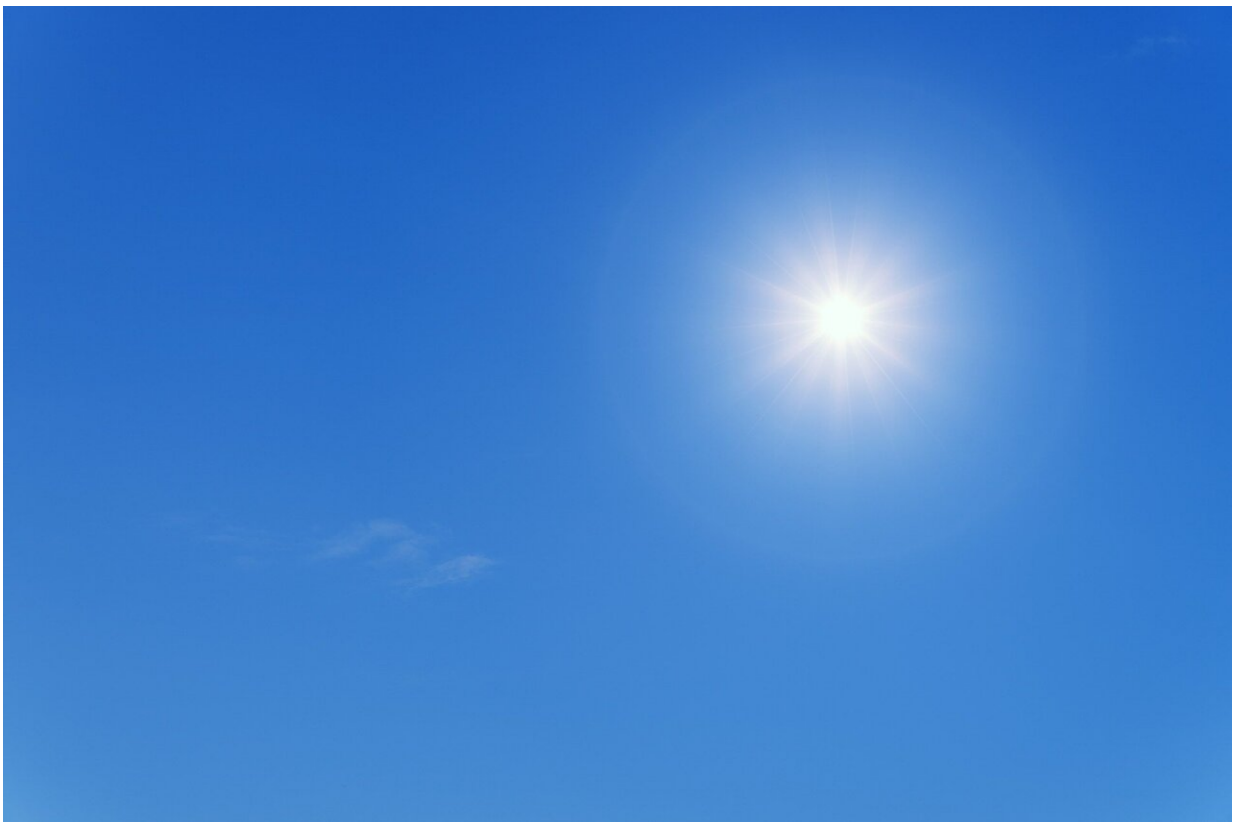


# Can technology clean up our air? An atmospheric scientist got a glimpse of the future

January 16 2024, by Alastair Lewis

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Every few years I visit CES (formerly the Consumer Electronics Show) in Las Vegas, a goliath event that is equal parts shameless spin and

publicity, trade show and business conference. I'm an atmospheric scientist, and I want to get some insight into the technologies that might reduce our personal emissions in future.

In 2018, there was an explosion in interest in air-quality sensors alongside products aimed at cleaning air in the home. I wondered back then whether air filtration would gain traction in Europe and whether this was environmentally sustainable or socially equitable.

That was in a pre-COVID world. While indoor air filters still aren't ubiquitous, I see far more today than I'd have predicted in 2018. My futurologist skills are pretty poor.

All this matters because, thanks to various engineering successes, emissions of "traditional" air pollution particles from combustion (so-called PM2.5) in most rich countries are the lowest they've been in a [century or more](#). The key sources of air pollution are changing, vehicle emissions are improving and there are fewer large industrial emitters left to control.

Air pollution remains the largest global environmental factor that harms [public health](#), but there is an increased focus on pollution in [day-to-day life](#) and what to do about it.

## **An air-quality dimension to new tech**

CES involves a lot of walking because it is vast—seven miles on day one according to my smartwatch, six miles the next. Those miles deliver an endless stream of booths and stands offering new tech, large and small, and there is an air-quality dimension to a surprising number of them.

The first thing to note was the conspicuous absence of air-quality sensors, which haven't quite delivered what was promised in 2018. This

is probably due to a combination of continued accuracy issues of the sensors themselves, difficulty finding a niche in an often regulated marketplace, and the reality that just measuring pollution in lots of places and showing it on a nice website doesn't directly make it any better.

Home air filtration is, however, still a major product sector and every appliance manufacturer has offerings—but these never really were "tech" in the first place. Indoor air cleaners remain pretty basic and any half-competent DIY-er could make their own. They're just filter papers, a fan, a cheap particle counter, often now coupled with a dehumidifier to help reduce mold and spores indoors. For both combustion and biological particles they really can be effective if you can afford them.

There still aren't convincing technological solutions to reducing indoor pollution from "volatile organic compounds," or VOCs, however. These gases are released from [personal care products](#), [aerosol sprays](#), fires, candles, cooking, paints, glues, wood, furniture and many others. Modern energy-efficient buildings can have limited ventilation and often trap VOCs inside. Once they are in the air, they are difficult to collect and contain.

Some devices aim to oxidize VOCs to CO<sub>2</sub> and water but this process may not be completely efficient and can [create byproducts](#) that are themselves harmful, such as formaldehyde. Technologies that removed the need to use VOCs in the first place would seem a simpler indoor air quality fix.

## **Electrification means better air quality**

Electrification is everywhere at the consumer show, with the promise of phasing out fossil fuel burning from our lives. The pollution benefits of battery [electric cars](#) are now very well understood.

Perhaps more significant for the future will be the accumulating air quality benefits from replacing less visible polluting equipment—using heat pumps, solar and battery storage in place of gas and oil boilers, hydrogen fuel cells for trucks and backup generators, hydrogen engines for construction and farming, the list goes on. Compared to 2018, hydrogen is much more prominent, although accessing sufficient "green" supplies is another story.

Vehicle autonomy has been a part of CES for years but fully [self-driving cars](#) still seem some way off (or appear so to a complete non-expert like me). There is, however, growing [evidence](#) that using more autonomy could have a direct air quality benefit since it is aggressive stop-start driving that wears out tires and suspends tiny polluting particles from the road into the air.

This could be reduced by smoother driving that is synchronized with nearby vehicles and urban traffic management, taking heavy-footed humans out of the equation.

Then come more distant transport technologies that might never come to pass—electric drones for everything, from food deliveries to air taxis for people, all displacing combustion-driven road vehicles.

I'm a technology enthusiast and came away with an optimistic view of the air [pollution](#) future. But I'm not naive and know that CES is ultimately about selling us stuff.

While it's far less glitzy we can also get cleaner air by simply consuming less. It sounds (and is) simple, but I'm sure I'm not alone in feeling conflicted when offered different options. The latest mobile app-driven AI-guided e-scooter journey creates less urban [air pollution](#) than using a diesel car, but for those that can, it will always be cheaper and healthier just to walk.

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