

Storm warning:

The impact B.C.'s wild weather is having on British Columbians and their power



Report

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 **BC Hydro**
Power smart

From a destructive ice storm, to extreme heat and two of the worst wildfire seasons on record, B.C. is not immune to the extreme weather events that have become common around the world. And, there is no indication of this trend slowing down.

Highlights

- Storms and extreme weather events in B.C. are becoming more frequent and more severe.
- In the past five years, the number of individual storm events BC Hydro has responded to in the province has tripled.
 - This has resulted in an increase in the number of customer outages by about 265 per cent – from 323,000 customers in 2013 to 1.18 million in 2017.
- The impact of storms in B.C. has not gone unnoticed by British Columbians. A recent survey¹ commissioned by BC Hydro found more than 75 per cent of British Columbians agree that storms in the province are getting worse and 20 per cent indicate they have experienced more outages in their neighbourhood in recent years.
- The combination of falling trees and branches with adverse weather account for nearly 60 per cent of all outages.
 - B.C. has three times more trees per kilometre of line than anywhere in North America, so it should come as no surprise that trees are the primary cause of outages in the province.
- Despite the increasingly challenging weather, the amount of time customers are without power has remained relatively stable averaging at three hours a year over the past five years.
 - In addition, the number of customers BC Hydro restored within 24 hours after a major event has improved from 92 per cent in 2013 to 95 per cent in 2017.

Solutions

- To battle against the increasingly extreme weather Mother Nature is throwing at British Columbia, BC Hydro remains focused on preparing for storm season year-round. It is using its smart meter network and introducing new technology and processes to improve its response times, some of which includes:
 - Enhanced prediction logic: using an algorithm and the smart meter network, BC Hydro's system can confirm an outage and mark its location on a map, where a dispatcher can then analyze and send a crew to investigate and make necessary repairs.
 - New mobile dispatch tools: these tools communicate via satellite and transfer information from the field to the operations centre faster and more frequently – providing more timely updates for customers.
 - Improved meteorology models: this information provides greater insight into where and when a storm might hit so BC Hydro can ensure crews are ready to respond quickly.
- Outages during storms are a reality – and it is difficult to predict how much damage a storm may cause to BC Hydro's system and how long a power outage may last. This is why it is important for British Columbians to be prepared with a well-stocked emergency kit that includes: a flashlight, extra batteries, first aid kit, blanket or warm clothing, ready-to-eat non-perishable food and water.

¹ Online survey conducted by Mustel Group on behalf of BC Hydro of 600 British Columbians from October 19 to 23, 2018.

Mother Nature's fury: ice, wind and fire

Over the past five years, the number of individual storm events BC Hydro has responded to in the province has tripled – from 52 events in 2013 to 148 in 2017. Included in this are three extreme weather events – a major windstorm in August 2015, wildfires in the summer of 2017, and an ice storm in December 2017.

The damage these increasingly intense storms and extreme weather events are having on BC Hydro's infrastructure is reflected in the rising number of customer outages they cause. The number of customer outages caused by major storms has increased by about 265 per cent in the past five years – from 323,000 in 2013 to 1.18 million in 2017 – and British Columbians are noticing this as well. A recent survey conducted for BC Hydro found more than 75 per cent of British Columbians believe storms are getting worse in the province and one in five British Columbians believe their neighbourhood has experienced more power outages in recent years.

Extreme weather events pose new challenges for BC Hydro crews as they work to make repairs and get power back on for customers. Crews are also battling the challenging conditions and unique circumstances while dealing with a huge volume of work. In some cases, an extreme event can amount to over 2,000 individual trouble calls – more than what BC Hydro averages provincewide over an entire month.

ICE

During the last weekend of December in 2017, an unprecedented ice storm hit the Fraser Valley. The freezing rain and cold temperatures caused ice to form on trees causing them to break and fall on to power lines and knock down power poles. In other cases, BC Hydro equipment – power lines, poles and equipment at a substation – became encased with ice, leading to outages. Over the course of the three day event, the storm caused 142,000 power outages and damaged: over 50 power poles and 391 spans of wire. The poor weather conditions and icy roads made for an extremely challenging response for BC Hydro crews who had to pare back work at times to ensure their own safety. Despite this, crews managed to restore power to 75 per cent of affected customers within 24 hours.



A power pole encased with ice as a result of the 2017 ice storm.

WILDFIRES

The summer of 2017 was the largest wildfire season on record in the province. Significant wildfire activity in the Central and Southern Interior caused extensive damage to BC Hydro's infrastructure and impacted approximately 50,000 of its customers. Over the course of the summer, more than 100 BC Hydro and contractor crews worked to repair 475 power poles and 377 spans of wire.



A power pole burned down by the 2017 wildfires.

WIND

As the majority of the province was gearing up for summer, a major windstorm hit northern B.C. in May 2015 that knocked out power to close to 14,000 customers from Prince Rupert, to Fort St. John and to the Robson Valley. Additional crews were brought in from the Lower Mainland and Southern Interior to aid in restoration efforts, which took two days to complete.

Not to be outdone, the Lower Mainland and Vancouver Island were also hit by an unusual late summer windstorm that same year that caused extensive damage to BC Hydro's system and knocked out power to more than 700,000 customers over a three day period. In the end, crews had the majority of customers restored within 72 hours – a huge effort which involved repairing over 10,000 metres of power line, 200 power poles and 1,200 pieces of electrical equipment. The August 2015 storm was the single largest outage event in BC Hydro's history.



A tree near Nelson and Howe in Vancouver taken down by the August 2015 windstorm.

Powerless in extreme weather

The Central and Southern Interior regions of B.C. are notoriously difficult geographic regions for BC Hydro to service. These areas have large distances between customers as there is one distribution pole for every customer in this region, compared to the Lower Mainland where there is five customers per pole. The Interior region also has over 15,000 kilometres of distribution line, which works out to be more than 60 metres of line per customer, compared to only 14 metres per customer in the Lower Mainland. This is one of the reasons customers in these regions tend to experience more outages – and longer outages – compared to those in other parts of the province.

According to the survey conducted for BC Hydro, customers in these regions agree – with the majority saying they recall having seven or more power outages in the past five years. This is in comparison to the majority of those in the Lower Mainland and on the Island that recall having just one or two.

BC Hydro customers in the Fraser Valley and Metro Vancouver experienced the highest number of storm-related outages in 2015, largely due to the late summer wind storm, which resulted in more customer hours lost that year than the previous two years combined.

Last year, BC Hydro customers in the Southern Interior experienced the highest number of power outages during major storm events compared to customers in other parts of the province. At 1.32 outages per customer, this is more than double the provincial average of 0.62 outages. This is largely due to two severe windstorms that hit the region in the fall and summer last year and knocked out power to thousands in the region.

There is no indication of this trend slowing down – extreme storm events seem to be becoming the new normal. While the long term, seasonal predictability of windstorm frequency and intensity is difficult to predict, BC Hydro's team of meteorologists produce daily weather forecasts throughout the year and watch storm development closely. They alert various groups across the company if anything that has the potential to cause damage to the system is in the forecast so they can get ready.

Despite the increasingly challenging weather in the province, the amount of time BC Hydro customers are without power has remained relatively stable at around three hours a year for the last five years.

Wind and trees – oh my!

While storms and extreme weather can cause the most challenges for BC Hydro crews, power outages can occur for a variety of reasons, including adverse weather, motor vehicle accidents, vandalism, and birds and animals interfering with electrical equipment. Last year, BC Hydro customers were without power for more than 13 million hours in total.

B.C.'s biggest culprit are trees. BC Hydro has three times more trees per kilometre of transmission line than any other utility in North America – which is why it should come as no surprise that trees are the single most common cause of outages in the province. During 2017, BC Hydro saw a 27 per cent increase in tree-related outages, compared to the five year average. By region, this means:

- The Lower Mainland saw a 36 per cent increase.
- The Vancouver Island saw a 16 per cent increase.
- The North, Central and South Interior saw a 20 per cent increase.

WHAT'S CAUSING POWER OUTAGES?



46%
Trees



10%
Adverse
weather



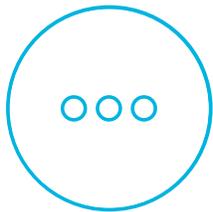
7%
Adverse
environment



7%
Equipment
failure



3%
Birds and
animals



12%
Other



9%
Planned
outages



6%
MVAs

Restoring power

B.C.'s lush forests, tall mountains, and pristine lakes and rivers make it one of the most naturally beautiful places in the world. But for those whose job it is to keep the lights on across the province, this natural beauty does not come without its challenges. When the power goes out, the process for BC Hydro in getting it back on is not always as simple as flicking a switch. This is especially true during major storm events where high winds, rain, snow and even ice add an extra level of challenge for crews and repair work can often look like individual construction projects.

Fortunately, despite storms getting worse, BC Hydro's storm response times are improving and it has restored more customers in a shorter amount of time over the past five years. About 95 per cent of customers' power is restored within 24 hours during an extreme event and the number of customers whose power was restored within four hours has increased during that same time period by nine per cent to 53 per cent.

When crews are alerted to an outage from BC Hydro's centralized operations centre, the first step is figuring out the cause. During storm events, outages are often caused by the high winds, rain and snow knocking a tree or branches on to a power line. When this happens on BC Hydro's distribution lines – the smaller lines that bring electricity to homes and business – this is relatively easy to spot (if the line has not already gone out) and begin repairs. Repairs typically involve disconnecting the power to the line, removing the tree or branch, restringing the line or replacing a power pole if it was damaged.

BC Hydro's operations centre and communications systems located throughout the grid can tell where outages are approximately located. However, when damage is significant, crews need to perform damage assessments in order to put together a construction plan to determine the required repairs. These repair plans can involve engineering expertise, the use of specialized equipment, and in some cases, helicopters are used to survey damage from the air in order to determine the required repairs.

Priority pass: who gets power back first?

When it comes to prioritizing outages during a storm event, safety always comes first. This means crews will first work on repairs to any issues that present an immediate danger to the public, such as a downed power line. Focus then turns to getting as many customers back on as quickly as possible. Damage to transmission lines or substation equipment can affect tens of thousands of customers, which is why these take priority over repairs to distribution equipment.

From there, BC Hydro works with local municipalities and emergency responders to determine critical services – such as fire stations, hospitals and municipal water systems – that need to be restored. Crews will then work from the substation (source of the power) outwards – restoring customers as they go and making repairs on the main ‘feeder’ line with a focus on areas with the largest concentrations of customers. They will then work on the smaller pockets of customers and those located at the end of a circuit where repairs to the rest of the circuit need to be completed first.

Storm preparation and outage prevention

For years, BC Hydro’s storm response has been looked to as one of the best in North America. However, as extreme weather events are becoming more common, this is creating new challenges in its response efforts. In fact, the number of storms BC Hydro has responded to has nearly tripled in the last five years. Despite the increasingly wild weather, the number of customers BC Hydro has restored within 24 hours after a major event has improved from 92 per cent in 2013 to 95 per cent in 2017.

The key to a successful storm response is preparation – ensuring the right people and the right resources are in the right place at the right time. With over 55 offices located throughout the province, crews are well-positioned to respond quickly when problems occur. BC Hydro also relies on a team of in-house meteorologists to track storms so they know where and when a storm might hit.

While some outages are inevitable, BC Hydro and its contractor crews perform regular maintenance to prevent outages from occurring in the first place. Just as car parts break down over time, the equipment in BC Hydro’s system – including its close to one million power poles – become less reliable as it ages. This is why BC Hydro replaces around 10,000 power poles each year. Poles typically last between 40 and 50 years and are tested annually to identify any that may have become damaged by adverse weather, wildlife or weakened by age and in need of being replaced.

With millions of trees across the province, keeping BC Hydro’s network of 79,000 kilometres of transmission and distribution lines clear of vegetation is no small feat. BC Hydro spends over \$50 million each year on its vegetation management program to help prevent vegetation-related power outages. Certified arborists inspect vegetation located near BC Hydro’s infrastructure and remove any dead or diseased vegetation, and prune back anything that is growing too close to equipment. Last year, BC Hydro identified and safely removed more than 53,000 trees that posed a risk to its electrical system.

When is my power going to be back?

If the power does go out, the latest outage information can be found on BC Hydro’s mobile-friendly website bchydro.com/outages. If an outage is not listed, it can be reported by calling *HYDRO on a cell phone or by calling 1 800 BCHYDRO from a landline.

Solutions: How technology is improving restoration times

Being without power can be a nuisance for some and downright frustrating for others – and not knowing when it might be back only makes it worse. This is where communication between crews and BC Hydro’s operations centre becomes important to ensure it can provide timely and accurate estimated crew arrival times and estimated restoration times for its customers. In some cases this can be a challenge, especially when crews are working in remote areas where cell reception is limited. The roll out of new mobile dispatch tools that communicate via satellite is helping to bridge gaps in communication and ensuring information is getting to customers in a timely manner. This also allows crews to move from outage to outage more efficiently – freeing up more time for repair and restoration work.

Enhanced prediction logic is another way BC Hydro is using technology to improve its outage response times. Previously, it could take multiple customer calls before an exact outage location could be determined and a crew could be dispatched to make repairs. It now relies on smart meter data and an algorithm that allows its system to confirm an outage and mark its location on a map. This allows a dispatcher to analyze and send a crew to investigate and make necessary repairs – helping to get power back much faster.

Don’t be powerless in a power outage

It is difficult to predict how much damage a storm may cause to BC Hydro’s system and if a power outage will occur. This is why it is important for British Columbians to be prepared with the right supplies and information on hand.

The survey conducted for BC Hydro found nearly half of British Columbians do not think they are prepared for an emergency. Having a well-stocked emergency kit is key in being prepared – yet only one-half of the respondents said they have one and only one-third said have an emergency plan for their family.

An emergency kit should include basic supplies, such as:

- Flashlight
- Extra batteries
- First-aid kit
- Blanket or warm clothing
- Ready-to-eat non-perishable food
- A three day supply of bottled water for each member of the household
- Other optional items include personal toiletries, medications, cash in small bills, copies of important documents, a portable cell-phone charger and books or games

Items should be put in a grab-and-go bag such as a backpack or duffle bag that is stored in an easy-to-access area of the home. It is also important to check the kit annually and replace any expired or used items.

A downed power line is an emergency

A downed or damaged power line should always be assumed live, stay back at least 10 metres (the length of a city bus) and call 9-1-1 to report.



STORM WARNING