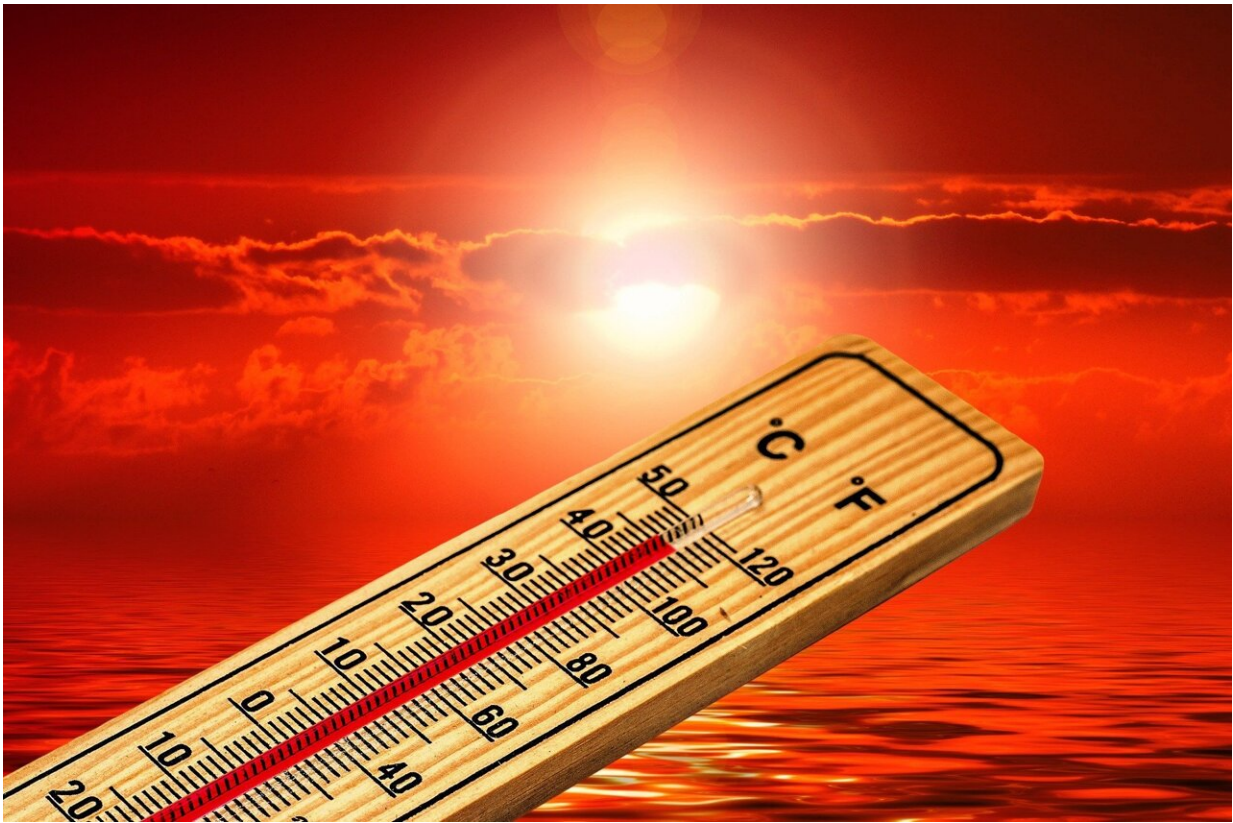


How to prepare your home for summer heat waves

August 22 2023, by JoAnna Wendel



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Every year, an estimated 600 people in the U.S. die in extreme heat waves. Nearly 10,000 are hospitalized and more than 67,000 visit emergency rooms. This year, record-smashing heat waves have swept

across the southwestern United States, which has sweltered under temperatures above 100 degrees for weeks. In July, excessive heat warnings were announced for many western U.S. states, Texas and some of Florida.

In the last century, temperatures have risen 1.5 degrees and modeling efforts suggest that temperatures will continue to rise 2.5 degrees in the next few decades. Extreme heat can wreak havoc on the body's ability to cool itself, which can lead to heat related illnesses and death.

Staying inside is one of the best protections against [extreme heat](#), especially for older and medically vulnerable people. At Pacific Northwest National Laboratory (PNNL), researchers study technologies and provide comprehensive guides to homeowners that can help keep buildings cool. Whether you own or rent, there are ways to upgrade your house or apartment to stay safe in extreme heat.

Block sunlight with window covers

Good news: one of the main ways homes heat up is also the easiest to counteract.

"The biggest source of heat gain in most homes is the sun's heat coming through windows," said Christian Kaltreider, a systems engineer at PNNL who studies energy efficiency in buildings. "Addressing that first is a major key to preparing for an extreme heat event or weathering an ongoing heat wave."

That means covering windows, both inside and out. PNNL researchers have found that all types of interior windows coverings, from drapes to films to blinds, can keep out direct sunlight, but some are better than others. For example, insulated cellular shades cut air conditioning (AC) use 13% compared to vinyl blinds and up to 25% compared to no

window coverings, said Theresa Gilbride, a building efficiency researcher at PNNL.

Exterior coverings like awnings, solar screens, roller shades and operable shutters are especially effective at keeping out the sun's heat. In one study, exterior solar screens cut AC use by more than 10% compared to interior vinyl blinds and more than 20% compared to no window coverings. [This guide](#) from Department of Energy's Building America Solution Center was developed by PNNL to help occupants choose the right window coverings for their house or apartment.

Set up a cool room

If you know a heat wave is coming, consider preparing a room in your house or apartment as a cool room, with an air conditioning option like a portable AC or window unit, fans, window coverings and a well-sealed door, Kaltreider suggests. It's also a good idea to have some kind of air purifier, as heat waves generally coincide with poor air quality.

Keep windows well shaded during the day. If it is hotter outside than inside, keep windows and doors shut. At night, if it cools down enough that the outside is cooler than the inside, you can position fans at windows to pull in cold air. If your home allows, put one fan facing outward in one window, and one fan facing in on the other side of the home. That way, one fan blows hot air out of the building while one fan blows cooler air in.

If the power goes out, or if you don't have air conditioning, window coverings are the best way to keep out heat. Covering windows can be low-cost or free—even a piece of cardboard or clothes hanging in front of a [window](#) helps. If the cardboard has a lighter-colored side, position it with the lighter side facing out. Taking cold showers, avoiding cooking indoors and making ice ahead of time can also help in a heat wave.

Upgrades and renovations

For homeowners who can make upgrades, landscaping can be a powerful tool against heat, Kaltreider said. Buildings, roads and other city infrastructure absorb and re-emit heat, creating a [heat island effect](#) that can make an urban community measurably hotter than surrounding rural areas. To combat this, homeowners can plant trees near windows facing south, east or west to provide shade during sunny summer months. (Deciduous trees that lose their leaves in the winter allow for winter sun exposure.) The trees don't just shade windows; they also increase evaporative cooling and create a cooler microclimate around the house and neighborhood.

Adding greenery like trees "is one of the most powerful tools we have for addressing extreme heat both at the house and neighborhood level," Kaltreider said.

If you're already planning to renovate your walls, roof or attic, consider longer-term options that create a more heat-resistant and energy-efficient house, Gilbride said. If you are planning to re-roof your home, look for roofing products with a Cool Roof Rating Council rating, showing that the products are designed to reflect heat from the sun. While lighter colors will generally keep walls cooler, you can also check which wall paints also receive a Cool Roof Rating Council rating. Adding insulation to your attic or walls is another popular upgrade that can help keep the house more comfortable in summer as well as winter.

"If your HVAC ducts run through the attic, have a professional check that the HVAC ducts are well sealed to prevent air leakage and well insulated to prevent heat transfer," Gilbride said. "Leaky or poorly insulated ducts can be a big source of cooling loss in the summer and heating loss in the winter. And that leads to uncomfortable conditions and higher energy bills."

If your home currently has no air conditioner, consider installing ductless heat pumps, also known as mini-split heat pumps. Heat pumps use electricity and refrigerants to pump heat out of your home in summer. In winter, they pump outdoor heat back inside. Mini-split heat pumps don't require large renovations to a house because they don't use ducts, and they can provide cooling to just one room or to an entire home.

Learn more

PNNL offers detailed how-to guides on several topics to help you prepare your home for extreme heat. These guides can be found under the topic "[Extreme Heat](#)" in the [Disaster Resistance](#) section of the [Building America Solution Center](#):

- [Design for Extreme Heat](#)
- [Creating a Cool Room for Extreme Heat Events](#)
- [Cool Roofs and Walls to Reduce Heat Gain](#)
- [Air Sealing and Insulating Walls to Reduce Heat Gain](#)
- [Shading and Solar Control for Windows and Skylights](#)
- [Window Attachments for Solar Control and Energy Efficiency](#)
- [Landscaping to Reduce Cooling Load](#)

Provided by Pacific Northwest National Laboratory

Citation: How to prepare your home for summer heat waves (2023, August 22) retrieved 3 May 2024 from <https://phys.org/news/2023-08-home-summer.html>

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