

## ASK US ANYTHING

## ● THE BIG Q

**Will flying cars cause traffic jams in the sky?**

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**ON A GOOD DAY**, assuming decent weather, little traffic, and skills behind the wheel, a cab ride from John F. Kennedy International Airport in Queens to downtown Manhattan should take about 45 minutes. Yet who can reliably predict New York City traffic? That trip could last twice as long on a bad day.

Now assume you could avoid the streets entirely and get to lower Manhattan in minutes. By some estimates, more than 200 startups are racing to deploy what popular culture has dubbed flying cars. And, by their admittedly optimistic estimates, there's a chance that the 45-minute drive on pavement from JFK will be converted to a 10-minute flight through the air by the end of this decade.

Leaders in the quest to make cabs airborne believe everyday passengers at places like airports will exchange treks on four wheels for sorties through the skies. "Being able to fly over traffic and reach your destination in a much more predictable time will be very appealing," says John Criezis, head of mobility operations for Overair, a California-based maker of flying taxis. Market studies commissioned by NASA predict that by 2030, as many as 750 million flights will ferry passengers to and from destinations near or within US cities each year.

So let's be glass-half-full and assume companies overcome the pervasive technical challenges of air taxis: updating hundred-year-old flight controls, manufacturing durable carbon-fiber structures, crafting designs capable of vertical and forward flight, developing batteries that last a long time and don't overheat. (Oh, and getting clearance from the Federal Aviation Administration.) On top of that, there still remains another puzzling question. How will we manage all this new traffic in the sky?

In the search for answers, it helps to first consider what the fleet will look like. Regardless of what midcentury *Popular Science* may have promised us (er, sorry), these will not be family sedans that soar to Grandma's house. Many of the proposed aircraft feature a fixed wing with multiple rotors that pivot for takeoff and landing. These lithium-battery-powered electric VTOLs—aircraft capable of vertical takeoff and landing—are meant to flip the script on traditional public transportation. "We intend to

function...as an aerial ride-sharing service, to move people in and around our cities,” says Andrew Cummins, director of strategy and business development at Archer Aviation. For that to work, VTOLs will need places to land and corridors through which to fly.

Initially, Archer, Overair, and many of their counterparts expect to use existing infrastructure. They hope to rent space at some of the 5,000 public-use airports and heliports in the US. Pick any big city, and the idea is the same: Land at the airport and walk outside, past the rows of wheeled taxis, to a VTOL waiting to speed you to a helipad atop some downtown edifice mere blocks from your meeting. (And vice versa.) This October, air-taxi company Joby Aviation announced a first-of-its-kind partnership with Delta Air Lines to ferry flyers this way in NYC and Los Angeles.

Eventually, cities will also need dedicated landing and parking areas for fleets of VTOLs—known in the biz as vertiports. Situated on the top floors of parking garages or in large parking lots, these are the spots where 6,000-pound VTOLs will recharge, be maintained, and take off.

Suchithra Rajendran, a professor of systems engineering at the University of Missouri, has spent the last five years mapping out how such a network might look in the Big Apple. By analyzing two years’ worth of

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taxi data—both the number of voyages taken and the pickup and drop-off points—Rajendran’s model recommends 17 vertiports, with 84 VTOLs flying among them. Assuming four passengers per flight, that adds up to 6,500 riders making 1,600 trips every day.

Models from air-taxi companies also assume a big market. In huge cities like NYC and LA, where drivers make roughly 50 million trips every day, they project that there are perhaps 5 million riders who would be better served by VTOLs.

Figuring out the choreography of where all those flying contraptions will go is currently the job of Brock Lascara, a systems engineer at MITRE, a nonprofit research org funded by the FAA. For starters, you won’t see them zipping between buildings, he says: Cruising altitudes will reach a couple of thousand feet, which is what’s necessary to hit optimal speeds of 150 miles per hour. At the same time, the taxis can’t contest existing controlled airspace (up to 10,000 feet above sea level) intended for passenger jets during takeoff. Lascara adds that specific urban corridors—VTOL-only pathways near airports and through cities—will have to be established. Those avenues will let airliners know where commuter birds will be and let VTOL pilots know where they can, and can’t, fly.

Still, no one wants to trade congestion on the street for gridlock in the sky, which means there’s another problem to be worked out. “A big constraint point is the vertiports themselves,” says Lascara. One way around the potential commotion is through a technique called vectoring. Already

used in air traffic control, it would send various VTOLs, all jockeying for landing space, on different routes to the same destinations. One craft might fly in a straight line while another swoops in a semicircle, providing enough time for the first one to land, drop off passengers, and take off again before the other needs to touch down.

Zooming so close to an urban grid will also create its own aerodynamic complications. That's why Lascara's counterpart, systems engineer Mike Robinson, is involved in his own MITRE project to predict how turbulent winds created by the canyons between buildings might affect flight. By running a simulator called JOULES—Joint Outdoor-Indoor Urban Large Eddy Simulation—Robinson's team has been able to map out the wind hazards in places like Atlantic City, Chicago, and swaths of NYC. That data could help nail down where to situate vertiports so buffeting breezes don't rattle a VTOL as it comes in for landing.

As for what to do when a storm blows in? "The weather's the weather," Robinson says, shrugging. We might find that there are many days when a flying taxi just can't get airborne. The good news? Unlike when an airplane is grounded, we still have an alternative—if we can bear the traffic.

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**NEXT:** Cloudy with a chance of climate crisis