

How flying cars could help in the fight against climate change

April 11 2019, by Leila Miller, Los Angeles Times

Have you ever been stuck in traffic and wished you could zoom above the gridlock in a flying car? A new study predicts these futuristic vehicles could be good for your commute and good for the environment—as long as they're used on long-distance trips with several carpool buddies.

The finding, published Tuesday in the journal *Nature Communications*, could help guide the development of flying cars so they'll have more in common with a plug-in electric vehicle than a gas-guzzling SUV.

"We did not imagine that flying cars would have any role in a sustainable mobility system," said study leader Akshat Kasliwal, a graduate student at the University of Michigan's Center for Sustainable Systems. "We were surprised to see that they do."

These flying cars—known officially as vertical takeoff and landing aircraft, or VTOLs (pronounced "v-tolls") - won't be getting off the ground regularly for a few more years, at least. But engineers already have a pretty good idea of how they would operate.

Generally speaking, they would begin their flights by rising straight into the air like a helicopter, then climb to at least 1,000 feet. Once they reach cruising altitude, they are capable of flying about 150 miles per hour. When it's time to land, the final descent would be vertical as well.

A VTOL could get in and out of tight spaces. The amount of real estate

needed to park four school buses side by side would be more than enough.

But could a VTOL compete with traditional cars in terms of greenhouse gas emissions?

This is an important consideration, because scientists say the world needs to begin reducing its total emissions within the next decade to avoid the worst effects of climate change. By 2050 or so, they say, net carbon emissions will need to be nearly zero.

Cleaning up the transportation system will be a big part of that. Transportation is responsible for 28% of greenhouse gas emissions in the U.S, and 60% of those emissions come from light duty vehicles like [passenger cars](#), according to the U.S. Environmental Protection Agency.

To see whether flying cars have a role to play in a sustainable future, Kasliwal and his co-authors from the University of Michigan and Ford Motor Co. compared a hypothetical battery-powered flying car to two vehicles that travel on the ground: a regular car powered by an internal combustion engine, and a battery-powered electric car.

The researchers simulated a variety of scenarios.

First, they considered the emissions that each kind of car would produce if it carried a single passenger. The regular car releases greenhouse gases through its tailpipe. The electric car and the flying car wouldn't produce emissions directly, so the researchers considered the pollution associated with generating the electricity needed to power them.

For short trips up to 35 kilometers (about 22 miles), the regular car produced fewer emissions than the flying car. For longer trips, the flying car was cleaner to operate.

But in this analysis, the flying car could never match the low emissions of the electric car. In fact, it didn't even come close unless the trip was more than 120 km (about 75 miles).

A new generation of flying cars is taking to the air. But without the cars "

However, the researchers noted that people won't always be traveling solo. So they redid their calculations assuming that the regular car and the electric car had 1.54 passengers (which is the actual average in the U.S.) and that the flying car had 3 passengers (not including the pilot).

When they considered the [greenhouse gas emissions](#) per passenger for a trip lasting 100 km (about 60 miles), they found that the flying car was 52% cleaner than the regular car and 6% cleaner than the electric car.

The key for the flying car is to spend enough time in the air—and carry enough passengers—to justify the emissions produced during takeoff and landing.

"You're able to essentially spread out the emissions more per person," said study co-author Jim Gawron, a graduate student at Michigan's School for Environment and Sustainability and its Ross School of Business. Having multiple passengers also "allows you to take more vehicles off the road," he said.

These findings suggest that flying cars would be more sustainable if used as ride-share taxi services, the study authors said.

Passengers should be motivated to use flying cars because they can get them to their destinations faster, Kasliwal said. Not only do VTOLs have a much higher top speed, they can take more direct routes and thus log fewer total miles.

Flying cars could become even greener if they got more of their electricity from renewable sources. For instance, the study authors noted that emissions for VTOLs would be only half as high in a place like California, where more fossil fuels have been replaced with renewables than in other states.

Steven Davis, an Earth system scientist at UC Irvine who was not involved in the study, agreed that flying cars could become more appealing from an environmental perspective as electricity generation gets greener. In fact, he said, it "might make VTOLs look even better in comparison to ground transport."

But R. John Hansman, director of the MIT International Center for Air Transportation, said that while the researchers have identified an advantage for [flying cars](#) going longer distances, most people do not take taxi rides that are dozens of miles long.

"These (VTOLs) are not very efficient at the short range because of the inefficiency that the VTOLs have on take-off and landing," said Hansman, who was not involved in the study.

More information: "Role of flying cars in sustainable mobility" *Nature Communications* (2019). DOI: [10.1038/s41467-019-09426-0](https://doi.org/10.1038/s41467-019-09426-0) , www.nature.com/articles/s41467-019-09426-0

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