

CLIMATE SOLUTIONS

# Some E-bike batteries can explode. Here's how to stay safe.



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A [deadly fire](#) in the basement of a New York apartment that claimed the life of a 9-year-old boy. Another [blaze in Virginia](#) that killed a man. An explosion that [destroyed an apartment](#) in Huntington Beach, Calif., displacing the building's residents and neighbors.

The source of these devastating fires? Electric bicycle batteries, officials said.

Although there aren't national or international statistics on how often the lithium-ion batteries commonly found in E-bikes or scooters catch fire, these incidents do appear to "happen with some regularity — and the numbers are rising," according to the [National Fire Protection Association](#).

In New York, for instance, the city has seen a dramatic increase in battery-related fires in recent years, with incidents skyrocketing from 30 in 2019 to 220 in 2022, according to data from the New York City Fire Department. Of the fires last year, six resulted in deaths.

"Once the fire starts going, everything inside the battery will burn," said K.M. Abraham, a lithium-ion battery expert and former professor at Northeastern University.

But Abraham and other experts emphasize that batteries from reputable manufacturers that have undergone testing and certifications are widely considered safe. Problems, they say, may arise when batteries are damaged, modified or shoddily made. Here's what to know about these batteries and how you can lower the risk of fires and explosions.

# What are lithium-ion batteries and how do they work?

These powerful rechargeable batteries can be found in everything from cellphones and laptops to electric vehicles.

“Lithium-ion batteries have this incredible performance advantage over other types of batteries because they can store a lot of energy and they can store it for a long time,” said Benjamin Preston, an autos reporter with Consumer Reports and volunteer firefighter.

They consist of single or multiple lithium-ion cells and a protective circuit board. The cells are composed of a negative electrode and a positive electrode separated by a thin porous barrier, known as a separator, allowing lithium ions to move from one side to the other through a liquid or gel that conducts ionic current. The movement of lithium ions from the negative to the positive electrode inside the cell and electrons through the external load creates the electrical current that gives the battery its juice to power devices.

## What could cause a fire or explosion?

Lithium-ion batteries contain a large amount of energy stored in a small volume, and many of its components can be highly flammable. They have complex chemistry and structure, so there are multiple ways they could catch fire and potentially explode, said Anna Stefanopoulou, a mechanical engineering professor at the University of Michigan, who studies batteries.

Physical damage, such as impact from a crash, improper use, or defects or other manufacturing issues could lead to short-circuiting or other failures that cause the energy inside the battery to be released “in an uncontrolled fashion,” Abraham said.

If one of the cells short-circuits, it could generate electrical currents 20 to 50 times greater than what the battery is designed to handle, Stefanopoulou said. That could set off a chain reaction of cells heating up, triggering a rapid rise in pressure and temperature inside the battery.

“Even in a small battery, that temperature can rise as high as 1,500 degrees Fahrenheit,” Abraham said.

As the cells heat up, they create flammable gases and high pressure inside the cell, Abraham said. At this high pressure, he noted, the gases can rupture the cell container and be released, burning upon contact with air, or with just a spark.

## Why are these battery failures so dangerous?

Lithium-ion battery fires or explosions are particularly dangerous because they can happen suddenly and spread aggressively.

#131-23

A cellphone battery that catches on fire and explodes can create enough force to blow out the window of a car, Preston said. Larger batteries, such as those used in E-bikes and scooters, are capable of doing “significant damage” to rooms and have even been known to take down walls, he said.

“It’s crazy how quickly it happens,” he said.

What’s more, the batteries are “known to unexpectedly re-ignite (without warning) minutes, hours and even days after all visible fire has been put out,” according to the New York City Fire Department.

Water and some fire extinguishers also don’t always work on these fires. In fact, dousing a battery in water could make the situation worse, Abraham said, because water reacting with lithium can produce hydrogen, a highly flammable gas.

## How can I lower the risk of these incidents?

Last month, New York Mayor Eric Adams (D) signed a package of E-bike safety legislation into law, but similar regulations are still nascent in the United States. Meanwhile, experts encourage taking these steps to help lower the chances of a battery fire or explosion:

**Think about what you’re buying.** Avoid purchasing batteries or chargers that aren’t recommended by manufacturers. Experts suggest making sure that your battery meets safety standards by looking for certifications. In the United States, certification from Underwriter Laboratories, or UL, is a widely accepted standard. But keep in mind that some products might falsely advertise these certifications.

**Be mindful about charging.** The Consumer Product Safety Commission recommends using the charger that comes included with your device and following manufacturer instructions. Try not to leave your E-bike unattended while charging — for example, having it plugged in overnight while you’re asleep — and unplug it once it’s fully charged.

You should also consider where you’re storing and charging your E-bike. “You don’t want to have a scooter or an E-bike in your bedroom with you or in an entry hallway” where it could block an exit, Preston said.

In addition to keeping bikes away from flammable materials, avoid leaving anything close to external heat sources, such as radiators or heating vents. Stefanopoulou added that bikes should be charged outside in the shade whenever possible.

**Pay attention to your battery.** If you do crash or otherwise damage your bike, make sure you assess your battery, Stefanopoulou said.

“Every time you fall, you check your head and your arms and your knees and everything, I think you should also check your [battery] pack,” she said.

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