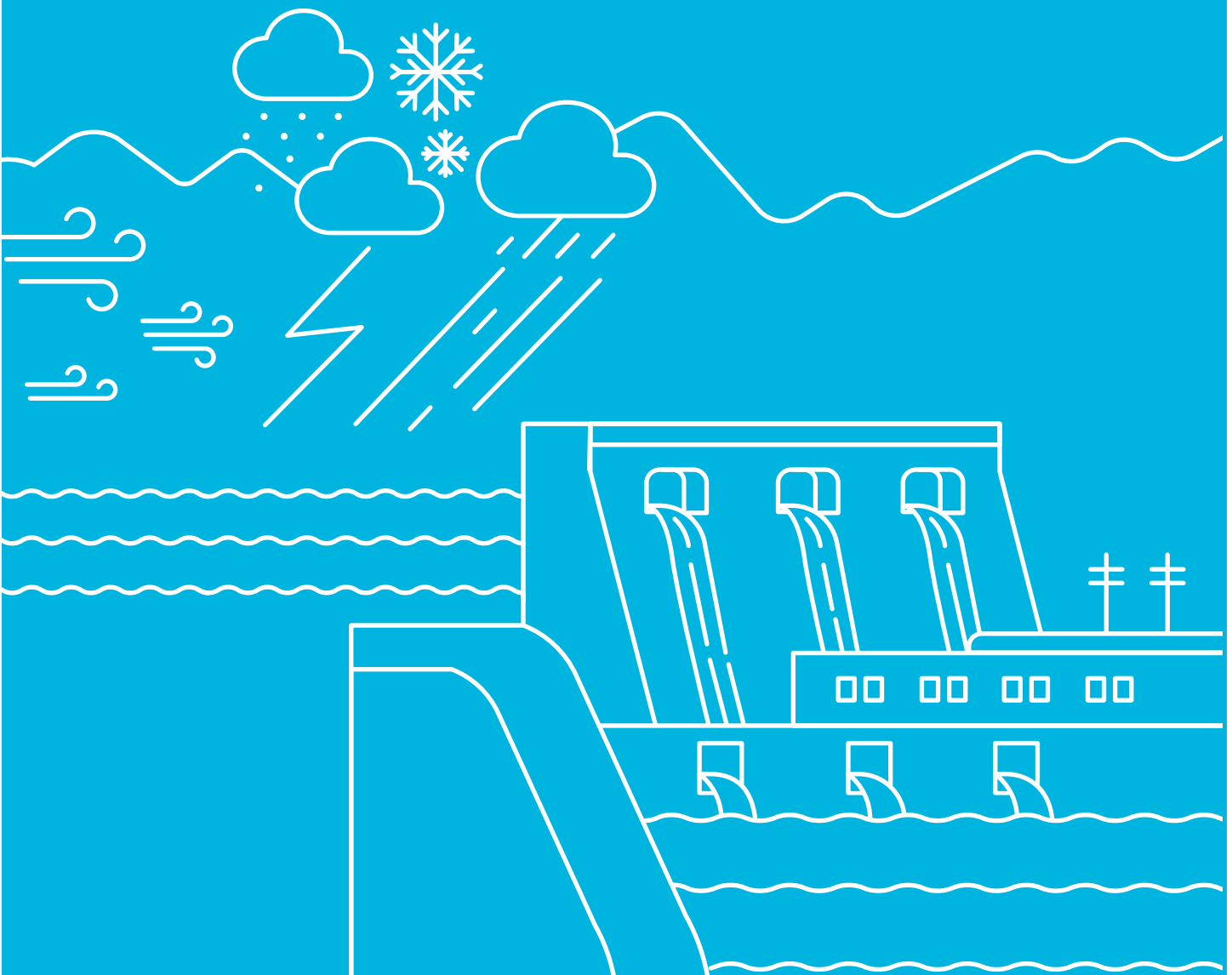


# 2021:

A record-breaking year for electricity demand and extreme weather



# 2021: A record-breaking year for electricity demand and extreme weather

From extreme heat and cold, to unprecedented rainfall, British Columbia experienced wild and devastating weather in 2021. BC Hydro's hydroelectric system is directly impacted by variations in weather, and in 2021 more electricity demand records were broken than any other year prior, largely because of the back-to-back extreme temperatures lasting for days and weeks on end. Although BC Hydro research<sup>1</sup> shows 76 per cent of British Columbians are more concerned than ever about grid reliability due to extreme weather and climate change, BC Hydro is well positioned because of its flexible hydroelectric system to provide safe, clean and reliable electricity to its customers through extreme weather events and increases in demand.

## Highlights

- New data shows BC Hydro experienced more record system peak loads – the hour in a day that customers use the most electricity—in 2021 than ever before.
- While BC Hydro remains a winter-peaking utility, extreme weather caused by climate change is driving higher summer consumption.
- In fact, BC Hydro experienced record-breaking demand for electricity in both summer and winter 2021, a trend that is expected to continue.
- In summer 2021, some places in B.C. broke temperature records, and BC Hydro experienced 19 of its top 25 all-time summer daily peak records.
  - This includes breaking its all-time summer peak hourly demand record.
- Similarly, the 2021 holiday season saw extremely cold temperatures and heavy snow throughout B.C. that resulted in the highest and longest sustained load levels ever experienced on the BC Hydro system.
  - Overall, this winter so far, BC Hydro has experienced 11 of its top 25 all-time daily peak records.
  - BC Hydro has broken the peak record five times in the past five years.
- Peak demand patterns have also changed since the first year of the COVID-19 pandemic.
  - When the previous peak hourly load record was broken in January 2020, load displayed sharper increases and decreases throughout the day, suggesting more typical weather and behaviour.
  - In contrast, the 2021 peak load built up more gradually throughout the day, suggesting more British Columbians were likely working from home, or home for the holidays – waking up later and home earlier in the evening – as well as colder weather than average.
- The record-breaking electricity demand can be tied to B.C. experiencing extreme temperatures in both summer and winter that lasted for extended periods of time.
- Current climate models suggest a warming trend continuing in years to come which could increase demand year-round, and fortunately, BC Hydro's flexible hydroelectric system can meet changes in demand quickly.
- To meet increased demand, including from electrification, BC Hydro is preparing its system for increasingly challenging and unpredictable weather brought on by climate change. While the exact nature of British Columbia's future climate remains uncertain, BC Hydro is working to ensure that it is ready.

## Solutions

BC Hydro's goal is to have the adaptive capacity to continue to safely provide its customers with reliable, affordable, clean electricity. BC Hydro is well positioned to meet increases in demand and can also help people reduce their carbon footprint:

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<sup>1</sup> Online survey by Majid Khoury of 801 British Columbians from Sept 24 to Sept 27, 2021. Margin of error: 3.46%.

- BC Hydro has a surplus of electricity and expects to have more than it needs until about 2030. BC Hydro’s 20– year **Integrated Resource Plan** maps out how it will meet future demand for electricity through a combination of energy conservation and the development of generation resources.
- BC Hydro is encouraging electrification. British Columbians can reduce greenhouse gas emissions and help mitigate the effects of climate change by switching to hydroelectricity from fossil fuels: an electric heat pump can cool in the summer and heat in the winter, while electric vehicles significantly reduce greenhouse gas emissions.

## Wild weather, changing patterns

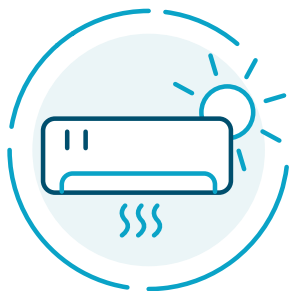
Extreme weather hit British Columbia hard in 2021, with temperature records broken in both the summer and winter in some parts of the province, and unprecedented levels of rainfall from multiple atmospheric rivers. In fact, B.C.’s June heat dome and November flooding topped Environment Canada’s list of worst weather events of 2021.<sup>2</sup> Research conducted on behalf of BC Hydro found British Columbians are experiencing increasing anxiety over these weather events – with 76 per cent saying they are more concerned than ever about grid reliability due to extreme weather and climate change.

Unlike utilities in Ontario and Quebec, BC Hydro normally experiences peak electricity demand in the winter months, when British Columbians turn up their heating systems and leave lights and appliances on longer. However, extreme weather in recent years is slowly changing this pattern. Although winter peaks remain higher than summer peaks, new data shows BC Hydro experienced more daily system peak loads in 2021 than ever before, in both summer and winter. This report will explore the record-breaking year in demand and how BC Hydro is fully prepared to provide safe, reliable power as the province faces more challenging weather in the years to come.

## Cruel summer

In summer 2021, several places in B.C. broke temperature records, most notably Lytton, B.C. which reached a high of 49.6°C – the highest temperature ever recorded anywhere in Canada. That same week, 90 per cent of the village of Lytton burned in a tragic wildfire. The unprecedented heat also caused record-breaking demand for electricity, as British Columbians turned to using air conditioning more than ever before.

With traditionally cooler summers compared to other parts of the country, especially in the Lower Mainland and on Vancouver Island, B.C. has always fallen far below the national average when it comes to air conditioning use. However, with extreme temperatures becoming the norm, air conditioning use has grown – increasing by about 50 per cent over the past decade from a quarter of British Columbians using it at home to nearly 40 per cent.<sup>3</sup>



On June 28, 2021 BC Hydro broke its all-time summer peak demand record at 8,568 megawatts – breaking the previous record by 600 megawatts – the equivalent of turning on 600,000 portable air conditioners.

In 2021, record-breaking temperatures and an increased number of air conditioning users drove summer peak hourly demand – the time of day British Columbians use the most power – to all-time highs. In fact, this summer BC Hydro experienced 19 of its top 25 all-time summer daily peak hours for system load. This includes breaking its all-time summer peak hourly demand record on June 28, 2021 when demand reached 8,568 megawatts, shattering the record that was set before the heat wave began by more than 600 megawatts – the equivalent of turning on 600,000 portable air conditioners.

<sup>2</sup> Environment and Climate Change Canada

<sup>3</sup> BC Hydro Residential End Use Survey 2020

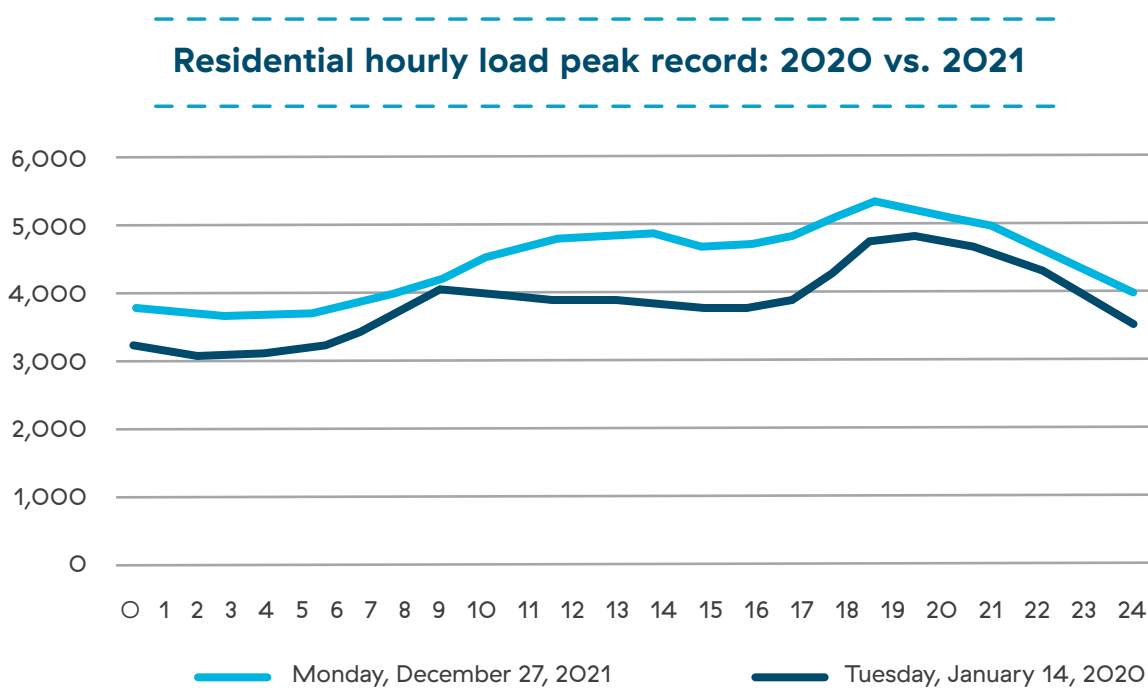
## Winter wonderland demand

Much like the extreme heat experienced this past summer, the 2021 holiday season saw extremely cold temperatures and heavy snow throughout B.C. that resulted in the highest and longest sustained load levels ever experienced on the BC Hydro system.

Overall, this winter so far, BC Hydro has experienced 11 of its top 25 all-time daily system peak load hours ever. In fact, on December 27, BC Hydro broke its all-time peak hourly demand record at 10,787 megawatts.<sup>4</sup> To put things in further perspective, BC Hydro has broken the peak record five times in the past five years.

Peak demand patterns have also changed since the first year of the COVID-19 pandemic.

When the previous peak hourly load record was broken in January 2020, load displayed sharper increases and decreases throughout the day. In contrast, the 2021 peak load built up more gradually throughout the day, suggesting more British Columbians were likely working from home, or home for the holidays – waking up later and home earlier in the evening – as well as colder weather than average.



Typically, BC Hydro records the highest demand for electricity on weekday evenings when British Columbians come home, turn up the heat, and switch on lighting and appliances. However, while residential electricity use can increase, on average, by 88 per cent in the colder, darker, winter months, the increase has been even more pronounced in recent years as climate change creates stronger storms and cold snaps that last for days – and sometimes weeks– on end.

## How BC hydro is preparing

The record-breaking electricity demand that BC Hydro saw in 2021 is tied to B.C. experiencing extreme temperatures in both summer and winter that lasted for extended periods of time. Fortunately, BC Hydro's flexible hydroelectric system can meet changes in demand quickly and BC Hydro's asset management and emergency management processes have continuously evolved to prepare for and effectively respond to increasingly severe weather-related events and changes in electricity demand.

<sup>4</sup> The original load number of 10,902 listed in a previous media release has been adjusted based on new data.

BC Hydro has a surplus of electricity and expects to have more than it needs until about 2030. BC Hydro's 20-year **Integrated Resource Plan** maps out how it will meet future demand for electricity through a combination of energy conservation and the development of additional generation resources.

BC Hydro has the tools and expertise to continue to manage the unpredictable weather and climate change. This includes in-house weather forecasting and ensemble runoff forecasting, operations planning optimization methods, and its own climate, water and snow monitoring network. It is also a contributing partner in complementary networks in B.C. for water, climate, snow and glacier monitoring.

## Electrification and climate change

Mitigating the effects of climate change can be done by significantly reducing greenhouse gas emissions through electrification. Here in British Columbia, we are in a unique position for electrification given the abundance of clean electricity available. About 98 per cent of the power BC Hydro generates already comes from clean or renewable resources, mostly from its hydroelectric resources that are powered by water.

BC Hydro's Electrification Plan aims to reduce greenhouse gas emissions in the province by 900,000 tonnes per year by April 2026 – that is around the same as taking 200,000 gas-powered cars off the road for one year. While British Columbia has more than enough power to keep up with changes in demand, British Columbians are encouraged to do the following to help reduce greenhouse gas emissions:

- Purchase a heat pump: Installing an electric heat pump in place of a gas furnace will significantly reduce home heating emissions, and provides the added benefit of not only heating, but cooling in the hotter months. Rebates up to \$11,000 are available for installation when switching from a gas furnace.
- Switch to an EV: driving an EV pays off in many ways including saving 80 per cent on fuel costs and lowering your carbon footprint. Rebates up to \$3,000 on the purchase of an EV are available, with another \$5,000 available through federal rebates.

