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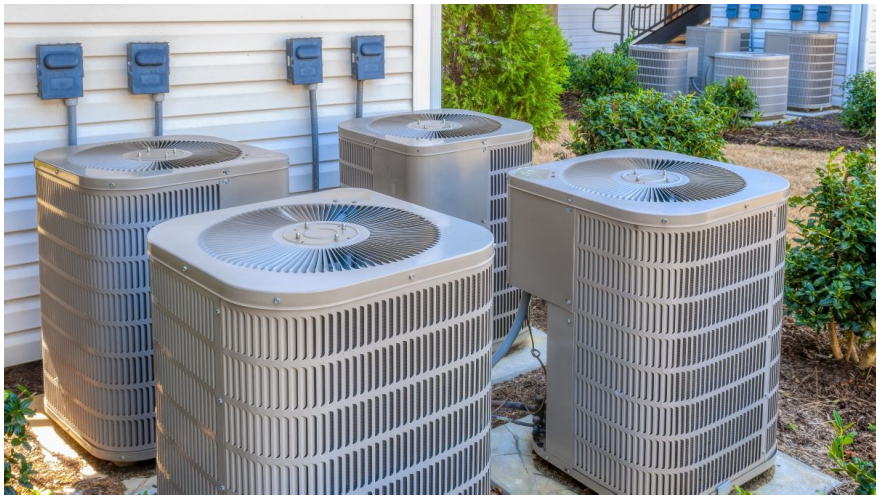
The Vicious Cycle of Air Conditioning

By Gemma Alexander

MAR 9, 2022 air conditioning, Climate Change, greenhouse gas, hfc, refrigerants



Air conditioning used to be a luxury, or something only needed in desert climates. But average temperatures have risen due to climate change and more people consider air conditioning a necessity. Today, 90% of all U.S. households have an A/C unit. That might sound like a win, an example of technology improving quality of life. Unfortunately, it is also a perfect example of a vicious cycle. The more air conditioners we run, the faster the climate changes and the more we need relief from high temperatures.

Air Con and the Ozone

Air conditioners contribute directly to climate change by releasing ozone-depleting greenhouse gases. Although the Montreal Protocol banned the use of CFCs, air conditioners still use hydrofluorocarbon (HFC) refrigerants. These refrigerants can leak up to 10% each year. And if we do not properly dispose of old units, the refrigerants may be completely released into the atmosphere.

The most commonly used refrigerant in air conditioners is the HFC known as R-410A, a greenhouse gas more than 2,000 times more potent than carbon dioxide. Eliminating HFCs the way we eliminated CFCs a generation ago could prevent as much as 0.5°C of warming over the next century. That would achieve one-third of the goals of the Paris Climate Agreement.

Air Con and Energy

Air conditioners are terrible energy hogs, consuming 3,000 to 5,000 watts of electricity every hour that they run. The climate impact of using that much electricity will depend on the energy source, but it's a significant part of a household's total, especially in hot climates. For most Americans, home energy use is the second-largest source of greenhouse gas emissions (after transportation). Temperature control makes up more than half of home energy use, and air conditioners specifically account for 23% of electricity use in all American buildings.

During a 2019 heatwave in France, each degree above normal seasonal temperatures correlated with additional electricity consumption equivalent to powering an additional city of Bordeaux, a municipality of about a quarter-million inhabitants. Not only does this result in significantly higher greenhouse gas emissions and associated climate impacts, but it also taxes energy infrastructure and can result in power outages, like the one in Portland in 2021. While power outages will temporarily reduce emissions, in a heatwave, they also increase the risk of heat-related deaths. Sociologist Eric Klineberg's research on the 1995 Chicago heat wave revealed that people who die during heatwaves are among society's most vulnerable, victims of environmental injustice that has led to unequal maintenance of infrastructure in low-income and minority neighborhoods.

Air Con and Health

Although necessary in extremely high temperatures, reliance on air conditioning also presents its own health risks. Air

conditioning can lead to fatigue and headaches, dry eyes and skin, and dehydration. Exposure to constant air-conditioning can prevent our bodies from acclimatizing to hot weather, which may be making us more vulnerable to heat-related illness. And unless air ducts are very well maintained, air conditioning contributes to allergies, lower indoor air quality, and even sick building syndrome.

What Can You Do?

If you are building a home, use passive solar design principles. Although people tend to associate solar design with heating, it is really about designing for compatibility with the local climate. It makes a home more comfortable year-round.

Even if you're not building a new home, you can make your existing home more efficient. Upgrading insulation and sealing air leaks, installing appropriate window treatments and planting shade trees, and replacing asphalt tiles are some of the ways to combat the urban heat island effect. When it's time to reroof, sustainable roofing choices like a cool roof or a living green roof can also make a difference.

When the temperature rises, before turning on the A/C, try using old-school cooling hacks. Open windows strategically, bust out the kiddie pool, sleep with damp sheets, and drink lots of iced tea to stay comfortable.

Better Air Conditioning

These strategies may be enough in some places, at least most of the time. But extreme heat kills about 700 people in the U.S. each year, so there are times and places when smokestorms and extreme temperatures make air conditioning necessary. Researchers are working on solid-state coolants, and the Rocky Mountain Institute launched the Global Cooling Prize to encourage development of greener air conditioning technologies. Two winning prototype A/Cs are more efficient than current designs and use safer refrigerants. But they won't be commercially available until 2025.

In the meantime, a heat pump/heat exchanger is the most efficient cooling system. If you can't afford one, cooling only the most-used part of the house with a window unit uses a third as much energy as cooling the whole house with a centralized A/C. Whatever cooling method you use, don't use it more than you have to, and buy green energy to minimize the impact.

Edit

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By Gemma Alexander

Gemma Alexander has an M.S. in urban horticulture and a backyard filled with native plants. After working in a genetics laboratory and at a landfill, she now writes about the environment, the arts and family. See more of her writing here.

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