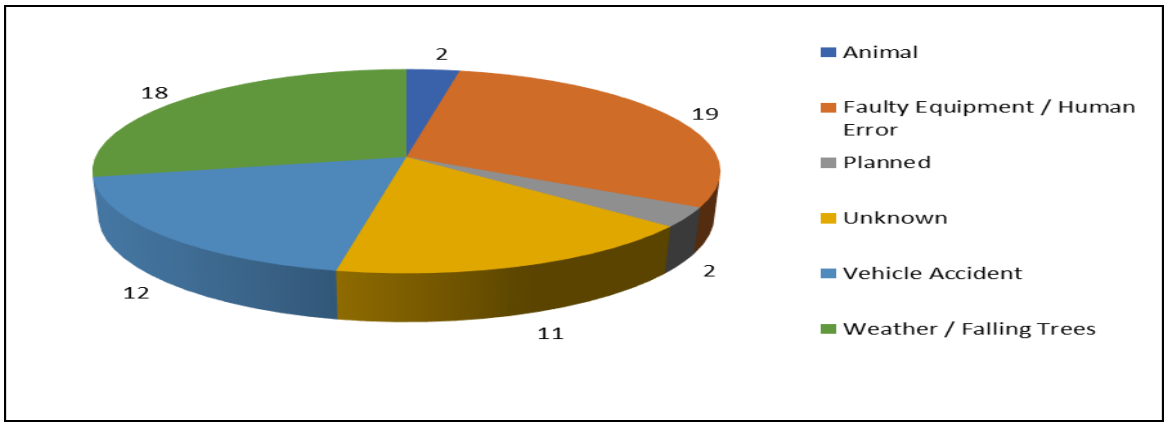
Outage summary

Total number of people affected by outages	267,761
Total duration of outages	2,010 minutes (more than 33 hours)
Total number of outages	64
State ranking (number of outages)	19 (tie)
Average number of people affected per outage	4,184
Average duration of outage	31 minutes

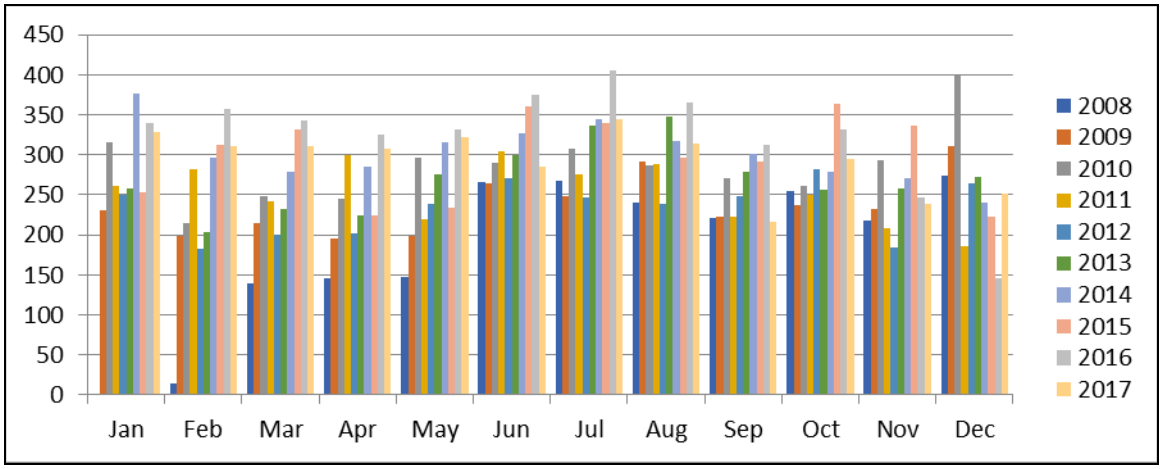
Note: Total number of people affected (and average) based on 37 (58%) of the total reported outages. Total duration of outages (and average) based on 13 (20%) of the total reported outages.

Outage fact: A raccoon that made contact with a transformer caused a Jersey City blackout on August 24 that left 2,450 customers without electricity for two hours.

Reported power outages by cause



Reported power outages by month



New Mexico

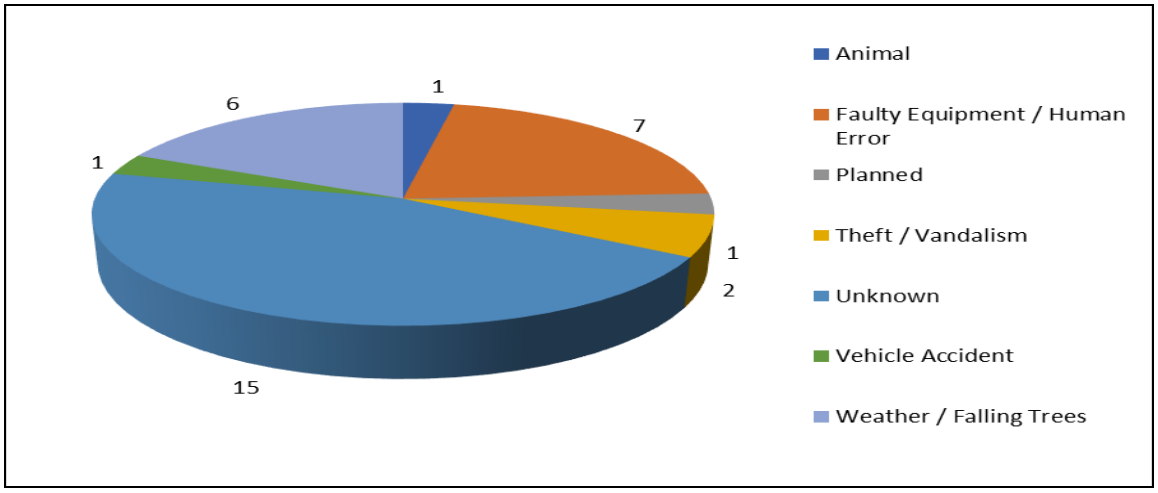
Outage summary

Total number of people affected by outages	106,278
Total duration of outages	900 minutes (15 hours)
Total number of outages	33
State ranking (number of outages)	34 (tie)
Average number of people affected per outage	3,221
Average duration of outage	27 minutes

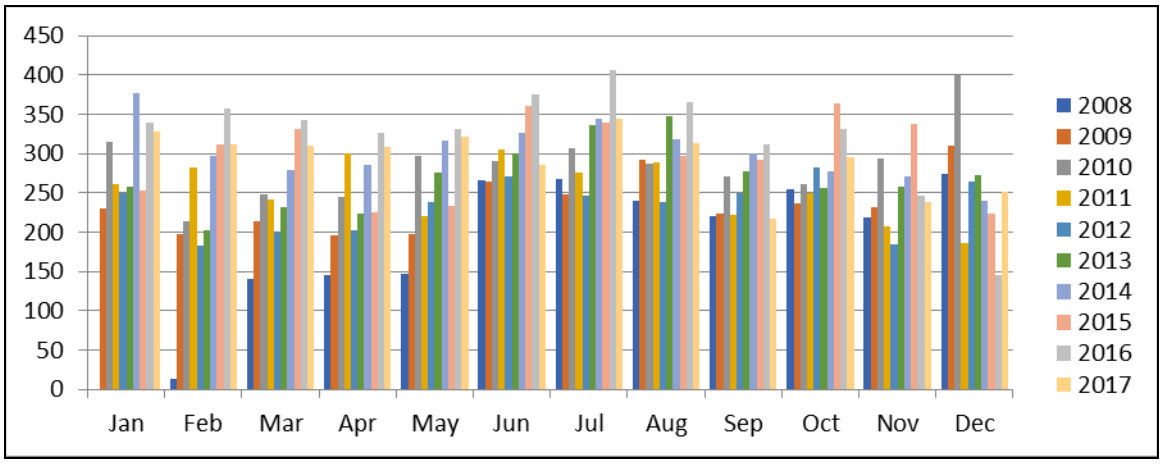
Note: Total number of people affected (and average) based on 18 (55%) of the total reported outages. Total duration of outages (and average) based on 5 (15%) of the total reported outages.

Outage fact: On Jan. 22, several hundred skiers and snowboarders were left hanging during an outage at Sandia Peak Ski Area. The power loss occurred while both lifts were at full capacity, with some riders having to be evacuated using ropes. The cause of the blackout wasn't clear.

Reported power outages by cause



Reported power outages by month



New York

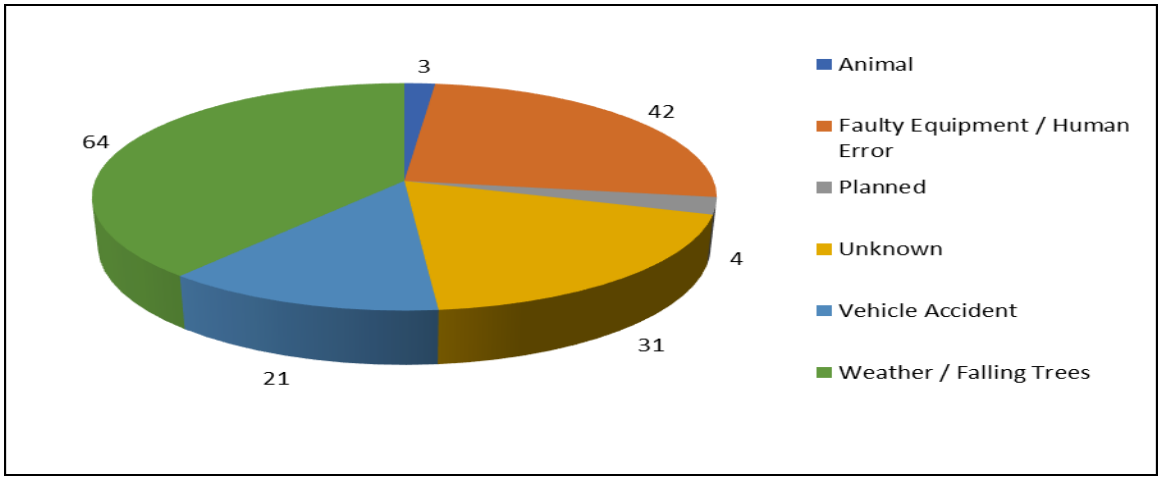
Outage summary

Total number of people affected by outages	883,183
Total duration of outages	10,650 minutes (more than 7 days)
Total number of outages	165
State ranking (number of outages)	3
Average number of people affected per outage	5,353
Average duration of outage	65 minutes

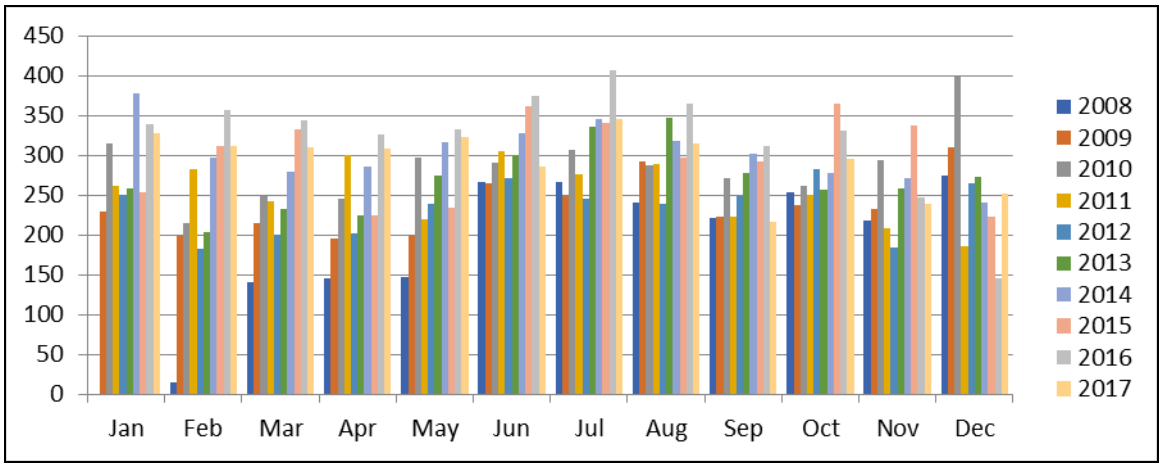
Note: Total number of people affected (and average) based on 102 (62%) of the total reported outages. Total duration of outages (and average) based on 29 (18%) of the total reported outages.

Outage fact: A train derailment triggered a power outage in Manhattan June 27. Nearly three dozen people were injured when two cars of a subway train derailed, triggering a blackout that halted service on four lines.

Reported power outages by cause



Reported power outages by month



North Carolina

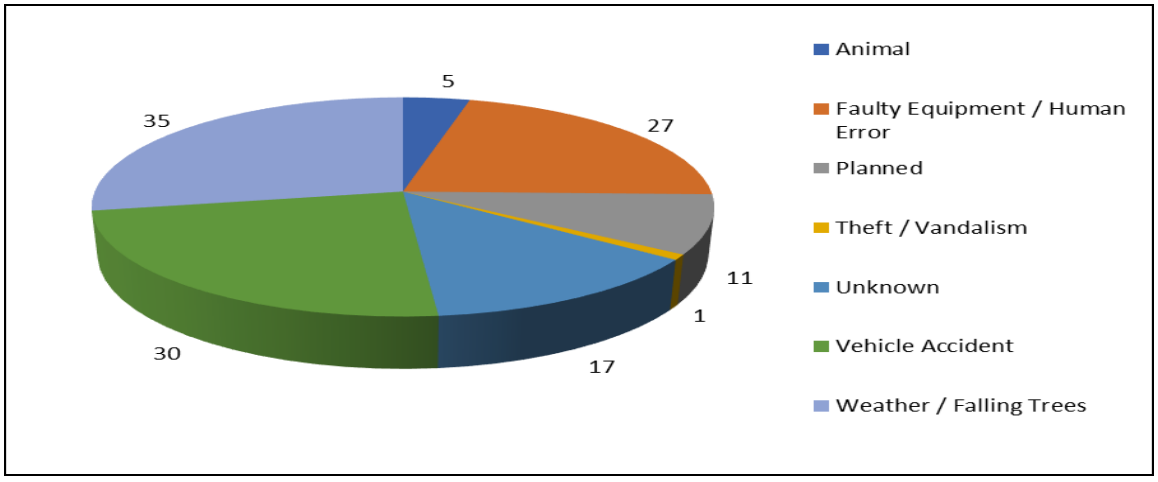
Outage summary

Total number of people affected by outages	996,599
Total duration of outages	19,787 minutes (nearly 14 days)
Total number of outages	126
State ranking (number of outages)	7
Average number of people affected per outage	7,910
Average duration of outage	157 minutes

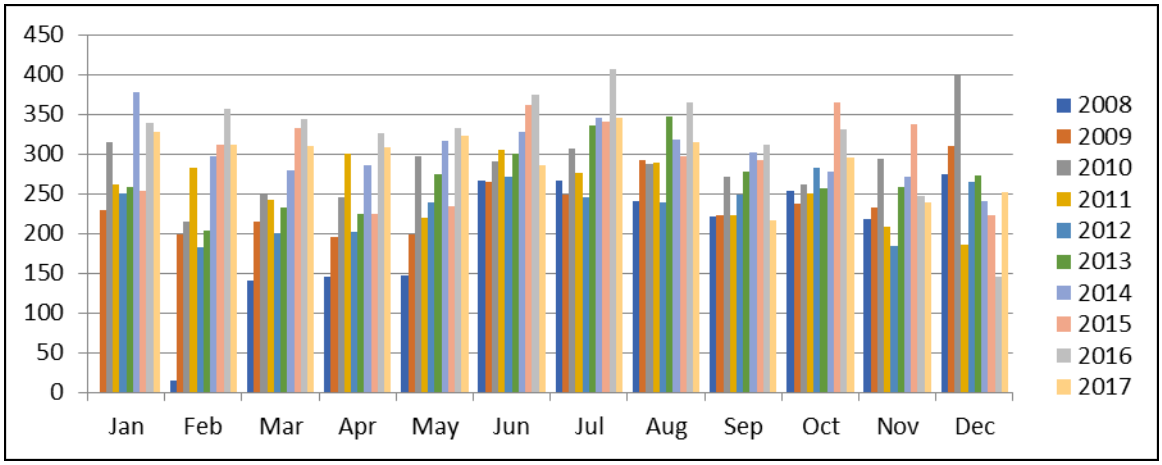
Note: Total number of people affected (and average) based on 86 (68%) of the total reported outages. Total duration of outages (and average) based on 31 (25%) of the total reported outages.

Outage fact: On Oct. 23, at least 98,000 homes and businesses were without power across North Carolina at the peak of an outage triggered by bands of strong storms that brought much-needed rain to the state.

Reported power outages by cause



Reported power outages by month



North Dakota

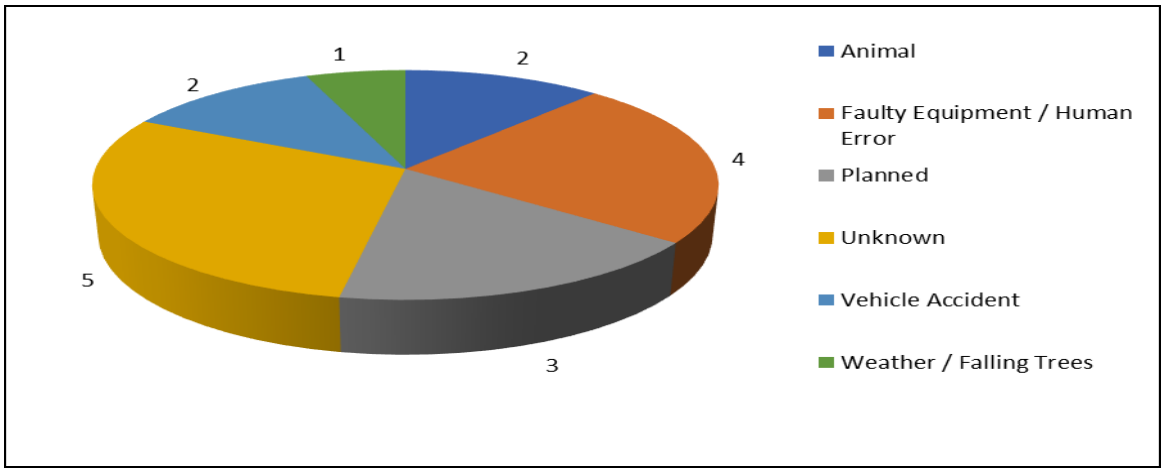
Outage summary

Total number of people affected by outages	41,015
Total duration of outages	2,025 minutes (nearly 34 hours)
Total number of outages	17
State ranking (number of outages)	39 (tie)
Average number of people affected per outage	2,413
Average duration of outage	119 minutes

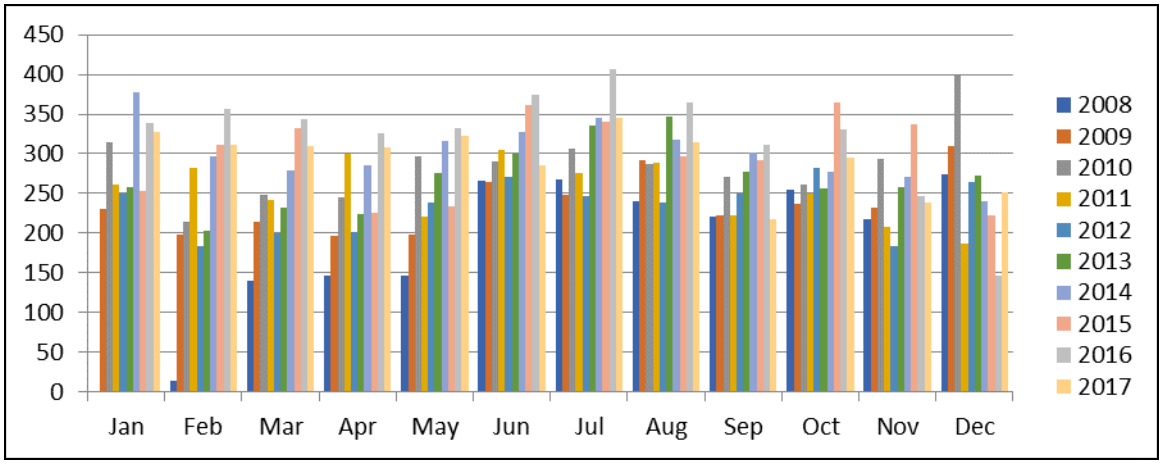
Note: Total number of people affected (and average) based on 10 (59%) of the total reported outages. Total duration of outages (and average) based on 7 (41%) of the total reported outages.

Outage fact: A power line snapped in Minot August 14, cutting electricity and causing a fire on the crop land below that burned about 20 acres.

Reported power outages by cause



Reported power outages by month



Ohio

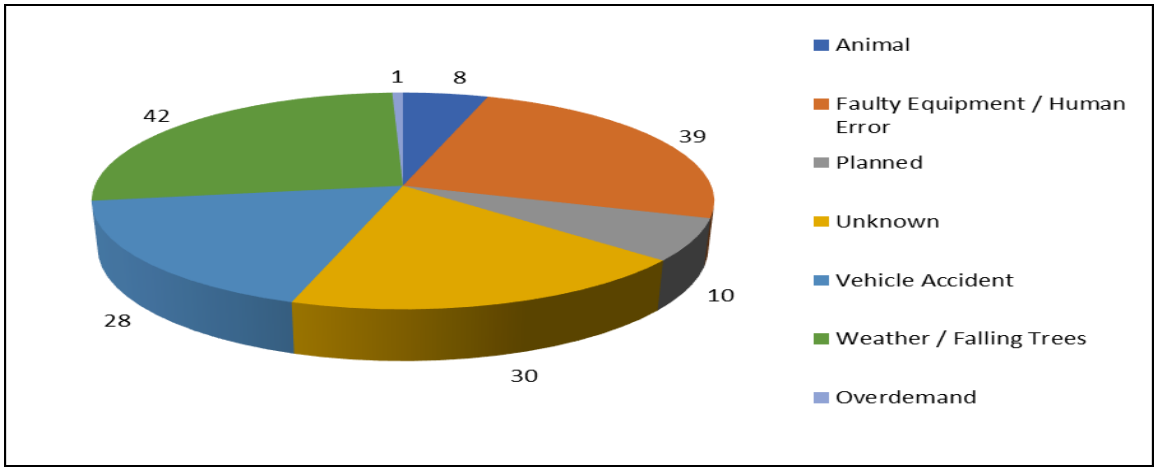
Outage summary

Total number of people affected by outages	663,210
Total duration of outages	4,635 minutes (more than 3 days)
Total number of outages	158
State ranking (number of outages)	4
Average number of people affected per outage	4,198
Average duration of outage	29 minutes

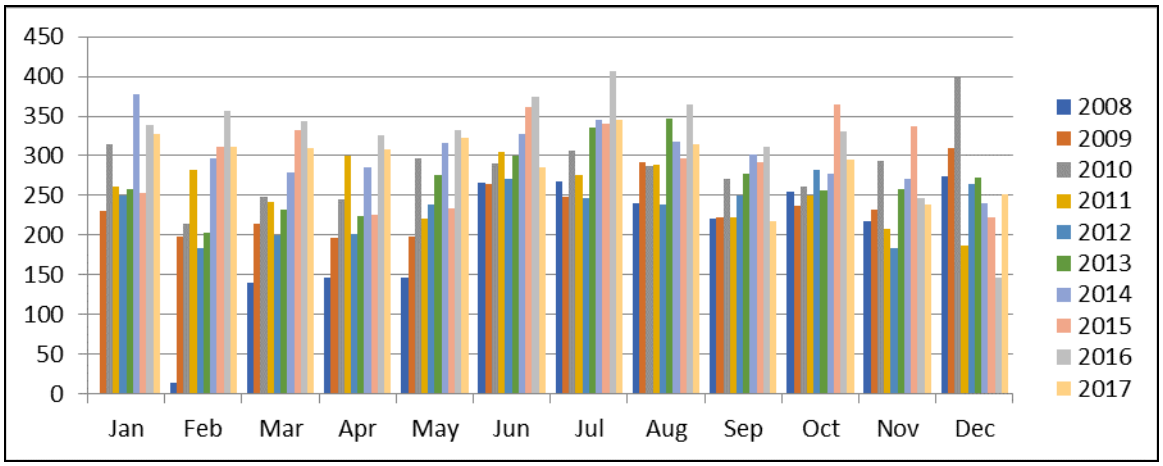
Note: Total number of people affected (and average) based on 100 (63%) of the total reported outages. Total duration of outages (and average) based on 29 (18%) of the total reported outages.

Outage fact: A cement mixer carrying 70,000 pounds of cement caused a blackout in Edgerton Oct. 13. The driver attempted to pass a tractor but veered too far to the side and was pulled into the ditch, turning the mixer sideways and sending it careening into a power pole, which was severed.

Reported power outages by cause



Reported power outages by month



Oklahoma

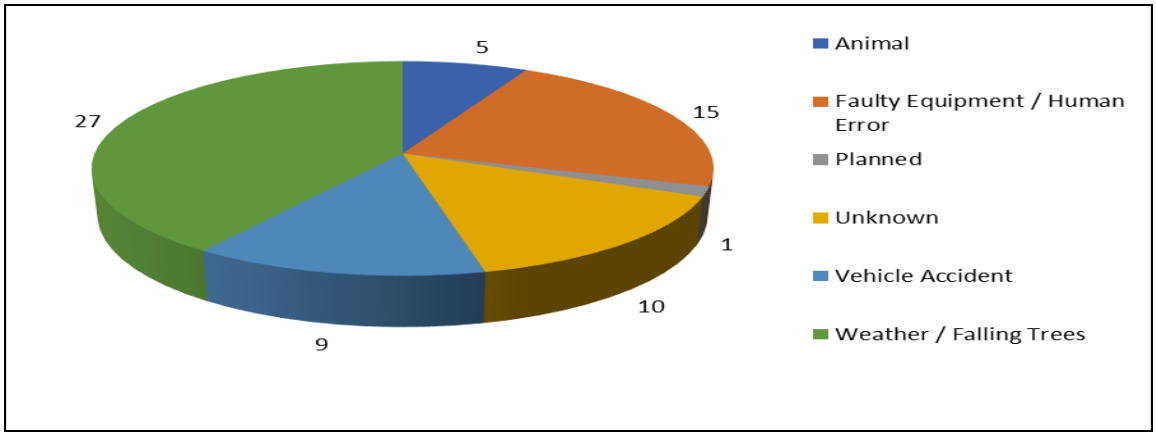
Outage summary

Total number of people affected by outages	303,221
Total duration of outages	1,240 minutes (20 hours)
Total number of outages	67
State ranking (number of outages)	17
Average number of people affected per outage	4,526
Average duration of outage	19 minutes

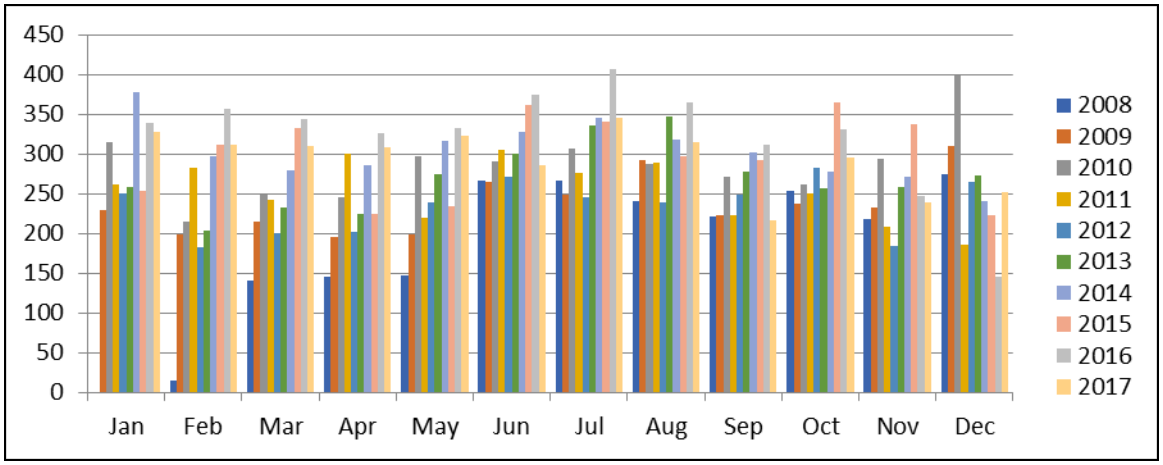
Note: Total number of people affected (and average) based on 48 (72%) of the total reported outages. Total duration of outages (and average) based on 10 (15%) of the total reported outages.

Outage fact: A drone flew into a power line and caused an outage in Moore August 27. In addition to the power cut, the $1,500 drone caused a small fire and damaged two cars, leading police to search for its owner.

Reported power outages by cause



Reported power outages by month



Oregon

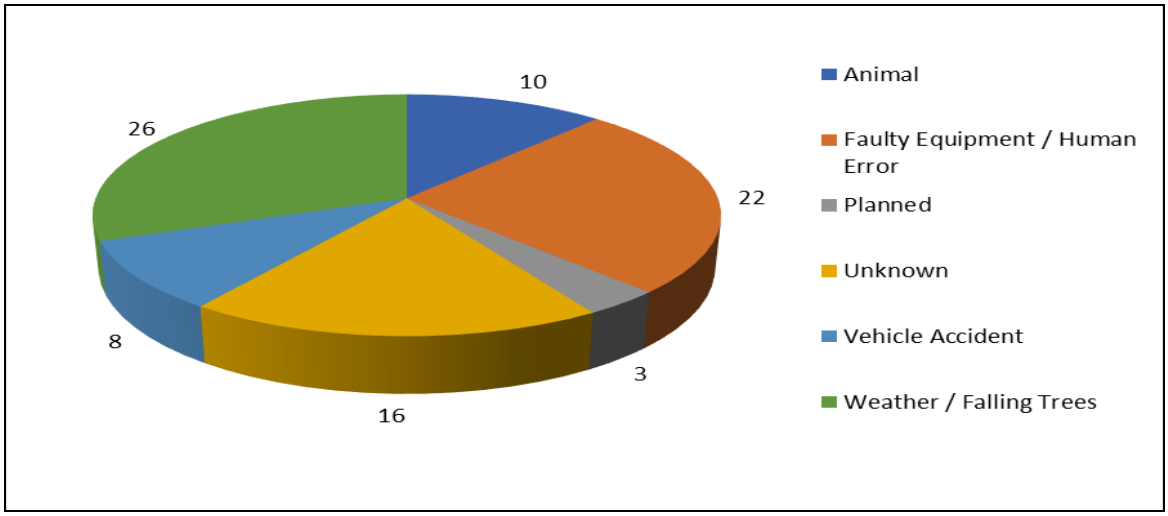
Outage summary

Total number of people affected by outages	531,977
Total duration of outages	6,643 minutes (more than 4 ½ days)
Total number of outages	85
State ranking (number of outages)	12
Average number of people affected per outage	6,259
Average duration of outage	78 minutes

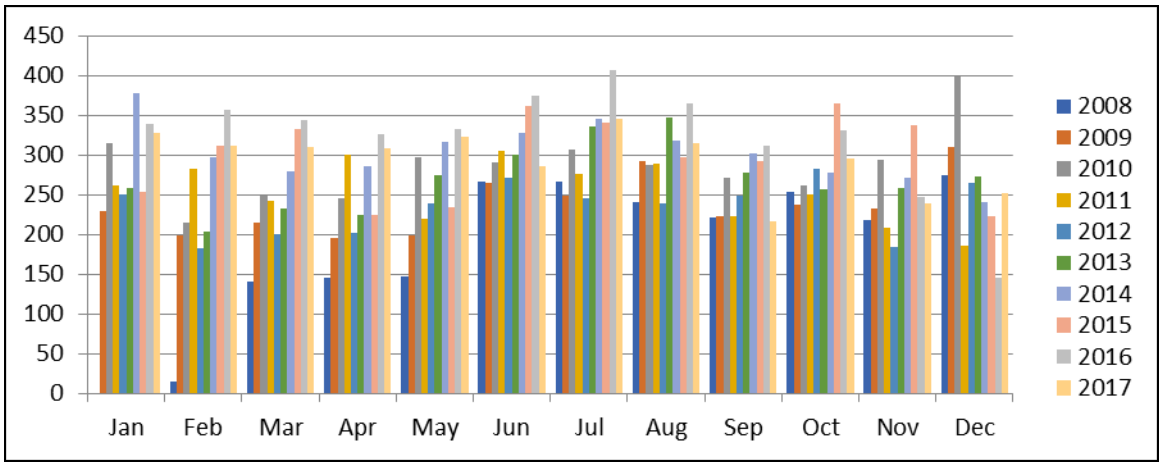
Note: Total number of people affected (and average) based on 58 (68%) of the total reported outages. Total duration of outages (and average) based on 29 (34%) of the total reported outages.

Outage fact: A lengthy outage in Starkey Feb. 10 was attributed to a large ice block. The block broke free, traveled down a flooded river, then impacted and damaged a power pole, causing 91 customers to lose power for 14 hours.

Reported power outages by cause



Reported power outages by month



Pennsylvania

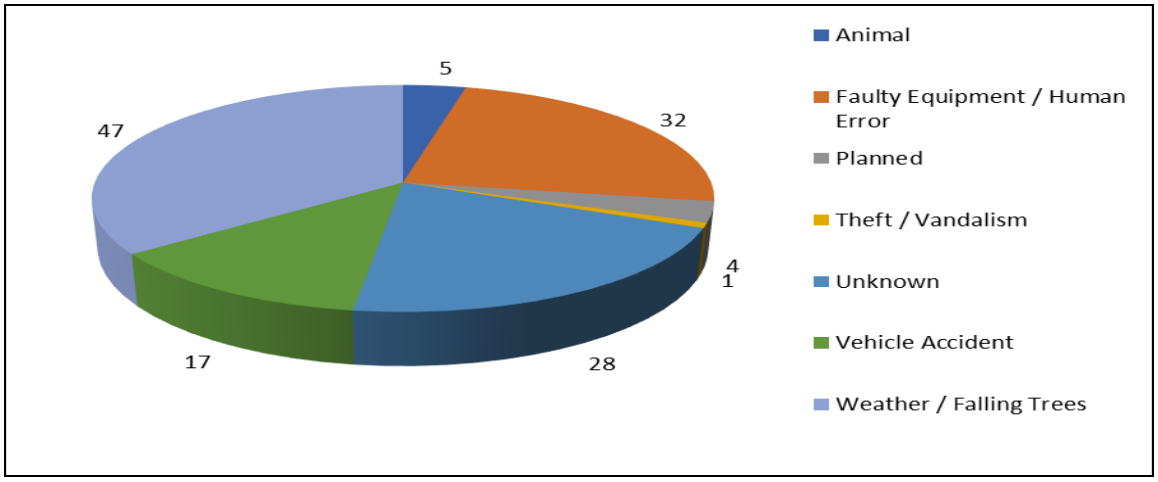
Outage summary

Total number of people affected by outages	335,268
Total duration of outages	5,696 minutes (almost 4 days)
Total number of outages	134
State ranking (number of outages)	6
Average number of people affected per outage	2,502
Average duration of outage	43 minutes

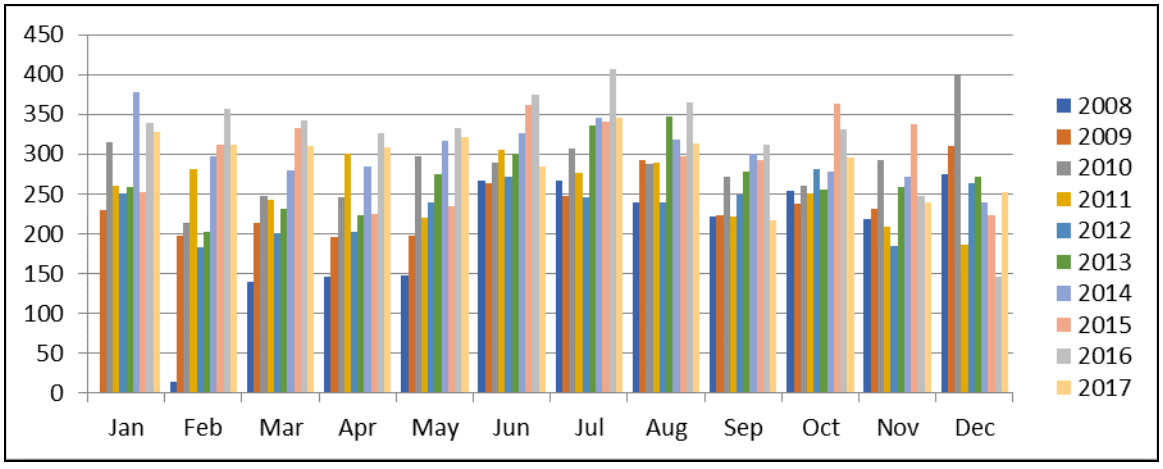
Note: Total number of people affected (and average) based on 90 (67%) of the total reported outages. Total duration of outages (and average) based on 30 (22%) of the total reported outages.

Outage fact: A rollover crash on Oct. 10 sent four Fox Chapel High School students to the hospital and caused an outage. All four boys, members of the golf team, survived the crash after their SUV struck a hillside, flipped and then took out a large utility pole and transformer.

Reported power outages by cause



Reported power outages by month



Rhode Island

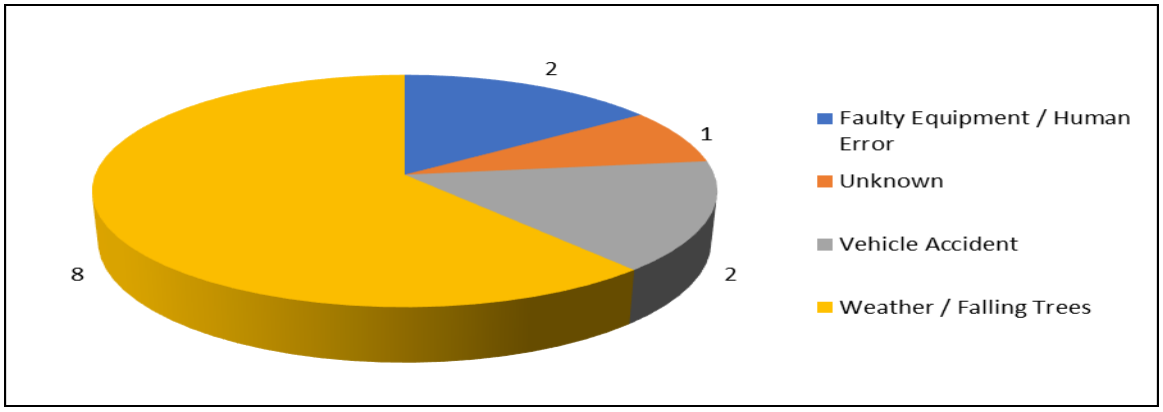
Outage summary

Total number of people affected by outages	21,347
Total duration of outages	1,680 minutes (28 hours)
Total number of outages	13
State ranking (number of outages)	40
Average number of people affected per outage	1,642
Average duration of outage	129 minutes

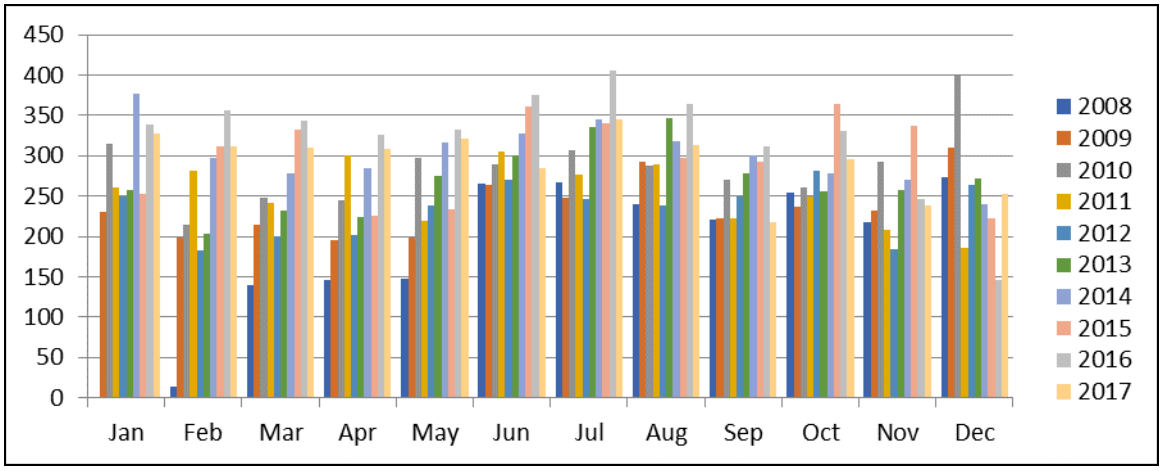
Note: Total number of people affected (and average) based on 4 (31%) of the total reported outages. Total duration of outages (and average) based on 1 (8%) of the total reported outages.

Outage fact: Several areas of Providence were without power for more than a day after an Oct. 30 storm downed multiple trees, damaging equipment.

Reported power outages by cause



Reported power outages by month



South Carolina

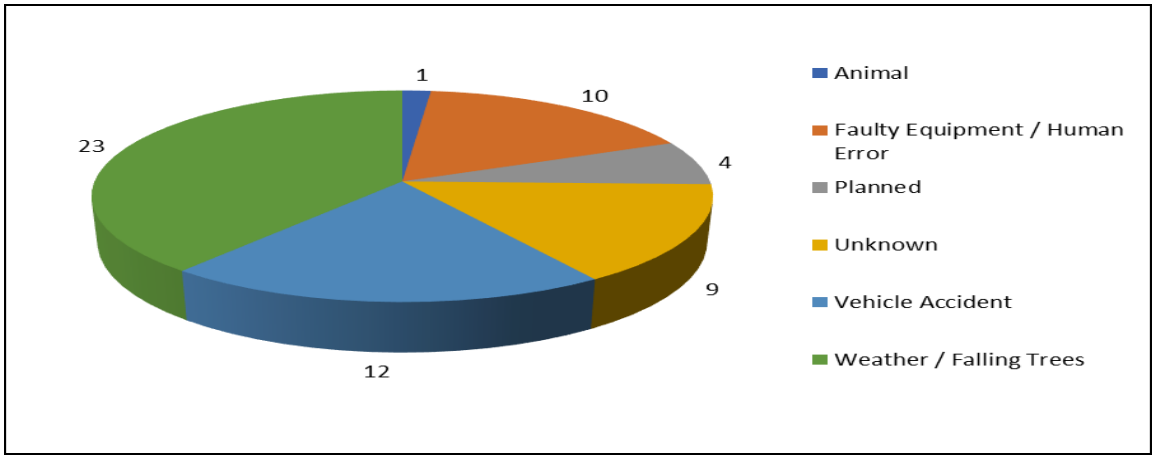
Outage summary

Total number of people affected by outages	365,055
Total duration of outages	8,045 minutes (more than 5 ½ days)
Total number of outages	59
State ranking (number of outages)	21
Average number of people affected per outage	6,187
Average duration of outage	136 minutes

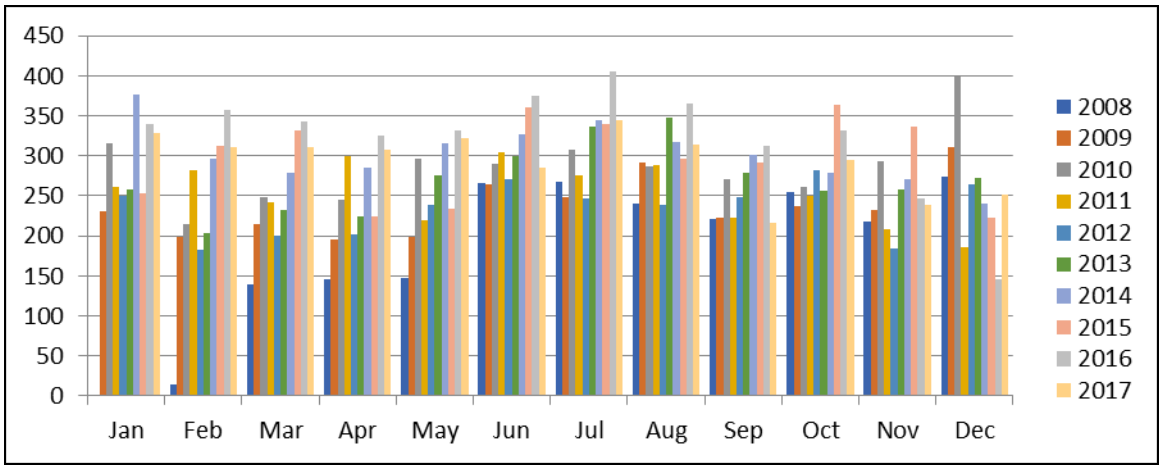
Note: Total number of people affected (and average) based on 39 (66%) of the total reported outages. Total duration of outages (and average) based on 6 (10%) of the total reported outages.

Outage fact: On Dec. 7 in Greenwood, a police officer was serving a warrant on a man wanted for violent felonies when the suspect ran and stole a car that was idling in a nearby driveway, later crashing it into a utility pole and cutting power to 500 customers.

Reported power outages by cause



Reported power outages by month



South Dakota

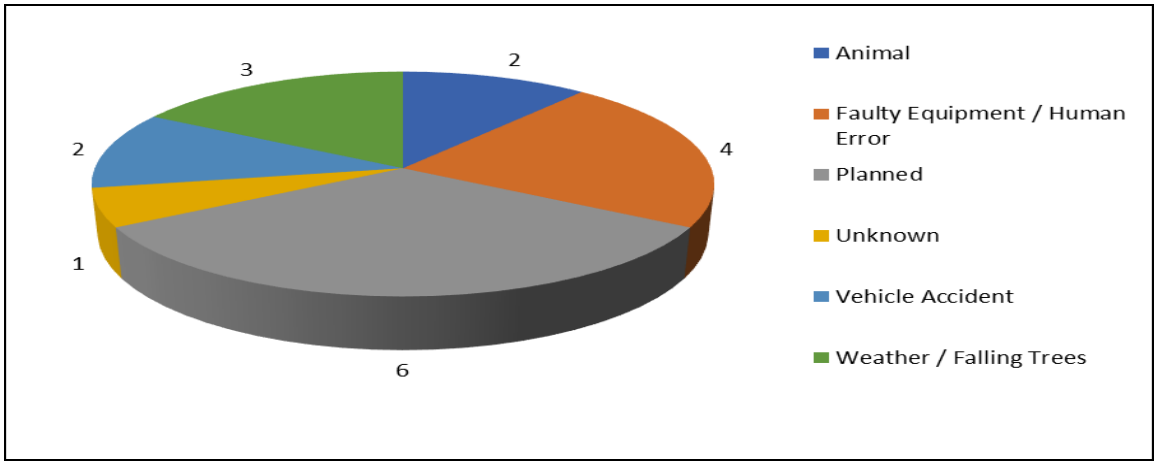
Outage summary

Total number of people affected by outages	17,991
Total duration of outages	866 minutes (more than 14 hours)
Total number of outages	18
State ranking (number of outages)	38
Average number of people affected per outage	1,000
Average duration of outage	48 minutes

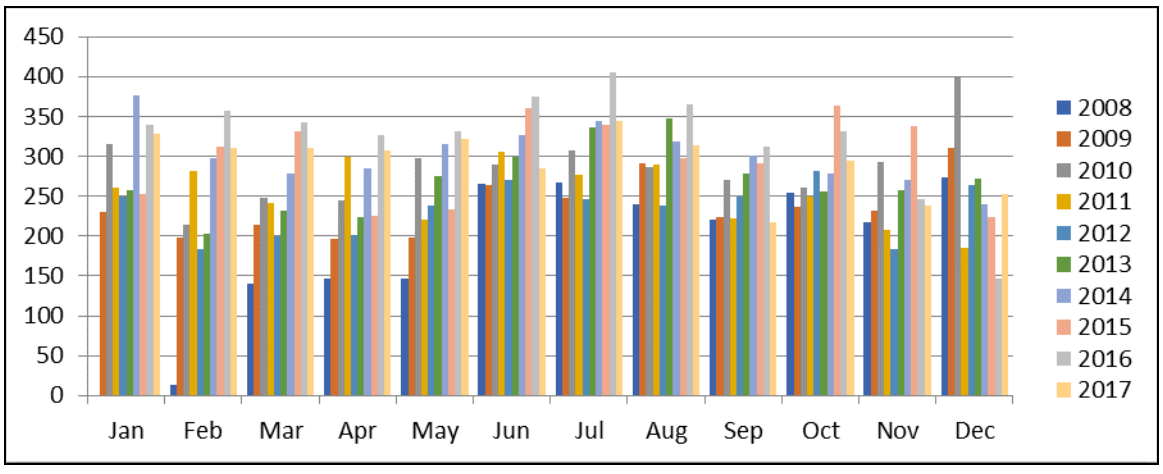
Note: Total number of people affected (and average) based on 5 (28%) of the total reported outages. Total duration of outages (and average) based on 6 (33%) of the total reported outages.

Outage fact: Severe weather led to power outages for 3,200 Sioux Falls customers July 5, with the National Weather Service issuing seven storm warnings in the area amid reports of 50 to 65 mile per hour winds.

Reported power outages by cause



Reported power outages by month



Tennessee

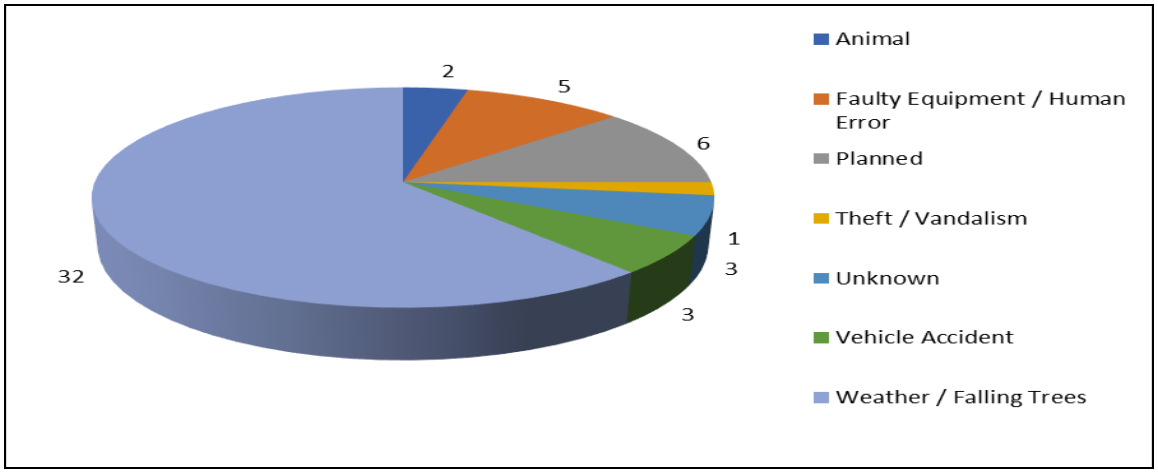
Outage summary

Total number of people affected by outages	404,352
Total duration of outages	11,091 minutes (nearly 8 days)
Total number of outages	52
State ranking (number of outages)	25 (tie)
Average number of people affected per outage	7,776
Average duration of outage	213 minutes

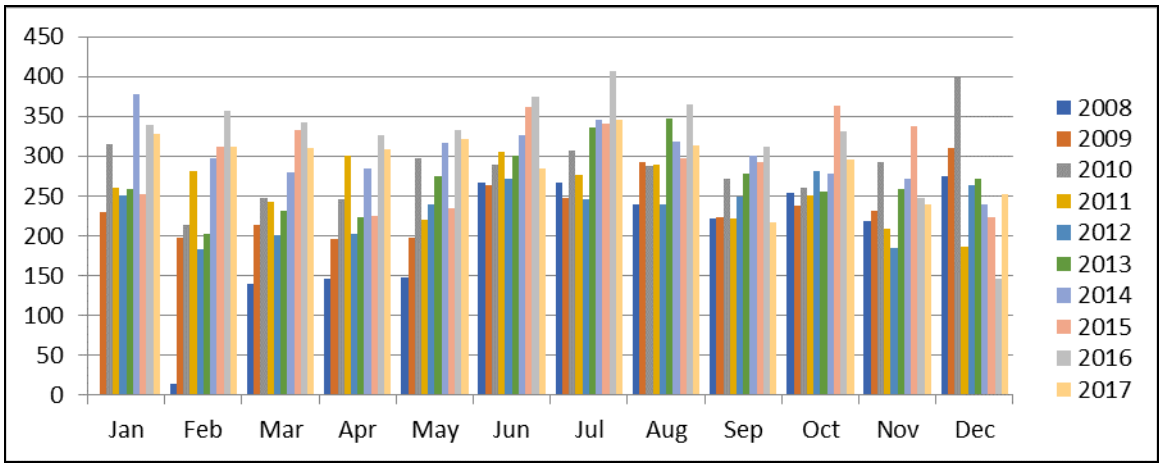
Note: Total number of people affected (and average) based on 33 (63%) of the total reported outages. Total duration of outages (and average) based on 10 (19%) of the total reported outages.

Outage fact: A man who broke into a Nashville substation May 23 caused an outage for 4,733 customers after attempting to steal copper. Crew members located several points where the ground wire had been and found the culprit moaning near the substation after apparently getting zapped.

Reported power outages by cause



Reported power outages by month



Texas

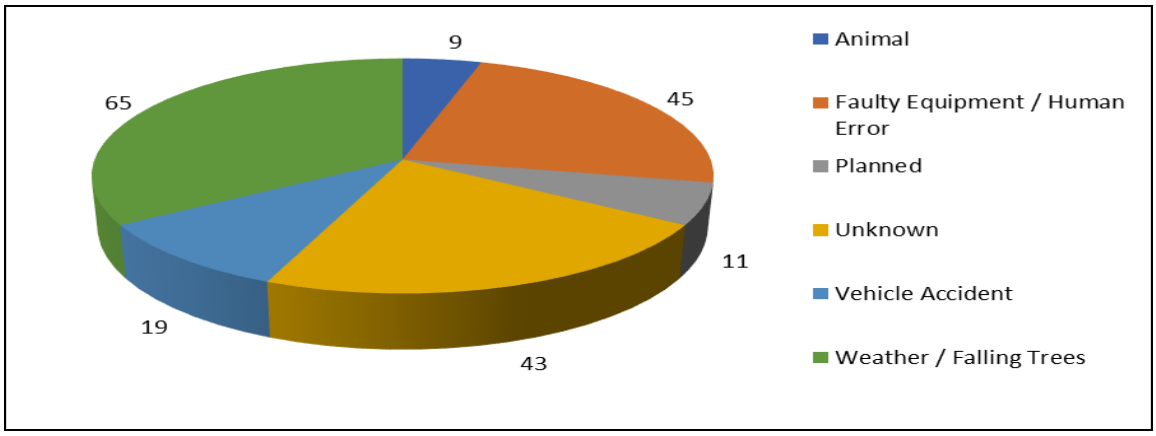
Outage summary

Total number of people affected by outages	1,118,955
Total duration of outages	7,931 minutes (5 ½ days)
Total number of outages	192
State ranking (number of outages)	2
Average number of people affected per outage	5,828
Average duration of outage	41 minutes

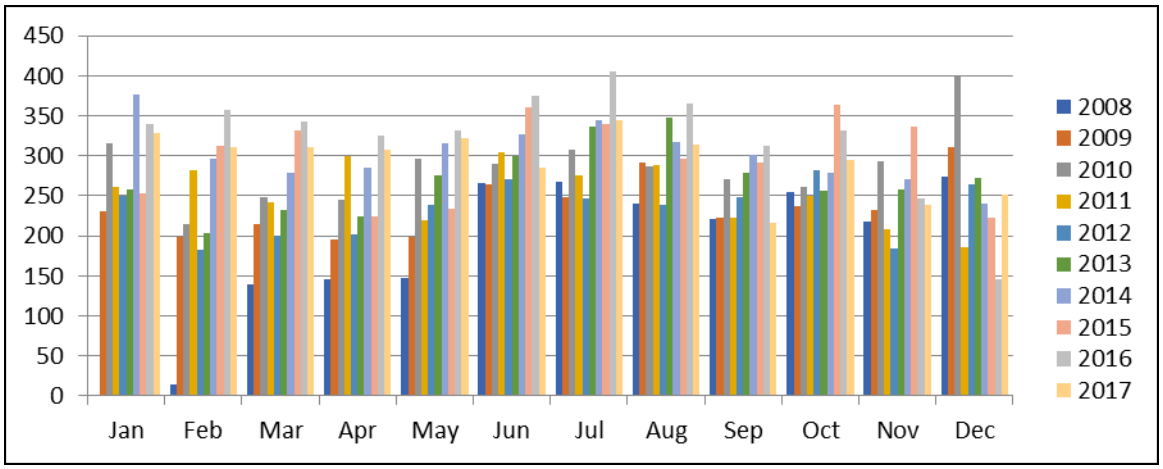
Note: Total number of people affected (and average) based on 124 (65%) of the total reported outages. Total duration of outages (and average) based on 26 (14%) of the total reported outages.

Outage fact: A buzzard got into some equipment at a Crandall substation May 15, resulting in an outage to 1,527 customers.

Reported power outages by cause



Reported power outages by month



Utah

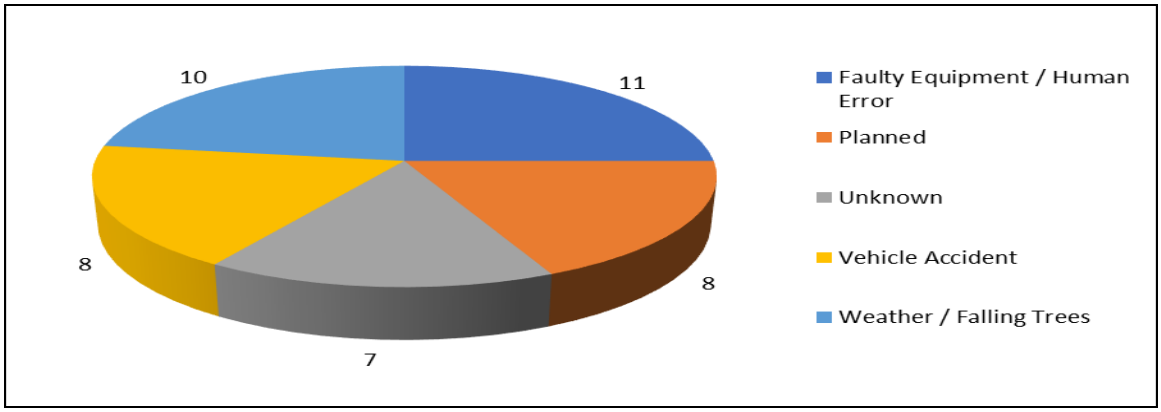
Outage summary

Total number of people affected by outages	129,156
Total duration of outages	4,975 minutes (more than 23 hours)
Total number of outages	44
State ranking (number of outages)	29
Average number of people affected per outage	2,935
Average duration of outage	113 minutes

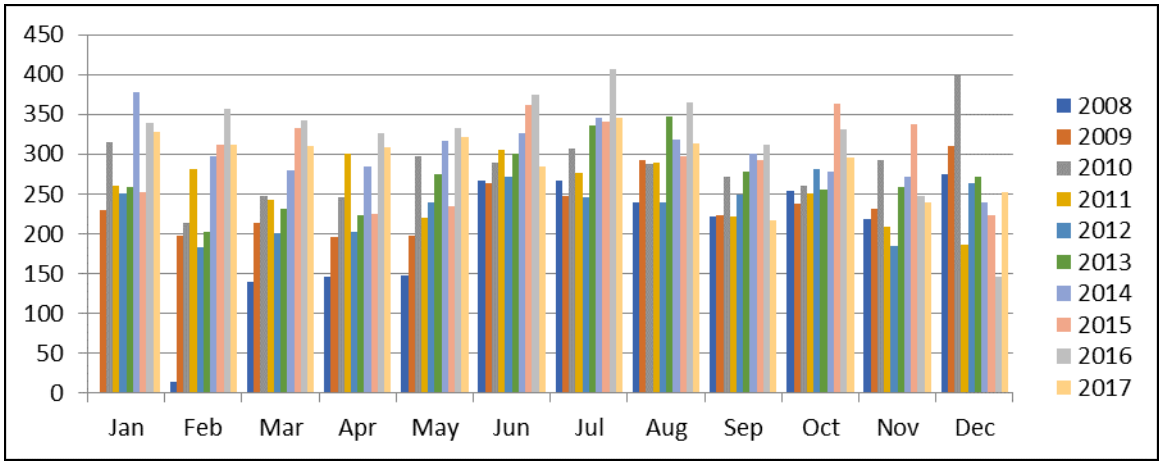
Note: Total number of people affected (and average) based on 23 (52%) of the total reported outages. Total duration of outages (and average) based on 14 (32%) of the total reported outages.

Outage fact: Multiple lightning strikes hit substations on Sept. 5, cutting power to 17,880 customers. The five-and-a-half-hour outage affected much of the Saratoga Springs, Eagle Mountain and western Lehi areas, slowing commutes and disrupting school bus schedules.

Reported power outages by cause



Reported power outages by month



Vermont

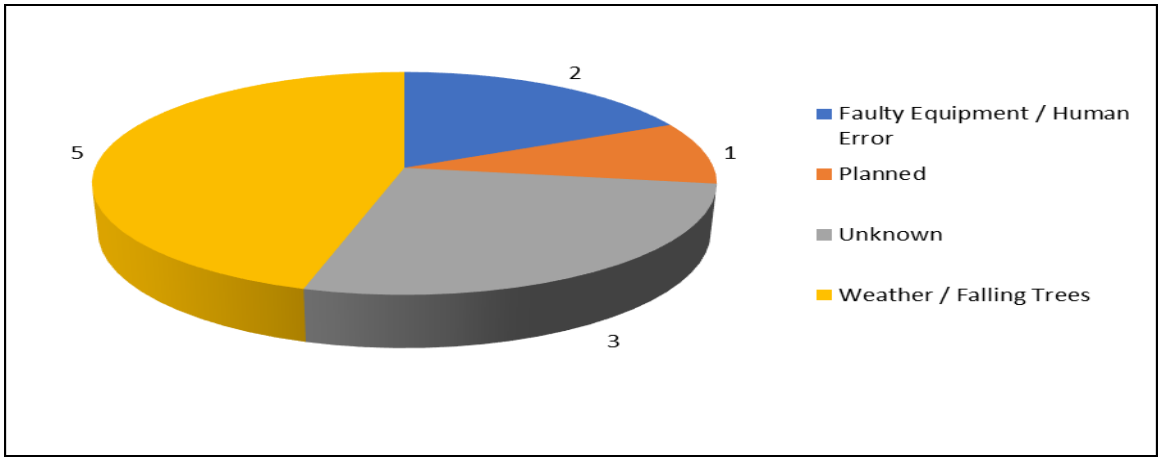
Outage summary

Total number of people affected by outages	41,009
Total duration of outages	700 minutes (more than 11 ½ hours)
Total number of outages	11
State ranking (number of outages)	41
Average number of people affected per outage	3,728
Average duration of outage	62 minutes

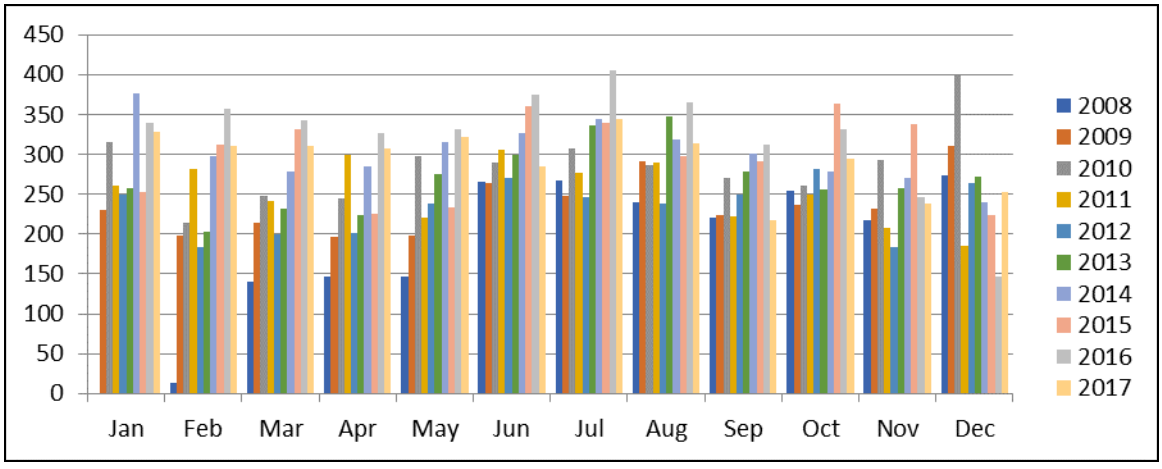
Note: Total number of people affected (and average) based on 6 (55%) of the total reported outages. Total duration of outages (and average) based on 4 (36%) of the total reported outages.

Outage fact: A large poplar tree split apart and crashed down onto power lines in Hartland Sept. 29. The lines landed on an electric fence around a field, with the resulting massive surge sending flames and smoke sizzling out from each fence post, sparking an outage and a series of tiny spot fires.

Reported power outages by cause



Reported power outages by month



Virginia

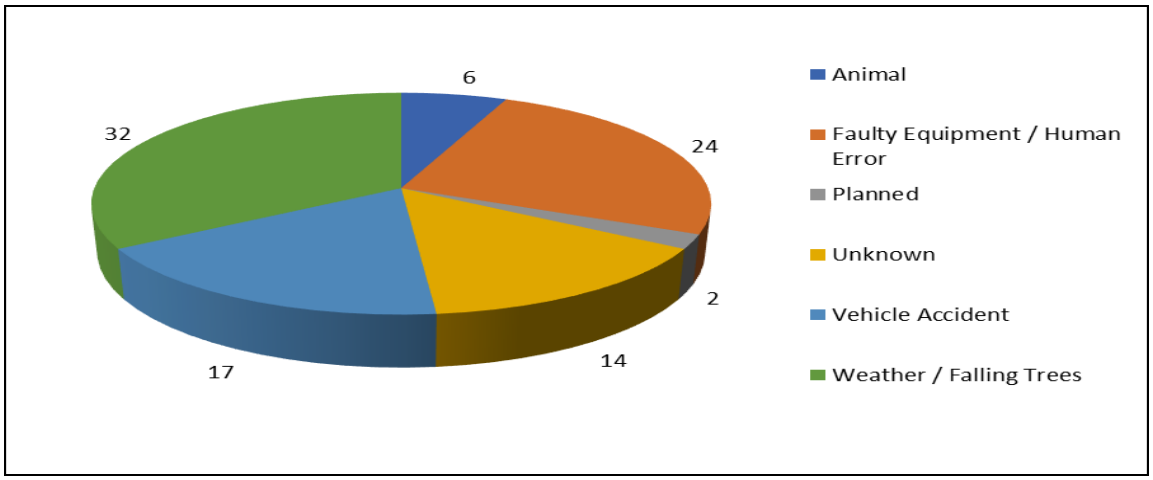
Outage summary

Total number of people affected by outages	253,175
Total duration of outages	2,514 minutes (nearly 42 hours)
Total number of outages	95
State ranking (number of outages)	10
Average number of people affected per outage	2,665
Average duration of outage	26 minutes

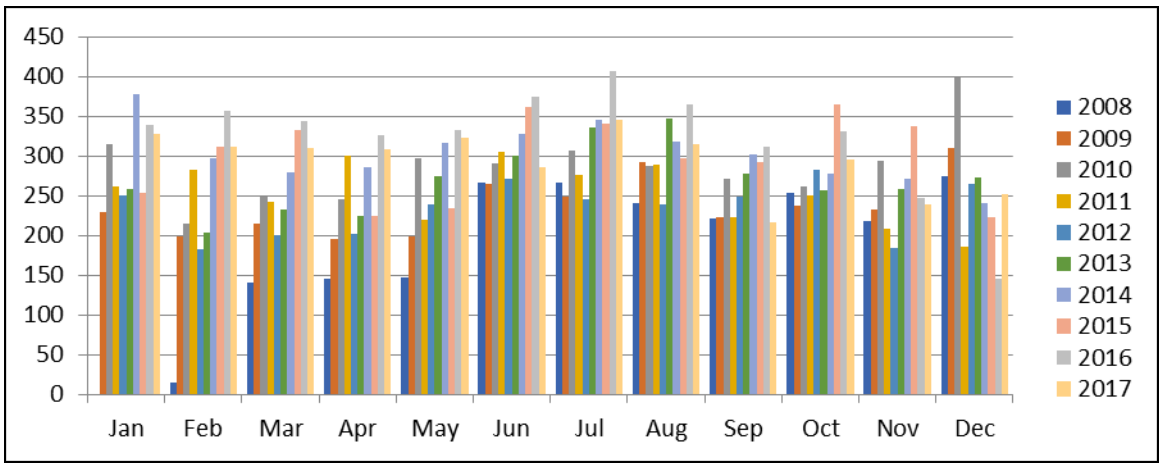
Note: Total number of people affected (and average) based on 68 (72%) of the total reported outages. Total duration of outages (and average) based on 15 (16%) of the total reported outages.

Outage fact: A lawn mower clipped a guy wire in Roanoke July 27, which shook the pole and caused a series of events that brought down the electrical line and left 950 customers in the dark.

Reported power outages by cause



Reported power outages by month



Washington

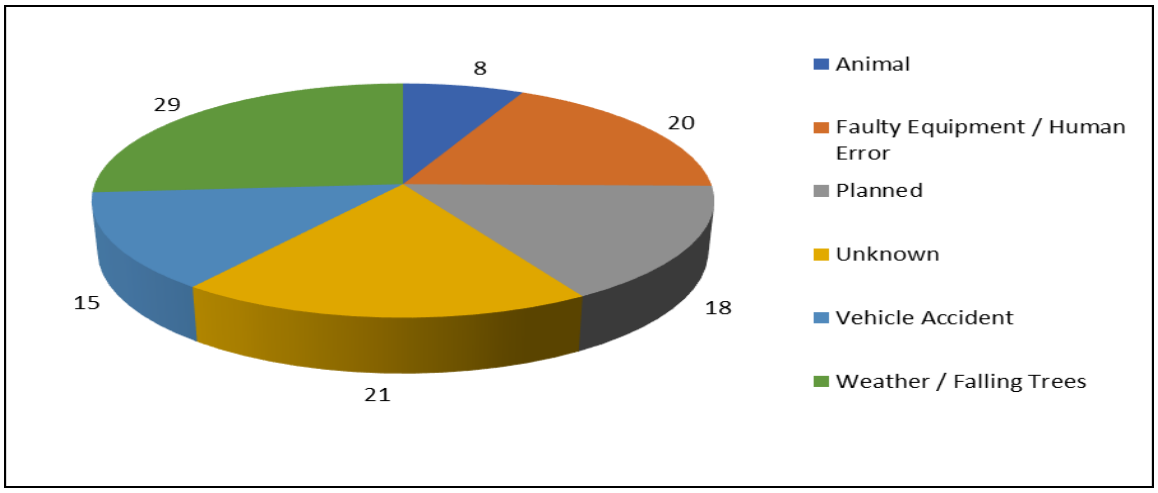
Outage summary

Total number of people affected by outages	593,894
Total duration of outages	13,897 minutes (more than 9 ½ days)
Total number of outages	111
State ranking (number of outages)	9
Average number of people affected per outage	5,350
Average duration of outage	125 minutes

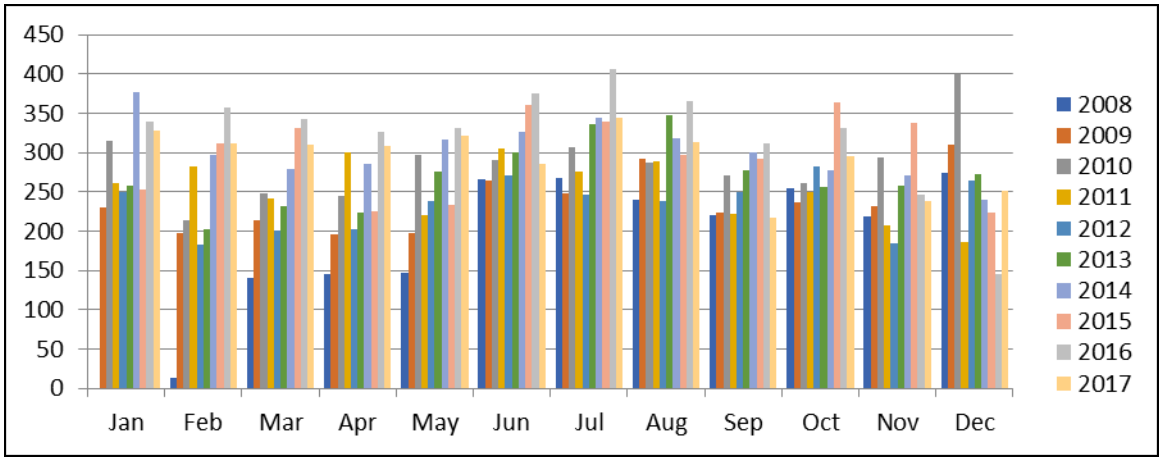
Note: Total number of people affected (and average) based on 66 (67%) of the total reported outages. Total duration of outages (and average) based on 27 (28%) of the total reported outages.

Outage fact: On Feb. 22, a rodent shorted out equipment at a Puyallup substation, leaving 5,800 residents in the dark and affecting numerous traffic signals in the city.

Reported power outages by cause



Reported power outages by month



West Virginia

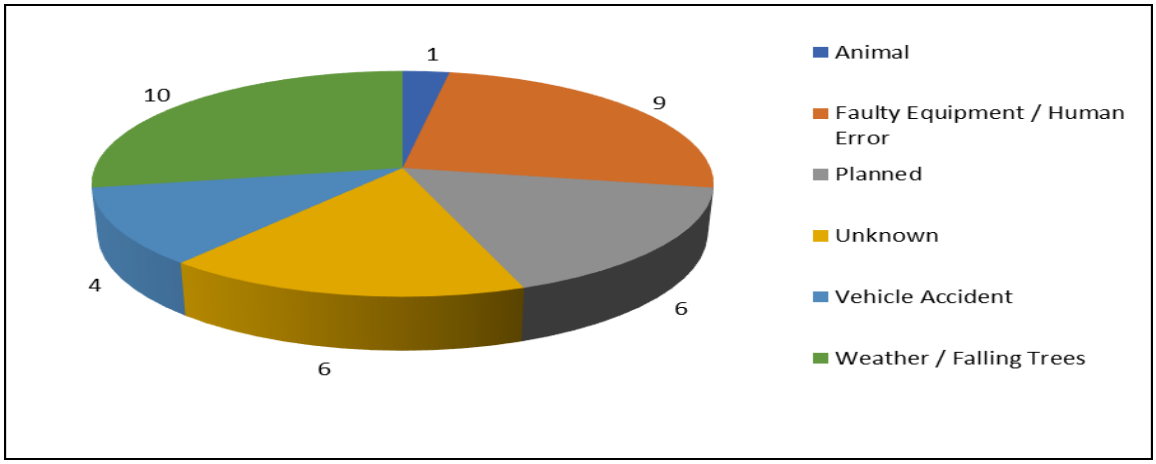
Outage summary

Total number of people affected by outages	170,240
Total duration of outages	2,498 minutes (nearly 42 hours)
Total number of outages	36
State ranking (number of outages)	33 (tie)
Average number of people affected per outage	4,729
Average duration of outage	69 minutes

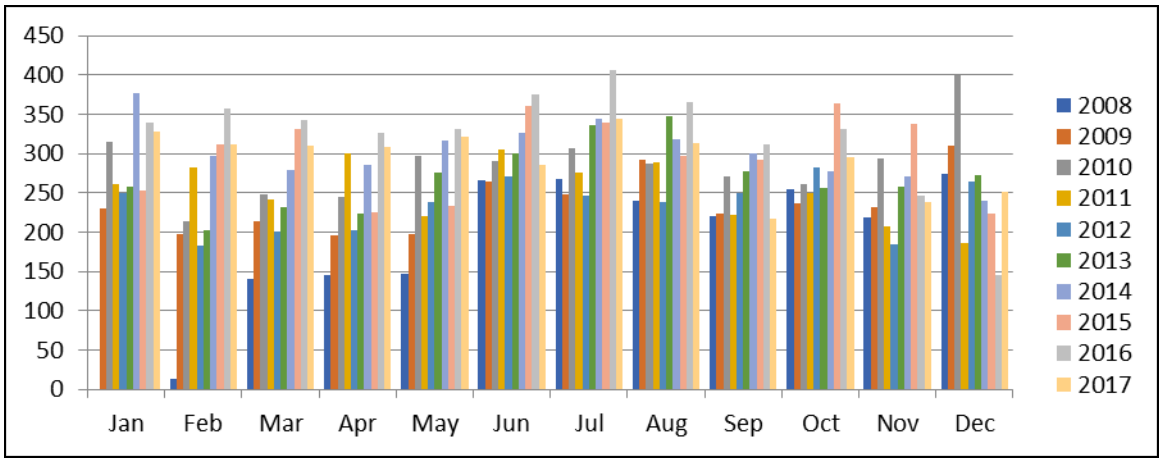
Note: Total number of people affected (and average) based on 26 (72%) of the total reported outages. Total duration of outages (and average) based on 7 (19%) of the total reported outages.

Outage fact: A helicopter clipped a static line while conducting an electrical survey in Pendleton County Oct. 11. The contact caused the line to fall into energized transmission lines, which knocked out power to all of the substations in the county, affecting 5,965 customers.

Reported power outages by cause



Reported power outages by month



Wisconsin

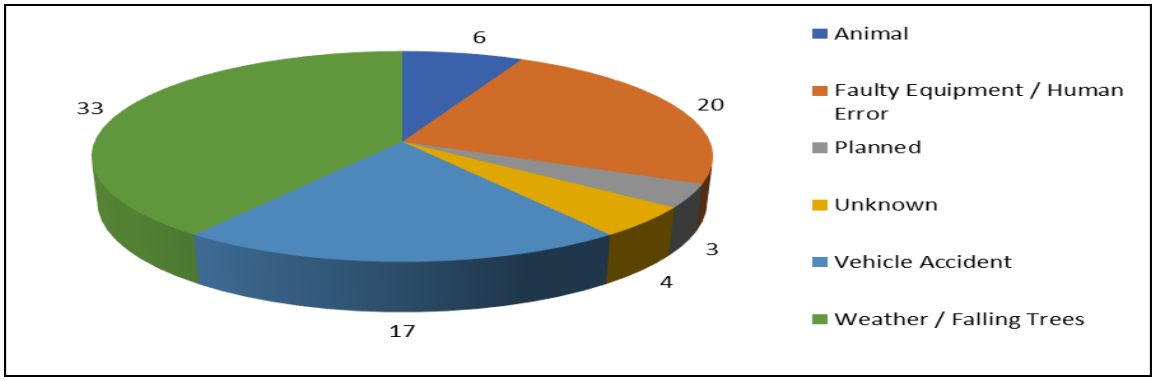
Outage summary

Total number of people affected by outages	458,218
Total duration of outages	2,110 minutes (more than 35 hours)
Total number of outages	83
State ranking (number of outages)	13
Average number of people affected per outage	5,521
Average duration of outage	25 minutes

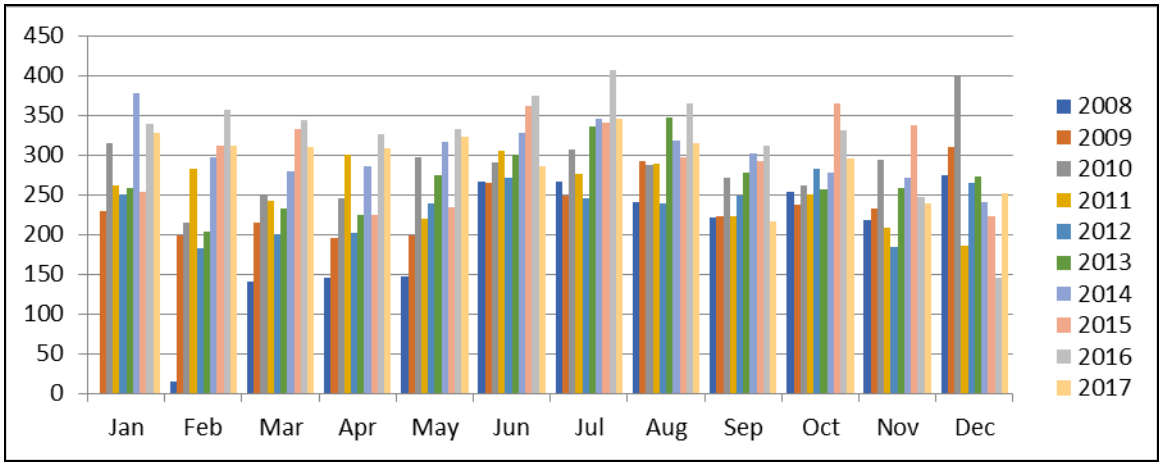
Note: Total number of people affected (and average) based on 56 (67%) of the total reported outages. Total duration of outages (and average) based on 13 (16%) of the total reported outages.

Outage fact: On August 1, a buildup of 3 feet of water underground caused a breaker to short circuit in Kenosha, causing what felt like an explosion that shook surrounding buildings and saw flames shoot out of a manhole. Eight hundred customers lost power for 6 hours.

Reported power outages by cause



Reported power outages by month



Wyoming

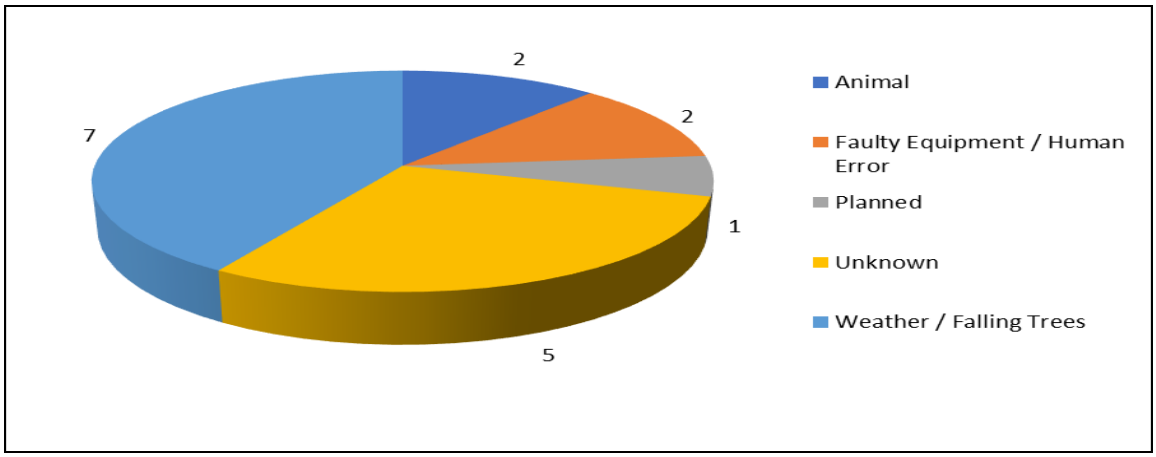
Outage summary

Total number of people affected by outages	15,168
Total duration of outages	876 minutes (more than 14 ½ hours)
Total number of outages	17
State ranking (number of outages)	39 (tie)
Average number of people affected per outage	892
Average duration of outage	52 minutes

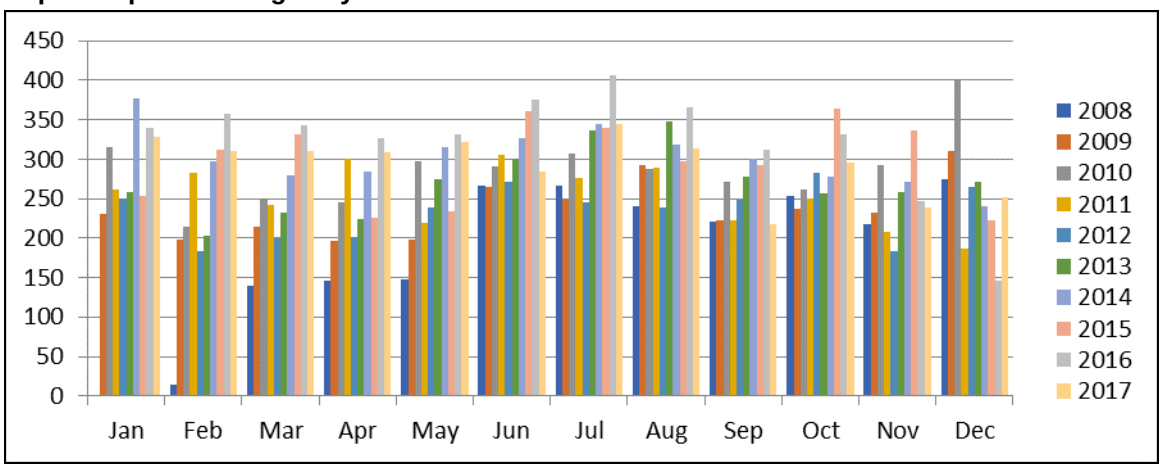
Note: Total number of people affected (and average) based on 8 (47%) of the total reported outages. Total duration of outages (and average) based on 3 (18%) of the total reported outages.

Outage fact: Bird mortality was blamed for a power outage in Lovell Oct. 22, after a raven flew into a substation and caused 2,000 to lose electricity.

Reported power outages by cause



Reported power outages by month



Eaton
1000 Eaton Blvd.
Cleveland, OH 44122 USA
Eaton.com

8609 Six Forks Road
Raleigh, NC 27615 U.S.A.
Toll Free: 1.800.356.5794
Eaton.com/blackouttracker

Printed in USA
MZ153043EN
February 2017