

REDUCING EXPOSURE TO WILDFIRE SMOKE: HOW EFFECTIVE ARE DO-IT-YOURSELF AND SOLAR-CHARGED AIR CLEANERS?

A Need for Air Cleaners

When wildfires impact air quality, health officials recommend sheltering indoors to avoid breathing in the tiny particles that are in smoke. However, indoor air quality can also reach unhealthy levels during smoke events. Heating, ventilation and air conditioning (HVAC) systems or portable air cleaners can help by filtering the air. But cost, availability, and access to a reliable power source (especially during fire events) can be barriers to their use.

Lack of electrical power can also prevent people from being able to use air filtration. This can occur during unplanned power outages caused by wildfires impacting the electric grid, or when there are planned power shutdowns to reduce electrical fire risk. In addition, lack of electricity is an issue for emergency response personnel sleeping in tents; among homeless and evacuee populations; and in some rural areas with no access to the electric grid. Adapting air cleaner technology to run on solar-charged batteries might offer a solution when lack of electricity is a barrier.

What are DIY Air Cleaners?

As a low-cost solution, some people are making Do-It-Yourself (DIY)

air cleaners (sometimes called a “filter fan”), with one or more store-bought air filters attached with screws or duct tape to a standard box fan. There are several designs available on the internet.

Are DIY Air Cleaners Effective and Safe?

While anecdotal reports and limited testing seem to suggest that there is some indoor air quality improvement with the use of DIY air cleaners, more research is needed to evaluate their effectiveness. There are also concerns about potential safety hazards from the excess strain on the box fan caused by adding an air filter (e.g., overheating the motor).

Methods

EPA researchers will be evaluating DIY and prototype solar air cleaners. EPA will first build air cleaners and conduct safety evaluations partnering with Underwriter’s Laboratory to assess fire and shock hazards. Next, EPA researchers will place the air cleaners in a laboratory test chamber and generate smoke to evaluate how effectively the air cleaners remove fine particulate matter (PM_{2.5}) and other hazardous pollutants, as well as odor-causing compounds. Finally, EPA will work with partners to deploy air cleaners



An example of a DIY air cleaner made with an air filter clamped onto a box fan.

in the field during wildfires to test their real-world effectiveness in homes and fire personnel tents.

Outcomes

EPA will use this research to provide guidance to health officials, emergency response personnel and the public on the potential hazards, effectiveness and best practices for DIY and solar air cleaners.

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